A District Environmental Management Plan for the Community of Lakeland, Saskatchewan, 2015-2019

Prepared by:

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For the:

District of Lakeland No. 521

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Photography

Unless otherwise indicated, photos were taken by the author.

Acknowledgments

With guidance from provincial staff, external organizations and the residents of Lakeland, the Working Group developed a draft of the plan for broader stakeholder consultation and review by partners of the District. The School of Environment and Sustainability, University of Saskatchewan, was (and is) a key partner in moving this project forward.

Members of the Working Group included individuals from the District Environmental Advisory Committee, Council, staff and the University of Saskatchewan:

John Stauffer, Councillor
Richard Afseth (EAC)
Isabel Afseth (EAC)
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Executive Summary

And Message from the Chair of the Environmental Advisory Committee

August, 2014

To the Community of Lakeland

In the fall of 2013, the District of Lakeland No. 521 in conjunction with the Environmental Advisory Committee submitted an application to the University of Saskatchewan's School of Environment and Sustainability to engage the services of a graduate student that would assist the municipality in developing a sustainable long term Environmental Management Plan for the municipality.

The District was fortunate in being accepted for the University program from among 60 applicants and the services of graduate student Kyle Young were obtained.

Throughout the balance of 2013 and into the fall of 2014, the Environmental Advisory Committee with support from the District of Lakeland No. 521 and input from the Ministry of Environment, many meetings were held to provide sufficient background information for the development of the plan.

Throughout the discussions, numerous issues were identified that represented a concern for the municipality and the Committee in terms of water quality, forest management and watershed protection. These issues include the number and operation of watercraft, regional development, shoreline alterations, lake water quality and the degradation of ecologically sensitive areas to name a few. As stated, the Environmental Management Plan identifies and prioritizes these concerns so that the municipality may work towards eliminating or reducing the detrimental effects and thus providing a sustainable plan for future generations.

Sincere thanks and appreciation go out to the members of the Environmental Advisory Committee who took the time to volunteer their time and ideas in the development and future implementation of this plan.

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Councillor John Stauffer, Chair
Environmental Advisory Committee
District of Lakeland

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1.0 Community Vision

1.1 Vision for the Environment

Community Vision	**Environmental stewardship based on best practices, knowledge, and ability to respond and to promote initiatives that enhance the quality of life for residents**

1.2 Strategic Goal

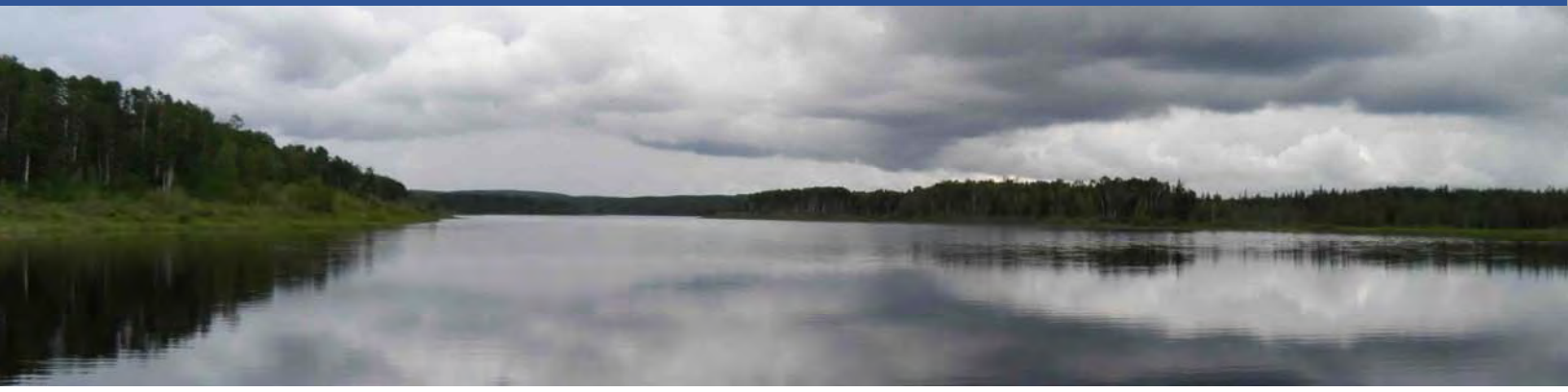
Strategic Goal	**Environmental stewardship based on best practices, knowledge and the ability to respond.**

In November 2013, the District released its very first Strategic Plan, which serves as an overarching guidance document containing District goals, objectives and initiatives for implementation. The above goal is one of five pillars which, together, form the strategic vision established by District staff and Council.

1.3 Plan Goals

The following three goals for this plan were established by the Working Group and presented to all partners for consideration and confirmation:

Goal 1	**To protect and conserve the ecological integrity, ecosystem functioning and biodiversity of Lakeland's natural environments.**
Goal 2	**To minimise the degree of human-induced environmental change in Lakeland in order to sustain our way of life for the full benefit and enjoyment of future generations of residents.**
Goal 3	**To effectively communicate with the broader public on the subject of environmental management in order to facilitate and promote interest in stewardship opportunities.**



2.0 Overview

2.1 District of Lakeland

The District of Lakeland No. 521 ("the District") is one of 296 rural municipalities in the province, located in mid-central Saskatchewan approximately 200 kilometres north of Saskatoon (see Figure 1). The District is governed by a Reeve and five councillors, each of which represents one of five divisions in Lakeland. Administration of local bylaws, policies and services is carried out by staff in the District's office located in the Village of Christopher Lake bordering the southern edge of Lakeland. Urban municipalities in the region include Prince Albert to the south, Candle Lake to the east and Waskesiu to the West. The only adjacent rural municipality is the Rural Municipality of Paddockwood No. 520. A map showing administrative boundaries, including the five nearby Indian Reserves, is attached as Appendix 1.

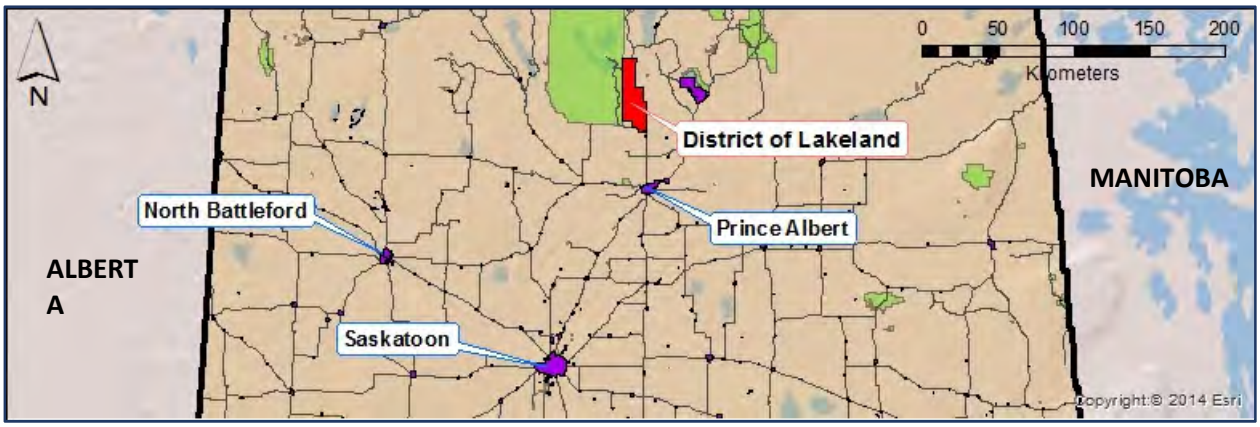


Figure 1. Location map of the District of Lakeland No. 521 (source: *Her Majesty in Right of Saskatchewan*).

The total area of the District is approximately 55,600 hectares (556 km^2), measuring approximately 15 km wide by 50 km long. Since its incorporation in 1977, the District has grown to a year-round population of 884[1] but the seasonal influx in the summer months can exceed a population of 20,000. Between 2001 and 2011, the population grew by 33 percent and, like the rest of Canada, Lakeland has an aging population[2]. Approximately 1,900 dwelling units can be found in the 16 unincorporated communities of Lakeland. Population projections completed as part of the strategic planning process undertaken by the District show that Lakeland could continue to increase in population to just under 1,200 residents before declining in 2031[2]. Regardless of fluctuations or increases in populations over the next two decades, it is clear that this region of Saskatchewan and Lakeland, in particular, will continue to be a popular destination for tourists and full-time residents.

The tourism industry is one of the principal economic drivers in Lakeland. Recreational boating and fishing, hunting, back country hiking and camping, and all-terrain vehicle use are some of the activities rear-round residents, seasonal residents and tourists enjoy during the summer months. In the winter months, ice fishing and snowmobiling are popular recreational activities. The proximity of Prince Alberta National Park and the relatively short driving distances to larger centres like Prince Albert (30 minutes) and Saskatoon (1.5 hours) are also important reasons why people come from other areas of Saskatchewan and Canada to explore the wilderness experience offered in the Lakeland area. Other industries and major businesses in Lakeland include commercial logging, golf courses and resorts.

2.2 Natural Environment

Water Resources

The satellite imagery and topographic maps attached as Appendices 2 and 3, respectively, show general land cover characteristics and known water features. Of its total area, 6,410 ha (11.5%) is water bodies, including over 240 lakes and ponds. There are over 96 km of streams, creeks and other water courses. The majority of the District falls within the North Saskatchewan River watershed. Only a small area in the northeast corner of Lakeland drains north into the Churchill River watershed. The major water course in the area is the Spruce River which flows along the western boundary of the District in Prince Albert National Park. A section of the Spruce River flows into the southern tip of Anglin Lake, then continues on to the Spruce River dam where it flows south. Other notable water courses include Bittern Creek, Bitter Creek and Montreal Creek. Table 1 shows estimates of the surface areas of the seven largest lakes in Lakeland.

Table 1. Lake areas.

Lake	Area (ha)
Emma Lake	1,768
Anglin Lake	1,306
Christopher Lake	666
Oscar Lake	414
Sampson Lake	215
Marshall Lake	215
McPhee Lake	188

Spruce River in Prince Albert National Park near the western border of the District.

Land Resources

The District is located within the Boreal Plain Eco zone, on the southern edge of the Mid-Boreal Uplands ecoregion and the Emma Lake Upland landscape unit. Soils common to this ecoregion include glacial till, sandy soils and loamy grey soils[3]. Aspen, white and black spruce, poplar, tamarack, balsam fir, birch and jack pine are the dominant tree species in Lakeland[3,4]. It is evident from the 2011 satellite image in Appendix 2 that cultivated land is not present in the District and that only a small portion of the total land base is occupied by commercial, residential or infrastructure land uses. The remainder of the District is either covered by water bodies or forested. Details concerning the extent of commercial forest harvesting are discussed in Section 5.7.3.

Wildlife and Fish

Examples of wildlife species that are likely to occur in Lakeland include white-tailed deer, mule deer, black bear, woodland caribou, elk, beaver, timber wolf, moose, coyote, northern flying squirrel and snowshoe hare[3,4]. Bird species are plentiful – American redstart, white-throated sparrow, bufflehead, ovenbird and hermit thrush[3]. Lake trout, walleye, whitefish, perch and northern pike are also present in the ecoregion and, therefore, likely to occur in Lakeland. The diversity of plant and animal species is one of the reasons why this region of Saskatchewan is so valued by the people who live here. Lakeland is on the very edge of the boreal forests of North America and, given its size, is an important refuge for many species.

Parks and Protected Areas

11,365 ha (20.4%) of the District is designated as park or protected area. A map showing the areas designated as either park or protected area is attached as Appendix 4. Additionally, wildlife refuges and wildlife habitat protection areas are shown on the Representative Areas Network map attached as Appendix 5. The largest park fully located within the District is Great Blue Heron Provincial Park at 11,168 ha, which represents approximately 98 percent of the total area of parks or protected areas. The park was established in 2013. As a recreation park, the principal purpose of the Great Blue Heron Provincial Park is not to protect ecosystems or biodiversity. Fairy Island located in the centre of the northern-most basin of Emma Lake is a 52 ha wildlife refuge protected under the *Wildlife Act, 1998* and the corresponding Wildlife Management Zones and Special Area Boundary Regulations. The Christopher Lake Protected Area is 80 ha in area and is located adjacent to the southwest corner of Christopher Lake. This protected area was designated under the *Parks Act, 1986*. One wildlife habitat protection area aligning with the boundaries of a quarter section of land (65 ha) is located north of the Village of Christopher Lake.

2.3 Environmental Management

With the wilderness areas, boreal forests, rivers and lakes covering the landscapes of Northern Saskatchewan, it is easy to forget the fragility of those areas. With communities present in the North and the popularity of outdoor recreation, the ecological risks posed by human activities is a reality. It could seem as though with such a small population and the large expanse of natural areas that the impact should be low. However, the potential impact of humans on the environment is not always a product of *how many*. The ability of communities and human activities to adversely affect ecosystems also depends on the nature and intensity of the activity and the characteristics of the supporting ecosystem.

Lakes are one of the most valued natural features of Northern Saskatchewan and, consequently, are very popular places to live. The convenience and aesthetic values associated with living on the 'lakefront' cannot be understated. It provides property owners with exceptional views of the lake and allows ease of access for boating, swimming and other lake recreation opportunities. However, the shoreline areas surrounding lakes contain riparian ecosystems and the littoral zone, which are very sensitive to disturbances. These areas are critical to maintaining the health of the lake ecosystem. In this way, there is a conflict between the desire for lakeshore development and the need to protect the areas supporting the lake features desired by communities, such as clean water and healthy fish and animal populations.

If communities are to exist in Northern Saskatchewan and continue developing in the usual fashion, environmental impacts are likely to occur. Communities require land for homes, businesses and institutions, and natural areas like forests are often on the receiving end of disturbances caused by land clearing. Roads and other infrastructure are also created to provide access and services to those communities. The goal of environmental management, therefore, is to reduce the overall ecological footprint of communities, while allowing human settlements to co-exist with nature and continue to enjoy the benefits of living outside of urban areas. The aim of this plan is to manage human activities to reduce the ecological impacts, rather than eliminate those activities altogether. More importantly, a balance must be struck in which community growth is tempered by an underlying, fundamental respect for nature[5]. A list of the 25 environmental issues addressed in this plan is shown in Table 2.

Table 2. Environmental issues, priority ranking of threats and existing management actions.

Environmental Issue	Priority Rank of Threat	Existing Management Actions
Number and Operation of Motorized Watercraft	25	"Own Your Wake" signage at boat launches and various areas around the lakes. Public education and communication via newsletter, website and vacationland news.
Shoreline Alteration	25	Permits required by Water Security Agency. Public education.
Septic Tanks and Grey Water	20	On a complaint basis, inspections by the Ministry of Health. District bylaws in place to regulate liquid waste disposal.

Regional Development	20	Establishment of the Planning District with three other municipalities. Zoning Bylaw and Official Community Plan in place. Development officer on staff.
Degradation of Ecologically Sensitive Areas	20	Regulations in the Zoning Bylaw and OCP. Working in conjunction with the Ministry of Environment to address problem areas.
Exotic Invasive Species	20	Aquatic invasive species signage. Public education through the Environmental Advisory Committee.
Off-road Motorized Vehicles	15	Prohibition on public property. Public education through Enforcement & Protective Services. ATV bylaws in place – enforcement done on complaint basis.
District Development	15	Development Officer on staff. OCP and Zoning Bylaw regulate development.
Algae and Weed Growth	15	Occasional sampling of algae.
Sediment Drainage and Sedimentation	15	Public Works Department working with Water Security Agency on various drainage projects that affect our lakes.
Lake Water Quality	12	Periodic annual water testing on all lakes and submission to provincial laboratories for results. Monitoring of grey water and effluent into our lakes.
Forest Fire Management	12	No actions.
Lake Water Levels	10	Levels managed by the Water Security Agency.
Negative Wildlife Interactions	10	All concerns directed to the Ministry of Environment.
Petroleum-Based and Industrial Products	10	Public education through shoreline development permit issues by the District and Water Security Agency with enforcement from the Ministry of Environment.
Spruce Budworm and Infestations	10	District has hired consultant to provide reports of possible infestations and spraying programs.
Fertilizers, Pesticides and Herbicides	10	Public education through the Environmental Advisory Committee regarding water quality.
Solid and Liquid Waste	10	Controlled by bylaw. Municipal landfills and lagoons operated by District. Encouraging multilateral recycling.
Species at Risk	9	No actions.
Light and Noise Pollution	9	Recommendation contained in the OCP – dark sky lighting standards. Recommendations made on development and building

		permits.
Pressure from Provincial Park Expansion	8	District Council member of Park Advisory Committee to advance municipal concerns.
Commercial Forest Harvesting and Reforestation	8	District Council member representing the municipality on the Prince Albert Forest Management area advisory board (Sakaw Askiy)
Climate Change	8	No actions.
Communication Towers	6	Response to industry consultation.
Boat Launches and Marinas	2	Background Report to 2005 OCP and Zoning Bylaw provides guidance on lake carrying capacities and provides direction to Council for future expansions.

There are two types of environmental issues included in the plan. The first type of issue focuses on activities causing a variety of adverse effects within the natural environment. For example, 'number and operation of motorized watercraft' is an activity that affects the water column as well as the shoreline. By organizing issues in this manner, the cause is treated, rather than the symptom. The second type are those issues whose causes are so diverse that it is more reasonable to consider the condition or ecosystem parameter to be managed. 'Degradation of ecologically sensitive areas', for example, can be managed by designating and protecting those areas.

For each environmental issue identified, a 'priority rank of threat' was assigned (see method below), an objective was stated, and one or more management actions to achieve that objective were identified. Some environmental issues, such as 'algae and weed growth' and 'climate change' have only one management action assigned at this time. Other issues like 'shoreline alteration' and 'off-road motorized vehicles' have up to six actions or policies.

Four-spotted chaser (*Libellula quadrimaculata*).

Priority Ranking Method

The purpose of assigning a priority rank to a particular environmental issue (i.e. the threat) is to help establish priorities for environmental management. If an environmental issue is more likely to be an ecological threat within the planning timeframe and the impact is expected to be more severe, actions to address that issue might be more urgent. Likelihood of occurrence and impact of occurrence were ranked on a scale of one to five, as shown in Table 3. Priority rank values ranged from 2 to 25, with an average of 13.

Table 3. Tables and method used to assign priority rank of threat.

Likelihood of Occurrence	**Impact of Occurrence**				
	Insignificant **1**	Minor **2**	Moderate **3**	Severe **4**	Catastrophic **5**
Most Unlikely **1**	**1**	**2**	**3**	**4**	**5**
Unlikely **2**	**2**	**4**	**6**	**8**	**10**
Likely **3**	**3**	**6**	**9**	**12**	**15**
Probable **4**	**4**	**8**	**12**	**16**	**20**
Almost Certain **5**	**5**	**10**	**15**	**20**	**25**
Low Threat	**Medium Threat**		**High Threat**		

Likelihood	**Value**
Most unlikely – extremely small chance of happening in the next 4-5 years	**1**
Unlikely – possible to occur in the next 4-5 years	**2**
Likely – evenly split between likely and not likely to happen in the next 4-5 years	**3**
Probable – is expected to happen in the next 4-5 years	**4**
Almost certain – confident this will happen at least once in the next 4-5 years	**5**

Impact	**Value**
Insignificant – no human health/environment risk;	**1**
Minor – short term or localized human health/environment risk e.g. aesthetic/noise	**2**
Moderate - widespread aesthetic issues or long term non-compliance, not health-related	**3**
Severe – actual or potential short to medium term health effects (human or ecosystem)	**4**
Catastrophic – actual illness or potential long term health effects (human or ecosystem)	**5**

2.4 Legislative Context

Rural municipalities are a form of local government in Saskatchewan responsible for the administration and provision of local services that benefit the residents within their borders. They govern the rural areas outside of the boundaries of urban municipalities (e.g. cities and towns). Local governments are also granted certain powers to create bylaws regulating land use, development and other aspects of community growth. As 'creatures of the province', rural municipalities in Saskatchewan receive their regulatory authority from provincial legislation, including the *Planning and Development Act, 2007* and the *Municipalities Act, 2006*. For example, the *Planning and Development Act, 2007* authorizes the District to adopt a zoning bylaw, establishing land use zones for all land within Lakeland, as well as development restrictions and standards.

The District, property owners and businesses also have responsibilities and obligations under various other provincial and federal legislation. The provincial *Environmental Management Act, 2010* and the federal *Fisheries Act* are two such pieces of legislation with implications for environmental protection in the District.

2.5 Provincial and Federal Interests

The provincial and federal governments both have interests with respect to environmental management in Lakeland and this plan acknowledges those interests. The plan does not seek to displace management actions already being undertaken by provincial and federal ministries and agencies. Rather, it seeks to complement programs already in place or currently being developed and to promote initiatives and policies that are locally relevant. The District also acknowledges that local environmental management planning cannot interfere with areas of provincial jurisdiction. Provincial Crown lands cover the majority of the municipality and bylaws or regulations created by the District may only apply to Crown land where there is not a conflict with provincial interests. With respect to the federal government, Fisheries and Oceans Canada administers the *Fisheries Act* by protecting fish habitat from harmful alteration, disruption or destruction. This means that approvals from Fisheries and Oceans Canada, as well as the Saskatchewan Water Security Agency is likely required for most types of lakeshore development.

Two of the 14 Statements of Provincial Interest are directly relevant to the environmental management work being undertaken by the District, as follows:

1. **Biodiversity and Natural Ecosystems**:

   "To assist in meeting the province's interests in biodiversity and natural ecosystems, planning documents and decisions shall, insofar as is practical:

   1) Consider the ecological value, integrity and management of wetlands, riparian areas, significant natural landscapes and regional features, and provincially designated lands;

   2) Minimize, mitigate or avoid development impacts to safeguard the ecological integrity of wetlands, riparian areas, significant natural landscapes and regional features, and provincially designated lands;

3) Consider dedication of critical or threatened habitat and environmentally sensitive areas as environmental reserve;

4) Recognize Crown rights and responsibilities to regulate activities related to the utilization and protection of forest resources on Crown forest lands; and

5) Recognize and support provincial planning initiatives contributing to ecological integrity."[1]

2. Shore Land and Water Bodies:

"To assist in meeting the province's water bodies and shore lands interests, planning documents and decisions shall, insofar as is practical:

1) Consider the impacts of development on associated water bodies and shore lands, aquatic life and habitat;

2) Minimize, mitigate or avoid potential development impacts to waterways, watersheds, water bodies, wetlands, shore lands, aquifers and groundwater;

3) Integrate provincial watershed management planning considerations into local and regional planning; and

4) Preserve and enhance public access to water bodies, shore lands and reservoirs for recreational use."[6 (p.17 & 86)]

The District and the province are partners with respect to environmental management in Lakeland. It is acknowledged that the provincial government has rights and responsibilities that are different than those of the District but by working together, mutual goals concerning environmental protection can be achieved in a more harmonious manner.

2.6 First Nations

Local First Nations will be an important partner with respect to environmental stewardship initiatives in Lakeland. As long standing stewards of the natural environment, First Nations' knowledge of sustainable use and practices are particularly relevant to local environmental management. The District falls within the Treaty 6 (1889) area and the local First Nations are the Montreal Lake Cree Nation. The Montreal Lake Cree Nation is a band member of the Prince Albert Grand Council. Traditional use of the land by the Montreal Lake Cree Nation includes trapping, fishing, berry and medicine gathering, hunting and ceremonial purposes[7].

2.7 References

1) Government of Saskatchewan (2012) *2011 Census of Canada: Saskatchewan Population Report*. Bureau of Statistics, Ministry of Finance, Government of Saskatchewan. Accessed online at http://www.stats.gov.sk.ca/pop/.
2) District of Lakeland No. 521 (2013) *District of Lakeland Strategic Plan*. Prepared by Crosby Hanna & Associates for the District of Lakeland No. 521.
3) Saskatchewan Conservation Data Centre (2014) *Ecozone Boreal Plan, Ecoregion Mid-Boreal Upland*. Saskatchewan Conservation Data Centre. Accessed online at http://www.biodiversity.sk.ca/ecoregions/MidBoreal_Upland.htm.
4) District of Lakeland No. 521 (2005) *Rural Municipality of Lakeland Municipal Planning Program Background Report*. Prepared by Crosby Hanna & Associates for the District of Lakeland No. 521.
5) Schmutz, J.K. (2014) Comments on draft District of Lakeland Environmental Management Plan. Dr. Joseph Schmutz, School of Environment and Sustainability, University of Saskatchewan.
6) Government of Saskatchewan (2012) *Planning Handbook: Companion Document to the Statements of Provincial Interest*. Ministry of Municipal Affairs, Government of Saskatchewan.
7) Prince Albert Grand Council (20014) *Montreal Lake Cree Nation*. Prince Albert Grand Council. Accessed online at http://www.pagc.sk.ca/first-nations/montreal-lake/.

3.0 Plan Development

3.1 Planning Process

The planning process adopted for this plan follows the five stages outlined in Figure 2. The Working Group primarily consisted of members of the District's Environmental Advisory Committee, as well as Council, staff and representatives from the University of Saskatchewan (15 total members). The draft plan prepared by the Working Group, including the list of environmental issues, goals, objectives and management actions, was intended to be preliminary in nature. It was expected that the draft plan would serve as a 'jump start' to future discussion about environmental planning and management in Lakeland, with the possibility of substantial changes following public review and partner engagement.

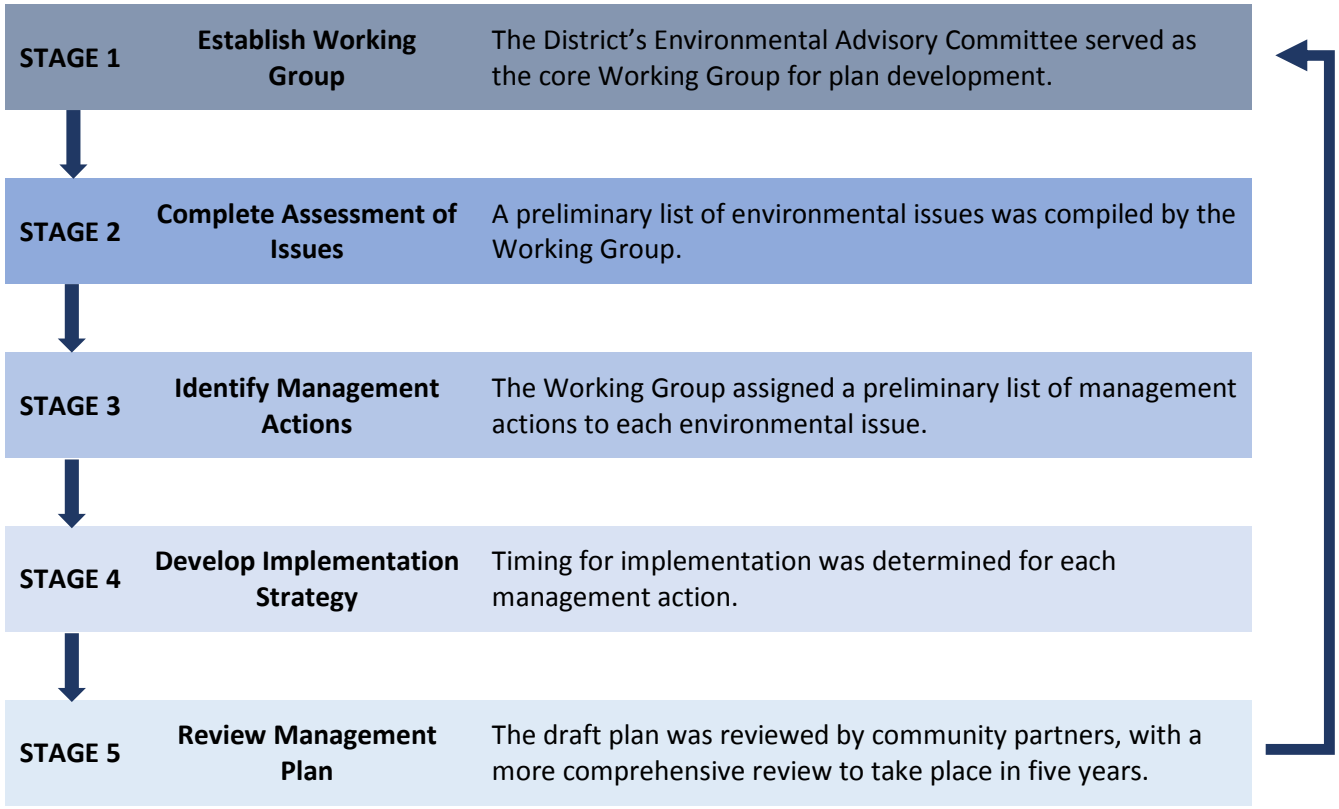


Figure 2. Environmental management planning process.

Stage 5 has two components: short term review and long term review and updates. On a smaller time scale, the draft plan prepared at stages 4 and 5 was intended to be the point at which broader review by the public and partners could occur. On an annual basis thereafter, the plan will be reviewed by the Environmental Advisory Committee to ensure that objectives, actions and timing are still appropriate. Following a five year implementation of the plan, a new Working Group will be formed to conduct a major review and updates.

3.2 Working Group Meetings

Five Working Group meetings were held in Lakeland, as detailed in Table 4. An average of 11 members attended meetings, with each meeting lasting approximately 5 hours.

Table 4. Working Group meeting details.

Meeting	Date	Accomplishments
1	May 9, 2014	Clarified list of environmental issues and concerns.
2	May 22, 2014	Assigned a priority rank of threat to each environmental issue.
3	June 13, 2014	Assigned management actions.
4	June 26, 2014	Assigned management actions and generated potential goals and objectives.
5	July 11, 2014	Determined implementation timing, partners and potential funding sources.

First Working Group meeting held on May 9, 2014 (photo: Wayne Hyde).

4.0 Community Sustainability

Sustainability is fundamental to this plan and a core value of the District with respect to environmental protection and conservation. In fact, the potential absence of community sustainability in Lakeland is one of the motivations for initiating an environmental management planning process.

The natural environment is the one area in which the experiences of residents and their vision for Lakeland now and in the future begins to resemble a common interest. It is reasonable to suggest that the presence of 'nature' in Northern Saskatchewan and the District, in particular, is valued by almost everyone who lives here and is one of the most important reasons why people come to this area. Whether it is to settle permanently or recreate during the summer months, those values have drawn people to Lakeland. It is important to note that the way in which nature is confronted by different individuals and groups does vary (e.g. choosing whether or not to drive an All Terrain Vehicle through a wetland; whether to build a house next to the lake or in the upland areas). However, everyone in Lakeland shares the same nature – its forests, lakes, streams, fish and wildlife. Therefore:

> **Community sustainability in Lakeland** is concerned with the degree to which the collective actions of its residents and other stakeholders are degrading nature to the disadvantage of the current and future generations, from ecological, economic and social perspectives.

By listing a few of the important implications of environmental degradation from the three perspectives identified in the above definition, the connection between community sustainability and environmental management is established (see Table 5).

Table 5. Examples of impacts of environmental degradation grouped as economic, social or ecological.

Perspective	Examples of Impacts
Economic	- Loss of property values (e.g. shoreline erosion and cabins on lakefront lots) - Reduction in tourism opportunities (e.g. public beaches with Zebra Mussels) - Increased property taxes to address issues (e.g. Spruce Budworm)
Social	- Human health threatened (e.g. poor water quality) - Lack of community cohesion between year-round and seasonal residents - Loss of spiritual and psychological benefits from enjoying nature
Ecological	- Loss of ecosystem services (e.g. water purification, shoreline stability, carbon sequestration) - Biodiversity loss and endangered species

It is acknowledged that our current actions – the way we choose to interact with the natural environment at present – have implications for the future condition of ecosystems. It is, therefore, in our best interests to control our own actions now to ensure that we can continue to enjoy life in Lakeland, while also ensuring that future residents will be able to experience the same benefits from

nature. This approach is consistent with Canadian and internationally-recognized definitions of sustainability, which place the emphasis on conservation, rather than strict preservation or protection precluding community growth and prosperity. The federal government, for example, defines sustainable development as an approach that "meet[s] the needs of today without compromising the needs of future generations. It is about improving the standard of living by protecting human health, conserving the environment, using resources efficiently and advancing long-term economic competitiveness. It requires the integration of environmental, economic and social priorities into policies and programs…"[3]. Similarly, a definition widely recognized internationally states that "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[4].

4.1 References

1) Government of Canada (2014) *Sustainable Development*. Environment Canada, Government of Canada. Accessed online at http://www.ec.gc.ca/dd-sd/.
2) United Nations (1987) *Our Common Future: World Commission on Environment and Development*. United Nations. Accessed online at http://www.un-documents.net/ocf-02.htm.

5.0 Management Areas

The 25 environmental issues are grouped into eight management areas, as shown in Table 6. This is for convenience and reference only.

Table 6. Management areas, environmental issues and corresponding section numbers.

Management Areas and Environmental Issues	Section #
Sensitive Areas and Species	**5.1**
Degradation of Ecologically Sensitive Areas	5.1.1
Species at Risk	5.1.2
Land Use and Development	**5.2**
District Development	5.2.1
Regional Development	5.2.2
Solid and Liquid Waste	5.2.3
Communication Towers	5.2.4
Controlling Drainage and Contamination	**5.3**
Petroleum-Based and Industrial Products	5.3.1
Fertilizers, Pesticides and Herbicides	5.3.2
Sediments Drainage and Sedimentation	5.3.3
Septic Tanks and Grey Water	5.3.4
Land of Lakes	**5.4**
Shoreline Alteration	5.4.1
Lake Water Quality	5.4.2
Algae and Weed Growth	5.4.3
Lake Water Levels	5.4.4
Boat Launches and Marinas	5.4.5
Responsible Recreation	**5.5**
Offroad Motorized Vehicles	5.5.1
Number and Operation of Motorized Watercraft	5.5.2
Pressure from Provincial Park Expansion	5.5.3
Living With Wildlife	**5.6**
Negative Wildlife Interaction	5.6.1
Light and Noise Pollution	5.6.2
Northern Forests	**5.7**
Spruce Budworm and Infestations	5.7.1
Forest Fire Management	5.7.2
Commercial Forest Harvesting and Reforestation	5.7.3
Threats and Adaptation	**5.8**
Exotic Invasive Species	5.8.1
Climate Change	5.8.2

5.1 Sensitive Areas and Species

5.1.1 Degradation of Ecologically Sensitive Areas

Objective:	**To protect natural areas in Lakeland with significant ecological value or that are ecologically sensitive relative to other areas.**

Action 1. Identify locations of ecologically sensitive areas and determine threats to and status of those areas.

Action 2. Create standards for development in and around ecologically sensitive areas.

Action 3. Increase public awareness of importance of ecologically sensitive areas using educational videos on the District's website.

Action 4. Develop a monitoring program with goals and protocols to assess the condition of ecologically sensitive areas within District watersheds.

Description and Ecological Impacts

'Ecologically sensitive area' (ESA), also known as a sensitive ecosystem, is a broadly used term with different meanings depending on the context in which it is being used. ESAs are usually more fragile than surrounding areas[1] because small environmental changes can result in major changes within the ESA. Some ESAs may take longer to re-establish (if at all) after being damaged or removed. Furthermore, ESAs can also support a greater biodiversity[2] than surrounding areas and may provide habitats for rare or endangered species not found anywhere else in Lakeland. Some examples of ESAs include wetlands, streams, riparian areas and old growth forests, all of which can be found in the District. Since ESAs have significant ecological value, human activity resulting in their degradation or destruction is of particular concern. If these areas are not specifically considered and monitored, the implications could extend beyond their boundaries by affecting plant and wildlife populations[1].

An example of a wetland ecosystem in the District.

Management Considerations

Under the *Planning and Development Act, 2007*, the District can establish environmental reserves or special zoning covering ESAs, along with specific siting and development standards for those areas. Minimum setback and similar regulations would serve to help protect ESAs from encroaching development and other forms of human activity, such as recreation. Communicating the special importance of these fragile ecosystems to Lakeland's residents will help bridge the knowledge gap. Short educational videos placed on a municipal website is a form of environmental communication being explored by local governments in recent years.

5.1.2 Species at Risk

Objective:	**Prevent extinctions or extirpations of local populations of threatened or endangered species that are at risk because of human actions.**

Action 1. Confirm list of species at risk within Lakeland.

Action 2. Identify habitats supporting species at risk and develop land use policies that support protection of those habitats.

Action 3. Promote public awareness of human impacts that endanger or threaten flora and fauna.

Action 4. Monitor the presence of species at risk and provide information to the Saskatchewan Conservation Data Centre and senior governments.

Action 5. Partner with research institutions and government agencies to determine specific management actions for Lakeland's species at risk.

Description and Ecological Impacts

There are different categories of at-risk species of plants and animals. In Canada, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) uses seven categories, from 'not at risk' to 'extinct'. A list of some of the species at risk that are most likely to occur in Lakeland is included in Appendix 6. Listed are 42 different species of mosses, mammals, birds, fishes, amphibians, arthropods and vascular plants that are of special concern, threatened or endangered under the *Wildlife Act, 1998*[3], COSEWIC or the *Species at Risk Act* (SARA)[4]. Some species are at risk because the habitats on which they depend are disappearing. For example, deforestation of Lakeland's boreal forests, the principal habitat of the boreal mountain caribou, results in habitat fragmentation and a reduction in the usefulness of remaining habitat patches[5]. This means that caribou populations that may have frequented Lakeland in the past would be forced to search for new habitat elsewhere (if those other areas are not already occupied by different caribou populations). Other species may be directly harvested or occur in spatially limited areas (e.g. small wetlands or riparian areas), making them particularly sensitive to development activities.

Fairy slipper (*Calypso bubosa*) (left) (A), boreal woodland caribou (*Rangifer tarandus caribou*) (right) (B).

The issue of species at risk is symbolic of a trend toward broader species losses. Protecting biodiversity within the District requires that local actions degrading habitats or threatening species be altered in such a way that considers the impacts to at-risk flora and fauna. Governments recognize that healthy ecosystems – essential for providing ecosystem services (e.g. land stability, crop pollination, water purification and clean air) – require protection of the species comprising those ecosystems[6].

Management Considerations

Since habitat loss is a threat to species at risk, identifying and protecting habitats used by those species is important. Some of the species at risk listed under SARA have had recovery strategies developed for them, including the Eskimo Curlew (*Numenius borealis*)[7]. Within those strategies, critical habitat for certain species is detailed, which could inform local protection efforts. Confirming which species at risk occur or are likely to occur in Lakeland will allow the District to effectively communicate that information to residents.

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Photo Sources:

(A) http://www.essencesonline.com/Alaskan-research.htm
(B) http://caribouandyou.ca/about-woodland-caribou.html

5.2 Land Use and Development

5.2.1 District Development

Objective:	Minimize impacts from all types of development in the District causing detriment to Lakeland's natural ecosystems.

Action 1. Review District policies and regulations to determine consistency with the goals and objectives of the Environmental Management Plan.

Action 2. Develop green spaces that promote environmental awareness and practices.

Action 3. Encourage replanting of trees removed during development processes.

Action 4. Develop partnerships to seek volunteer support for tree replanting efforts.

Description and Ecological Impacts

This environmental issue refers to all types of development in the District, including land clearing for subdivisions, construction or erection of buildings and other structures, creation of recreational facilities and construction of infrastructure (e.g. road and utility corridors).

The ecological degradation caused by land development can be substantial[1], either directly or indirectly. When land is cleared to support development, the existing vegetation and top soil layers containing microorganisms are typically stripped away for engineering and convenience purposes. This effectively eliminates local plant and animal life during the construction phase. If this occurs on green field sites or in ecologically sensitive areas, biodiversity loss is experienced at the landscape level because forests and sensitive areas provide habitat for many species. Land clearing has the effect of fragmenting those habitats[1].

Highway 953 in Lakeland.

Management Considerations

A number of existing District bylaws, regulations and policies already serve to protect the natural environment. The District's Development Plan was adopted by bylaw in July 2005[2]. A Development Plan is a local government document similar to an Official Community Plan that includes short and long range policies for land use, development and community growth. The District's Zoning Bylaw specifies current planning regulations and can be used to control the use of land and siting of new developments. Where trees have been removed during development processes, replanting of those areas with native tree species will help regenerate natural areas, providing habitat for plant and animal species.

5.2.2 Regional Development

Objective: **Ensure that development activities outside of the District do not exacerbate environmental issues within District boundaries.**

Action 1. Encourage further development of the District Planning Commission.

Action 2. Continue to meet with adjacent municipalities when major development projects are proposed in those jurisdictions.

Action 3. Promote regional dialogue and coordination on all environmental issues.

Description and Ecological Impacts

The first concern with respect to this issue is that the natural areas and ecological processes in the region do not recognize administrative boundaries. What is occurring within the District will have environmental implications beyond its boundaries and vice versa. Some of the water bodies and water courses such as Anglin Lake and the Spruce River flow between the District and external areas like Prince Albert National Park. Transportation corridors, including Highway 2 (Canam Highway), bisect the District and connect with other areas in the region.

The second concern is that development and growth in neighbouring jurisdictions could place additional recreational use pressures on Lakeland as a destination community. The District of Lakeland borders the Rural Municipality of Paddockwood No. 520 to the south and east, Prince Albert National Park (federal jurisdiction) to the west and the Northern Administration District to the north. The Rural Municipality of Shellbrook No. 493 is southwest of Lakeland and the Rural Municipality of Buckland No. 491 is southeast of Lakeland

An increased human presence in the area resulting from regional development, such as new residential subdivisions, means that the ecological impacts associated with that presence will likely increase as well.

Management Considerations

Regional discussion and cooperation will help create a dialogue focused on the environmental issues facing Lakeland and the region. Exotic invasive species is one area in which coordinated efforts to prevent introductions is critically important to success.

5.2.3 Solid and Liquid Waste

Objective: **Reduce the amount of waste produced in Lakeland and ensure that different types waste are disposed of appropriately.**

Action 1. Consider establishing a program with adjacent municipalities to allow residents to recycle irregular products a few times annually.

Action 2. Support education on proper composting techniques.

Action 3. Promote increased recycling within Lakeland – "Reduce, Reuse, Recycle"

Description and Ecological Impacts

The vast majority of solid waste and liquid waste is produced by the residential component of Lakeland's land base. The District operates a municipal landfill site and has implemented a roadside garbage collection program for all of Lakeland's residents. In 2014, the District retained the services of a consultant to complete a feasibility study to determine the capacity of the existing landfill site and whether a new site is a realistic option. Landfills produce emissions that are harmful to the natural environment and human health, including particulate matter, volatile organic compounds and leachates[3,4]. Leachates containing xenobiotic organic compounds that enter water courses or water bodies pose a risk to water quality[3,4]. Waste decomposing in landfills also emits substantial quantities of methane gas – a potent greenhouse gas – that is contributing to global climate change.

Recycling containers in the region.

Management Considerations

Since most of the waste in the District is household and landfills have an adverse ecological impact on soils, the air, and surface/ground waters, the first priority is to reduce the amount of waste being produced. Composting and recycling are strongly encouraged and the District will communicate that message to Lakeland's residents. It is up to residents and businesses to be leaders in terms of local-scale recycling efforts in Saskatchewan. Given that a large proportion of household waste is compostable, backyard composting is an effective way of reducing waste sent to the landfill. However, backyard composting containers that are used improperly will attract unwelcome animal guests. Disseminating information about effective composting techniques will ensure that residents can enjoy the benefits of composting, while avoiding negative wildlife interactions.

5.2.4 Communication Towers

Objective: **Minimize the ecological impact resulting from the construction of and site development for communication towers.**

Action 1. Respond to industry consultation requests by providing information on ecologically sensitive areas and requesting that towers not to be located in important habitats.

Action 2. Encourage tower structures with the lowest environmental footprint and impact.

Description and Ecological Impacts

'Communication tower' refers to any form of radio- or tele-communication facility, such as the cellular tower shown in the photo to the right (located in Lakeland). Increased demand in Canada for wireless technology means that there is an inherent corresponding increased need for communications towers[5]. The land clearing activities associated with communication towers are concerning because they result in the displacement of any existing plant communities and all species inhabiting those areas. This concern is heightened if towers are proposed in sensitive areas, including habitats necessary for rare, threatened or endangered species. Substantial avian mortality also occurs when birds collide with the tower structures and guy wires[6]. At night, nocturnal migratory birds can be attracted to the lights on the structures, resulting in a higher frequency of collisions[6].

The District is entitled to consultation under federal policies and when industry proponents present proposals for Lakeland, the District can provide any environmental information it has, as well as request that only low ecological impact practices be used.

Management Considerations

Regulation of communication towers are under the exclusive jurisdiction of the federal government. Specifically, Industry Canada is responsible for administering the requirements of the *Radiocommunication Act* and for permitting new installations. In addition, Industry Canada establishes the standard public consultation protocol and policies for local government involvement with new proposals. As of July 15, 2014, the new edition of the protocol – CPC-2-0-03 – Radiocommunication and Broadcasting Antenna Systems – came into effect[5].

5.2.5 References

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5.3 Controlling Drainage and Contamination

5.3.1 Petroleum-Based and Industrial Products

Objective:	Reduce incidents of spills and ensure that unavoidable contamination is dealt with appropriately.

Action 1. Promote safe use of petroleum-based and industrial products by residents.

Action 2. Discuss concerns with the province about industrial or capital projects in Lakeland and provide information and recommendations regarding local drainage patterns.

Action 3. Advocate for clean-up of industrial sites and refuelling stations.

Action 4. Promote use of environmentally-responsible products by all stakeholders in the District.

Action 5. Disseminate information about provincial regulations and requirements.

Description and Ecological Impacts

Accidental or intentional spillage of gasoline, diesel and other petroleum-based products is not uncommon. Indeed, when refuelling our cars, trucks, boats and motorized equipment, minor spills are sometimes difficult to avoid. We use lubricants, oils and cleaning products on a daily basis for our households and equipment. However, many of those products end up in the natural environment in one form or another and they have the potential to cause ecological degradation when they contaminate soils and water. Some of the most harmful pollutants in petroleum products include aromatic hydrocarbons (e.g. bezene, ethylbenzene, toluene and xylene)[1]. Even small quantities of petroleum products like gasoline and diesel can pollute soils and water bodies[2].

Fuel spill in a water course (A).

Management Considerations

Not all cleaning products are petroleum-based. There are plant-based, biodegradable alternatives that have a lower impact on the natural environment. Where possible, those products should be encouraged and the District will act as a leader in this regard within its own operations. Since larger spills are likely to occur at industrial and capital project sites like highways and transmission corridors, the province is a key partner. The District is well prepared to provide provincial ministries and proponents of larger projects with upper-level information concerning local drainage patterns. The District can also present its environmental concerns about existing or abandoned industrial sites that may be contaminated with petroleum-based products to the province.

5.3.2 Fertilizers, Pesticides and Herbicides

Objective: **Displace use of traditional, chemical-based fertilizers, pesticides and herbicides with more environmentally responsible alternatives.**

Action 1. Promote the safe use of environmentally responsible fertilizers, pesticides and herbicides.

Action 2. Develop list of environmentally responsible options and place on the municipal website and in mail outs to residents.

Action 3. Encourage low maintenance landscaping that requires fewer fertilizers, pesticides and herbicides.

Action 4. Research best practices and implement those practices within District operations.

Description and Ecological Impacts

Fertilizers, pesticides and herbicides are products used to eliminate unwanted pests and weeds, while allowing the plants we do want to thrive in landscapes that do not provide sufficient minerals and nutrients for growth. Many fertilizers are chemical-based and contain a nutrient that may not occur naturally in sufficiently high concentrations to support the plant (e.g. nitrogen and phosphorus). Residential lawns, gardens and golf courses often require substantial amounts of fertilizers for maintenance. However, not all of the fertilizers applied to the soil is taken up by a plant's root system. Fertilizers can be carried away in storm water runoff into lakes and streams, where it can have negative ecological effects. Phosphorus is often a limiting nutrient for aquatic vegetation and lake algae, meaning that increased concentrations can lead to algal blooms and excessive plant growth in lakes. This process – known as eutrophication – reduces the amount of dissolved oxygen in the water which, in turn, affects other elements of the lake ecosystem.

Pesticides and herbicides may have the effect of killing species other than the target species during application. Similarly, and like fertilizers, chemical-based pesticides and herbicides may leach into soils and surface/ground water, where it could be toxic to other organisms. Compounding this issue is the existing impact of atmospheric deposition of nutrients[3].

Management Considerations

Two realistic options exist for mitigating the adverse ecological effects of fertilizers, pesticides and herbicides. First, reducing the amount of these types of products can be achieved by encouraging low maintenance landscape design. Some plant species require fewer fertilizers and native species are already well-adapted to the biogeoclimatic conditions in Lakeland. The District could also explore the possibility of a ban on the cosmetic use of pesticides in the Lakeland. Second, there are alternative fertilizers, pesticides and herbicides that break down more quickly in the environment and that may not have a chemical component. For example, biological control can be an effective method of controlling pests in certain circumstances. The District will be a leader by researching more environmentally responsible options and implementing those techniques.

5.3.3 Sediment Drainage and Sedimentation

Objective:	Reduce overland flow of sediments resulting from human activities.

Action 1. Continue to encourage the province and residents to design drainage systems to reduce runoff into water bodies and water courses and act as a leader in this respect.

Action 2. Promote site development practices that reduce overland flow of sediments into water bodies and water courses.

Action 3. Incorporate best management practices for sediment control into planning processes.

Description and Ecological Impacts

Sediments are individual particles of soil, including grains of sand, loam and clay that are typically transported by water (or wind) and deposited. Grains of sand are heavier and usually settle to the bottom of a lake, river or stream relatively quickly but loams and clays contain finer particles that can be transported far greater distances, taking longer to settle. Sediments are sometimes picked up by flowing water during storm water events via overland flow or from the beds of rivers, streams and ditches when unusually high volumes of water are flowing.

When land is cleared of vegetation and the top soil layer, loose soil particles are exposed to increased water flow and sediments are picked up and suspended (as shown on the cover photo on page 30). If these sediments are carried into water bodies such as lakes and wetlands, they can alter the ecology of those systems. Sediments suspended in the water column increase turbidity, which reduces the amount of sunlight available for aquatic plants (primary producers).

Management Considerations

Tree and vegetation retention during the development process provides a natural barrier slowing down the velocity of water as it flows over land. Where significant clearing has taken place, natural vegetation should be replanted. A storm water management plan or system may be required at the time of subdivision or development in order to address onsite storm water drainage. Given the importance of lakes to everyone in Lakeland, participation of all stakeholders, including forest tenure holders, in sediment control is warranted.

Sediments carried in a stream (B).

5.3.4 Septic Tanks and Grey Water

Objective:	Minimize contamination from septic tank effluent and grey water releases.

Action 1. Work with the provincial Ministry of Health to ensure that faulty tanks are identified.

Action 2. Instigate pilot project to conduct septic tank tests.

Action 3. Increase public awareness of environmental impacts of improper septic tank use.

Action 4. Establish a voluntary septic tank testing program for lakeshore property owners.

Action 5. Identify problem areas within District boundaries and determine appropriate corrective actions.

Description and Ecological Impacts

Many of the residences in Lakeland, including those located on lakeshore sites, use an onsite septic system to dispose of sewage. The septic tank portion of the system holds the solid waste. With age, these tanks break down and develop faults such as cracks which may begin to leak; however, since the tanks are buried, it is impossible to know if it is leaking unless a test is conducted. If sewage is leaking from a tank, it will enter the surrounding soil and could contaminate ground water or a nearby water body. Water that has been used in the household – "grey water" – is sometimes disposed of in the septic field or directly onto the ground or into the lake. Household sewage entering lakes and other water bodies poses a significant ecological risk[4]. Sewage contains high concentrations of nitrogen, phosphorus and other nutrients which can be toxic to fish and aquatic life[4]. The increased nutrient concentrations leads to a higher risk of eutrophication with the potential to severely impact biodiversity[4]. Furthermore, the effect of septic system effluent on water quality increases during the low flow summer months[5]. Septic waste also contains bacteria like E. coli that are a threat to human health as well[6].

Sewage leaking from a faulty septic tank (C).

Management Considerations

Reviewing and approving new private on-site septic systems is the responsibility of the provincial Ministry of Health. Ministry of Health Inspectors will also respond to complaints regarding existing septic systems[7]. Existing septic tanks that may be leaking or faulty should be tested and replaced, if necessary. Voluntary testing is encouraged and the District will investigate the feasibility of conducting a pilot program to determine the extent of potential widespread problems in Lakeland. New residential construction should be able to demonstrate an adequate grey water disposal system.

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Photo Sources:

(A) http://www.pennlive.com/midstate/index.ssf/2011/04/crews_work_to_clean_up_susqueh.html
(B) http://www.lincoln.ne.gov/city/pworks/watrshed/educate/pollutants/
(C) http://www.suffolkcountyny.gov/stormwater/StormwaterIssues/SepticSystemsandSuffolkCounty/IdentifyingSepticSystemFailure.aspx

5.4 Land of Lakes

5.4.1 Shoreline Alteration

Objective: **Reduce incidence of shoreline alteration and where lakefront development activities proceed, ensure that those activities are undertaken with the highest ecological principles.**

Action 1. Increase awareness of provincial regulatory and permitting processes.

Action 2. Review and update guidance materials as part of the Building Permit information package, as necessary.

Action 3. Provide information to contractors regarding shoreline alteration regulations and enforcement.

Action 4. Continue supporting District efforts to mitigate environmental impacts from lakeshore development.

Action 5. Establish procedures and policies for site visits and review at before, during and after stages of lakeshore development.

Action 6. Strengthen enforcement efforts and penalties for bylaw contraventions.

Description and Ecological Impacts

For the purposes of this plan, 'shoreline' refers to a broad area at the edge of lakes and other water bodies, from the shallows waters where docks are located, through the foreshore to adjoining terrestrial areas above the high water mark (see Figure 3). The larger lakes in the District have substantial shoreline areas, making shoreline alteration a prominent concern. Christopher Lake, for example, contains over 18 km of shoreline and the three basins of Emma Lake collectively contain over 67 km of shoreline.

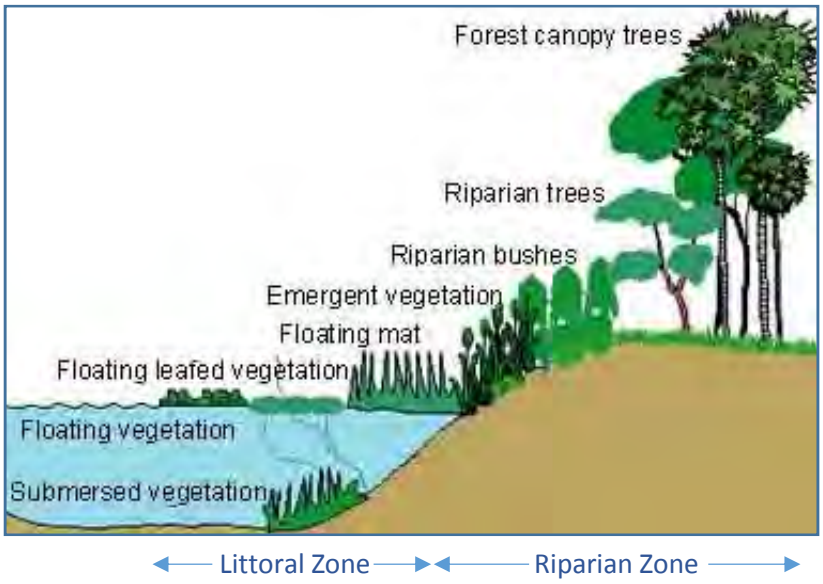

Figure 3. Lake zonation[1].

The riparian area is an ecologically sensitive and important area adjacent to wetlands, lakes, other water bodies and water courses. It is a transitional zone that is neither terrestrial nor aquatic, as it can be submerged or dry during certain times of the year. Riparian areas contain a unique mix of plant species adapted to these fluctuations[2], extending from the water's edge to the edges of upland environments. Maintaining the riparian area in good condition is essential to a healthy lake ecosystem. However, too often these areas are overlooked and cleared or built upon during the development process. The photo below shows an example of lakeshore development that has resulted in the destruction of the riparian area. The littoral zone of the lake is also ecologically important. A substantial amount of the biodiversity within lakes is found in the littoral zone because this is where aquatic plants and algae can take advantage of light for primary production[3].

Management Considerations

The provincial *Environmental Management and Protection Act, 2010* gives authority to the Saskatchewan Water Security Agency to protect aquatic habitats, as well as the banks and boundaries of Crown surface waters[4]. The Saskatchewan Water Security Agency seeks to protect aquatic habitats by requiring land owners and developers to obtain an Aquatic Habitat Protection Permit prior to undertaking work in or near lakes and other water bodies. For example, construction of retaining walls, docks or boat launches, or removal of vegetation by mechanical means requires a permit approved by the Agency. Approval from Fisheries and Oceans Canada may also be required under the *Fisheries Act* for projects in or near water courses or water bodies. Land owners and developers should contact the local Fisheries and Oceans Canada office to ensure they are meeting all federal fish habitat protection requirements. The District will endeavour to provide land owners and developers with information on provincial and federal approval processes required for projects near water.

Lakeshore development resulting in complete riparian area destruction.

5.4.2 Lake Water Quality

Objective: **Ensure that water quality in District lakes is in good standing in order to support healthy lake ecosystems.**

Action 1. Seek funding for ongoing water quality monitoring in District lakes.

Action 2. Continue monitoring water quality in District lakes and enhance monitoring program, if possible.

Action 3. Promote public education, including District website information showing water quality parameters, and in such a way that draws attention to the connections between water quality, algae growth and human activities.

Description and Ecological Impacts

Water quality is a term used to describe the condition of a body of water such as a lake and is dependent on a number of variables, including the quantity of microbes (e.g. viruses, bacteria and protozoa), nutrients and chemicals, taste, odour, colour and turbidity[5]. The quality of water is also relative to its use. For example, the acceptable level of water quality can be lower for agricultural or recreational uses than for use as drinking water. The characteristics of and inputs to a particular lake will influence its water quality[6]. Pesticides, fertilizers, herbicides, household products, increased sediment runoff and sewage can substantially lower water quality, adversely affecting the health of the lake ecosystem. A high quality of water in our lakes will help ensure that aquatic ecosystems remain healthy[7]. Large algae blooms, for example, are both the result of, and contributor to, deteriorating water quality in lakes. Water quality will not only influence elements of the ecosystem such as fish habitat and primary productivity[6], it also poses a risk to human health, with the possibility of impacting recreation.

Management Considerations

Water quality guidelines for the protection of aquatic life have been established by the province[8] and the Canadian Council of Ministers of the Environment[9]. In 2004, water samples were collected on McPhee, Anglin, Christopher and Emma Lakes to determine quality[6]. The results of that study showed that water quality on the four largest lakes in the District was generally good but also recommended additional testing to determine the potential impacts of future lakeshore development[6]. The District's Environmental Advisory Committee has implemented an annual water quality monitoring program to assess aquatic ecosystem health of these lakes. Lakeshore residents are key partners in protecting the health of our lakes and the District will endeavor to ensure that residents are kept informed about the findings of the monitoring program.

EAC Member Wayne Hyde collecting water samples (A)

5.4.3 Algae and Weed Growth

Objective: **To understand whether excessive algae and weed growth in District lakes is human-induced and if so, control activities leading to such growth.**

Action 1. Continue to monitor for the presence of algae and weeds and report findings back to Lakeland residents.

Description and Ecological Impacts

Algae and weeds occur naturally in lakes, ponds and wetlands. A number of factors can influence the species and abundance of algae or weeds in water bodies, including location, water temperature and the inputs to those water bodies. The presence of excessive weeds and algae growth can hinder recreational use of the water. However, it can also make fish habitat less suitable for spawning and deteriorate water quality because the growth of weeds and algae uses oxygen. It is important to recognize that not all weeds and algae are harmful and are a natural part of lake ecosystems. There are factors beyond human control affecting the presence of these organisms, which means that concern may be unwarranted in certain circumstances. Blue-green algae or cyanobacteria is not a form of algae but rapid and extensive growth of this group of species can result in 'blooms' similar in appearance to those caused by algae. Cyanobacteria are harmful to humans[10] but have not yet been recorded in Lakeland.

Lake weeds and algae on Namekus Lake.

Management Considerations

Removing naturally occurring weeds and algal blooms is not feasible, nor is it necessarily appropriate from an ecological perspective. However, efforts will be made to determine the degree to which development and human activities in the District are potentially influencing algae and weeds. The District and its partners should make an effort to limit the inputs to the lakes in order to control human contributions to excessive growth incidents.

5.4.4 Lake Water Levels

Objective: **Maintain lake water levels within normal operating ranges.**

Action 1. Continue to work with the Saskatchewan Water Security Agency to keep Emma, Christopher and Anglin Lakes within normal operating ranges.

Description and Ecological Impacts

The water levels of lakes in the District fluctuate throughout the year, exhibiting minimum and maximum levels. In late summer, for example, lakes are typically lower than in the spring months during snow melt. The water levels of some of the lakes in Lakeland can be controlled but others are subject to natural fluctuations and cannot be controlled. The Spruce River dam is used to regulate Spruce River water flows and provides a drawing point for the Emma and Christopher Lakes diversion project[11]. If the water in Christopher or Emma Lakes falls below a certain level, water can be pumped from Anglin Lake through a channel and into Emma or Christopher Lakes. Both Christopher and Emma Lakes have small watershed areas and are, therefore, susceptible to seasonal patterns affecting lake water levels.

Spruce River dam.

While water levels are primarily associated with aesthetic and other human-centric concerns, there are ecological implications for low and high water levels[12]. Increases in phytoplankton (algae) can result from low lake levels in combination with increased water temperatures[13]. Habitats used by aquatic plants and animals can disappear during low water level events[12]. The littoral zone near the lake's edge is particularly sensitive to fluctuations because this area may be void of water during certain times of the year, making food resources unavailable for macroinvertebrates[14].

Management Considerations

The Saskatchewan Water Security Agency is responsible for monitoring the levels of Anglin, Christopher and Emma Lakes. If the levels in Christopher Lake fall outside the desired operating range of 514.65 to 514.81 m, and if Emma Lake falls outside the 515.42 to 515.57 m range, the Water Security Agency will divert or release water, as necessary. The District will report any information relating to unusual water levels to the Agency.

5.4.5 Boat Launches and Marinas

Objective: **Mitigate ecological impacts from proposed boat launches and marinas.**

Action 1. Explicitly consider the issue of lake carrying capacities and ecological impacts associated with increased access to the lakes when boat launches and marinas are proposed.

Description and Ecological Impacts

Contamination of the environments in and around marinas constructed of pilings treated with creosote has adverse ecological impacts[15]. These pilings release polycyclic aromatic hydrocarbons into the water, which has been shown to affect the condition of surrounding benthic communities[15]. In addition, like any other development activity in Lakeland, the presence of artificial structures displaces natural plant and animal communities. Boat launches often extend through highly productive shallow waters near the shoreline. While the area covered by a single boat launch or marinas is small in comparison to the remainder of a lake's shoreline, additional structures on heavily developed lakes (e.g. Christopher and Emma Lakes) with existing boat launches and lakefront development is more concerning.

Additional boat launches and marinas could also facilitate an increase in the number of boats and other watercraft operating on lakes that may already be at or close to their respective carrying capacities. The number and operation of motorized watercraft is included in this plan as an environmental issue because excessive watercraft speed adversely affects the natural condition of lakes and their shorelines[16].

Management Considerations

Consideration should be given to the potential impact of increased watercraft and localized ecological impacts of chemically treated pilings when new boat launches or marinas are proposed. Minimizing the environmental damage from boat launches and marinas will be the responsibility of the District and senior government ministries and departments administering approval processes.

Community Marina on Emma Lake.

5.4.6 References

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16) Mosisch, T.D. and A.H. Arthington (1998) The impacts of power boating and water skiing on lakes and reservoirs. *Lakes & Reservoirs: Research and Management*, 3:1-17.

Photo Sources:

(A) http://www.lakeland521.ca/photo_gallery.php

5.5 Responsible Recreation

5.5.1 Offroad Motorized Vehicles

Objective:	Mitigate ecological impacts and environmental degradation resulting from off road motorized vehicles.

Photo Source (A)

Action 1. Distribute pamphlets on ecological impacts of improper off road motorized vehicle use within District watersheds.

Action 2. Contact the Ministry of Environment and the Ministry of Parks, Culture and Sport to discuss options for designating trails as 'off road motorized vehicle' only.

Action 3. Contact the appropriate provincial agencies, including the Ministry of Environment and the Ministry of Parks, Recreation and Culture to advocate for licensing of off road motorized vehicles.

Action 4. Ensure District presence at All Terrain Vehicle rallies and make ecological impacts known.

Action 5. Continue to enforce District regulations prohibiting the use of off road motorized vehicles on public land.

Action 6. Partner with All Terrain Vehicle associations to support their effort to disseminate information on environmental considerations.

Description and Ecological Impacts

Off road motorized vehicles (OMVs), including dirt bikes, all-terrain vehicles (ATVs) and snowmobiles, are a form of recreation enjoyed by many in northern Saskatchewan. OMVs offer an exciting way to experience the wilderness and explore parts of the north that are not easily accessible by other forms of travel. However, like any form of outdoor recreation, OMVs also have the potential to damage the natural environment. For example, ATV use results in soil compaction and erosion, it alters natural drainage patterns and results in the destruction of vegetation. Since OMVs may come to Lakeland from other parts of Canada and the United States, it is possible for units that are not properly cleaned to bring exotic invasive species into the wilderness areas of Lakeland.

Management Considerations

There are no designated OMV trails in Lakeland at this time and any existing recreation trails are generally shared by all users. Designation is one option for siting OMV-only trails in areas that are the least sensitive to the impacts associated with their use. Wetlands and streams crossing should be avoided. However, it should be also be noted that the preferences of OMV users need to be considered during the designation. While users may not consider the sensitivity of certain habitats and ecosystems, those areas could be important draws (e.g. water features and significant views). Using methods that can consider multiple variables (e.g. Geographic Information Systems), including ecological values, could be an effective approach for designating trails for different types of users[1].

Since the physical characteristics of trails, such as grade, slope, drainage patterns, are known determinants of the degree of soil loss, and ATVs result in the greatest loss[2], these factors should also be considered during trail siting and design. The Ministry of Environment also maintains the *Saskatchewan Activity Restriction Guidelines for Sensitive Species* which specifies sensitive species of plants and animals, their respective key wildlife features and recommended setback distances by disturbance category[3]. Where information is known about key wildlife features in Lakeland, it can be used during the trail designation process.

It has been found that the environmental impacts of ATVs are not always fully known by users and that communicating those impacts to users could be an effective management option[4]. Partnering with the Saskatchewan ATV Association and other user groups will be an important step in ensuring that OMV owners become stewards of the wilderness areas they use on a regular basis.

5.5.2 Number and Operation of Motorized Watercraft

Objective: **Reduce the number of boats operating at excessive speeds and in such a way that is causing damage to shorelines and lake ecosystems.**

Action 1. Investigate and seek the regulation of boat launches.

Action 2. Work with senior governments to explore options for licensing and permitting boats.

Action 3. Continue to communicate to boaters the importance of appropriate operation and handling of boats, emphasizing the ecological impacts of excessive boat speeds.

Action 4. Explore options with senior governments for lake zoning to control boat types and restrictions on boat access during extreme lake conditions.

Description and Ecological Impacts

Boating and other forms of motorized watercraft are an important part of the recreational experience for Lakeland's residents and tourists who come to the area. Motorized watercraft is the subject of this environmental issue because of their speed, the nature of their design and use, and the potential environmental impacts. The environmental concern regarding motorized watercraft is three-fold. First, when boats move through the water, sediments from the lake bed are re-suspended in the water column, increasing water turbidity, in turn reducing the biological productivity of the water[5]. Increased turbidity has the effect of blocking sunlight from reaching the aquatic vegetation and macrophytes at lower depths[5]. This can also result in nutrient enrichment of the water, leading to increased phytoplankton (algae) and aquatic plant growth (including weeds). Second, the increased wave action caused by motorized watercraft degrades shoreline by eroding soils and sediments[5]. Emergent and floating plants and the root of shoreline vegetation may also be eroded[5]. Third, boats operating in shallower waters can come into direct contact with aquatic plants[5].

Boaters enjoying one of the many lakes in the region.

Management Considerations

The authority to regulate all aspects of boats and boating rests with senior governments. However, since the ecological impacts of motorized watercraft is determined by the number and speed of boats operating at any one time[5], the District will ensure that those issues are communicated to boaters. The District will continue to communicate the message: "Own Your Wake". Signage has been installed at boat launches and information has been sent to boaters. Other aspects of living next to lakes can influence the impact of motorized watercraft on lake ecosystems. For example, shoreline vegetation supports soil strength and its removal exacerbates erosion and shoreline degradation.

An example of shoreline degradation.

Canoeing enthusiast taking a rest on the lakeshore – canoeing is a low impact form of aquatic recreation.

5.5.3 Pressure from Provincial Park Expansion

Objective: **Ensure that regulations created for the Great Blue Heron Provincial Park do not exacerbate environmental issues in the District.**

Action 1. Continue to represent the District's environmental concerns as the Park Advisory Committee develops a management plan for Great Blue Heron Provincial Park.

Description and Ecological Impacts

Like the issue of regional development, the District seeks to ensure that regulations and activities within provincial parks do not increase the occurrence of adverse human activity elsewhere in Lakeland. For example, if off road motorized vehicles are prohibited in the newly created Great Blue Heron Provincial Park, it could mean increased use of these vehicles elsewhere in Lakeland. In a way, the ecological burden could be shifted to the remainder of the District.

Management Considerations

In the absence of a management plan for the new provincial park, the extent to which provincial and District policies and regulations align are unknown. With a seat on the Park Advisory Committee, the District will continue to work with the Committee to achieve a level of consistency with respect to park management and the environmental issues facing the District.

5.5.4 References

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Photo Sources:

(A) https://aesrd.wordpress.com/2013/06/

Photo Source (A)

5.6 Living With Wildlife

Action 1. Create a public awareness campaign to reduce the number of negative wildlife interactions.

Action 2. Support projects to install animal proof garbage collection areas.

Description and Ecological Impacts

'Negative wildlife interactions' refers to human encounters with animals like bears and deer that result in harm coming to the animal, humans or both. For example, a vehicle colliding with a deer or porcupine on the highway is a negative wildlife interaction. Similarly, an encounter with a black bear (e.g. in the wilderness or in a residential area) that results in the bear being relocated or killed is considered a negative interaction. Interaction with wildlife is commonplace in Lakeland and is unavoidable in many instances. This issue is concerned with limiting the number of avoidable situations where the encounter with wildlife is not a positive one. This type of interaction can also be dangerous and costly. On average, there are 12,000 highway collisions with wildlife each year in Saskatchewan and in 2009 collisions resulted in six human deaths and 343 injuries[1]. The ecological impact is a product of the loss of individual animals due to these negative encounters.

Bear aware signage (left) and beaver (*Castor canadensis*) enjoying his meal (right).

Management Considerations

Unwanted encounters with large wildlife can be avoided. Ensuring that odours from garbage containers and collection areas are kept to a minimum will help reduce the likelihood that black bears will seek out these areas. Animal-proofing garbage collection areas will also help keep bear and other animals away. The Saskatchewan Wildlife Federation implements an annual public safety campaign to reduce highway collisions. The District will work with the Federation to disseminate similar information locally. Feeding wildlife is also strongly discouraged.

5.6.2 Light and Noise Pollution

Objective: Limit excessive light and noise pollution.

Action 1. Increase public awareness of environmental effects of excessive light and noise pollution.

Action 2. Promote dark sky lighting policies.

Description and Ecological Impacts

With respect to impacts on wildlife, noise pollution usually refers to excessive noise emanating from human sources, including construction, highway traffic, and residential activities like outdoor music. Noise pollution can adversely affect wildlife by lowering their ability to detect predators[2] and make important food selection decisions[3]. In avian (bird) communities, noise pollution can significantly change species interactions and other dynamics of those communities[4]. Artificial night lighting can also affect wildlife. The behaviours of certain species of songbirds, for example, may be altered by night lighting[5].

Management Considerations

Section 3.3(14) of the District's Development Plan requires new residential construction to incorporate dark sky lighting techniques and principles. The District will continue to communicate those requirements to owners and developers, as well as a general message regarding the ecological impacts of noise and light pollution in Lakeland.

5.6.3 References

1) Saskatchewan Government Insurance Canada (2010) Saskatchewan Wildlife Federation Launches Second Phase of Annual Public Safety Campaign. Saskatchewan Government Insurance Canada. Accessed online at https://www.sgicanada.ca/sk/about/newsreleases/2010/publicsafety.html.
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Photo Sources:

(A) http://outdoorcanada.ca/hunting/page/3
(B) http://www.pc.gc.ca/eng/pn-np/ab/jasper/natcul/caribou-jasper.aspx

5.7 Northern Forests

5.7.1 Spruce Budworm and Infestations

Action 1. Maintain cooperation with provincial agencies and consultants with respect to current research and control efforts.

Action 2. Research most appropriate and environmentally responsible ways for addressing infestations.

Action 3. Lead by example: demonstrate natural control options to support residents taking action on their own properties.

Action 4. Engage schools and the public to increase awareness of the issue, including posters and instructions to create natural control structures.

Description and Ecological Impacts

The Spruce Budworm is an insect native to the boreal forests that feeds on the foliage of spruce trees. Under certain circumstances, heavy infestations can occur like those experienced in Saskatchewan from 1996 to 2005[1]. Spruce budworm defoliation has also been observed in Lakeland in recent years. In 2013, a spraying program for the spruce budworm in the District was implemented, in which aerial spraying of pesticides was used to control outbreaks. Although the spruce budworm is native to Northern Saskatchewan, there is concern that more frequent and severe outbreaks may be the result of changing climatic conditions. If occurrences of future spruce budworm infestations are linked to climatic changes caused by humans, the ecological damage of extensive tree defoliation is more relevant but additional research is needed.

Management Considerations

The District will support local research efforts by universities and consultant groups. Since the pesticides used for controlling spruce budworm may have broader, unintended ecosystem implications, further investigation into environmentally responsible control methods is warranted. The District will establish a program to demonstrate natural control options for other types of pests in order for property owners to take actions on their property in a manner that has minimal impact on the environment.

5.7.2 Forest Fire Management

Action 1. Support the development of provincial forest fire management practices that explicitly consider the potential ecological impacts

Action 2. Promote FireSmart initiatives in the District.

Action 3. Display and distribute materials communicating the environmental risks of fireworks and open burning.

Description and Ecological Impacts

Forest fires pose significant risks to human life and property. They may occur naturally or are the result of human actions. The effect of forest fires on the natural environment can be both positive and negative. While the destruction to natural habitats and biodiversity loss resulting from large-scale forest fires is evident, such fires are also part of the natural successional patterns of many forested ecosystems. Pine trees, for example, require the heat from forest fires to initiate seed germination for new growth. This environmental issue is concerned with two elements of forest fire management. First, preventing human-induced fire will help mitigate the ecological damage caused by fires, while recognizing that there is an important role for naturally occurring fires. Second, there is also concern that the management actions taken to reduce the risk of forest fires, such as clearing understorey vegetation and establish clear-cut buffers, may not consider the ecological consequences of those actions.

Management Considerations

FireSmart is a widely recognized initiative to reduce the number of forest or wild fires caused by humans. The District will display FireSmart materials in the District office and work to promote the initiate. Since forest fire management is the responsibility of the province, the District will contact the Ministry of Environment to enquire about how ecological principles are being considered in management activities. The protection of human life is paramount but if there are ways to achieve that protection without causing unnecessary environmental damage, those options should be explored.

5.7.3 Commercial Forest Harvesting and Reforestation

Objective: **Reduce the overall ecological impact of commercial forest harvesting.**

Action 1. Encourage the provincial government to increase buffer widths along lakeshore development areas, commercial corridors and ecologically sensitive areas.

Action 2. Discuss environmental concerns at the Sakâw Askiy Management Inc. meetings.

Action 3. Develop a reforestation plan to plant public reserves with native tree species on an annual basis.

Description and Ecological Impacts

Approximately 5,350 ha of Crown forests in Lakeland have been commercially harvested since 1970, representing 10 percent of the total area of the District (see Appendix 7). Logging is a relatively important industry in the District and contributes to the overall economic diversity within the region. However, logging also poses a significant threat to landscape level biodiversity. Clear-cutting results in habitat loss and fragmentation, negatively affecting both plant and animal populations. By removing merchantable timber (spruce, fir and pine), native plant communities are altered and animal species using those forests as habitat must relocate. Fragmented forest habitats also become less useful to many species requiring larger patches of undisturbed habitats[2]. Large clear-cutting operations may not consider smaller, ecologically sensitive areas like wetlands and riparian areas that are important hotspots for biodiversity.

Management Considerations

In 2010, Sakâw Askiy Management Inc. obtained rights to the Prince Albert Forest Management Agreement (FMA) area which includes the District. Sakâw Askiy is currently working to develop a new FMA with the province, its member companies and partners (including First Nations), and stakeholders. The District is one of those stakeholders. While the authority to regulate commercial forest harvesting on provincial Crown land rests with the province, the District will continue to represent its environmental interests on the working group for development of the new FMA.

An example of clear-cut logging practices (A).

5.7.4 References

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5.8 Threats and Adaptation

5.8.1 Exotic Invasive Species

Photo Source[A]

Action 1. Contact agencies and other partners at provincial and federal levels, including the Saskatchewan Invasive Species Council, Ministry of Parks, Culture and Sport, Ministry of Environment and Environment Canada, to take preventative action on exotic invasive species. Specifically, assist the province as it develops sampling and monitoring protocols for Lakeland.

Action 2. Update the District website and provide links to exotic invasive species resources, including the Saskatchewan Invasive Species Council fact sheets.

Action 3. Support exotic invasive species awareness at public schools and local events.

Action 4. Increase exotic invasive species signage in the District.

Description and Ecological Impacts

Exotic invasive species (EIS) are plant and animal species that are not native to an area and cause detriment to the native plant and animal communities they invade. The Saskatchewan Invasive Species Council lists 32 EIS on its website[1] (see Appendix 8 for list). It is likely that there are many additional EIS present in the province. EIS are of concern because of the significant economic, social, culture and ecological impacts they can cause. Migration of species is a natural process but instead of occurring over many millennia, human activities can result in the relatively rapid transportation and introduction of species to non-native ecosystems. Inadvertent human transportation of species can occur in a variety of different ways. Zebra mussels (*Dreissena polymorpha*), for example, were likely introduced to the Great Lakes when commercial trading vessels from Europe released ballast waters. Once they have been introduced to a new ecosystem, EIS like leafy spurge (*Euphorbia esula*) outcompete native populations, less encumbered by predators and diseases of the native species.

Zebra mussels (B).

EIS can be very costly to eliminate once introduced and to address the impacts of certain species. The federal government estimates that the total cost of zebra mussels to businesses, industries and communities exceeds $5 billion[2]. EIS may be aesthetically unappealing, while affecting recreational use

of an area (e.g. zebra mussels covering a beach). Ecologically, EIS can harm ecosystems by displacing native vegetation and eliminating important habitats in the process. A study completed north of Lakeland in 2007 found 23 exotic plant species in logged areas, forest fire sites and highway corridors[3]. One species – smooth brome grass (*Bromus inermis*) – was determined to be a serious threat and a difficult plant to control[3]. That study demonstrates that EIS are in the region, which means that exotic plants could pose an immediate threat to Lakeland's biodiversity.

Management Considerations

Prevention is typically the best approach to addressing EIS because once established they can be difficult to remove. Prevention also requires fewer resources in the long term but does necessitate a short term investment in public education and awareness campaigns. This issue is important to all partners in Lakeland because the impacts will be widespread.

The District has already taken efforts to communicate the EIS message to Lakeland residents and tourists by installing aquatic invasive species signage at boat launches in the District and including an insert on EIS in a mail-out to residents. The provincial government is taking steps to address zebra and quagga mussels (*Dreissena rostriformis*) in Saskatchewan. The issue recently became more salient when zebra mussels were discovered in Lake Winnipeg, Manitoba. The campaign is titled "Clean, Drain, Dry" and the message is aimed at boaters who are coming to Saskatchewan. The Ministry of Environment is also in the process of establishing monitoring and sampling protocols for Saskatchewan to help ensure early detection of introductions. Monitoring in Lakeland is necessary given the number of boats coming to the area from outside of the province.

5.8.2 Climate Change

Action 1. Promote public awareness of connections between climate change and local environmental issues.

Action 2. Support local research.

Description and Ecological Impacts

Global climate change is occurring. The extent to which humans are affecting global climate patterns may be unclear and, furthermore, the possible local ecological implications may not be fully known. However, the concern is that climate change could exacerbate environmental issues facing the District, such as increased wildfire events and extinctions of local plant and animal populations sensitive to such changes. Climatic factors (e.g. precipitation and temperature) have changed in the boreal forest in the last century[4], potentially resulting in broader ecological changes[5]. As a significant carbon sink, climate change is also a function of maintaining the boreal forest. In this way, the condition of the natural landscape of Lakeland (containing boreal forests) is both threatened by climate change and a contributor to ecological changes experienced in other parts of the world.

Management Considerations

The District advocates for a reduction in the carbon footprints of all local partners, meaning that local contributions to global climate change and the greenhouse effect are minimized. For the District, this means increased energy efficient and reduced dependence on fossil fuels. Since the province is responsible for deciding the extent to which the boreal forests of Northern Saskatchewan are harvested, continued engagement with the Ministry of Environment on the global importance of the boreal region will be important. Given that the District is located along the southern boundary of the Mid-Boreal Uplands ecoregion, changes to the extent of the boreal forest could have significant implications for Lakeland. If global climatic changes (and resulting local changes) are not averted, local adaptation will be required (e.g. increased monitoring for and control of insect outbreaks that may be linked to changing weather patterns).

5.8.3 References

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Photo Sources:

(A) http://commons.wikimedia.org/wiki/File:Lythrum_salicaria,_purple_loosestrife_4.jpg
(B) http://www.100thmeridian.org/photobank/

Luna moth (*Actias luna*) (Photo: Leslie Tuchek).

6.0 Implementation

6.1 Implementation Strategy

The plan follows a five year implementation timeline, beginning in 2015 and ending in 2019. Implementation will occur in the short term (Year 1), medium term (Years 2-3), long term (Years 4-5), or is classified as an ongoing action. This is intended only as a guide to help prioritize environmental management initiatives and timing may change depending on circumstances. For example, if immediate funding is available for a long term project, it may be advantageous to seek that funding when it is available. While the District will lead each of the management actions, involvement of key partners will be important to success of the plan. Table 7 states each management action, implementation timing and key partners.

Table 7. Implementation Strategy.

Management Actions	Implementation Timing	Key Partners
Sensitive Areas and Species		
Degradation of Ecologically Sensitive Areas		
Action 1	Short/Medium	UoS, Ministry of Environment
Action 2	Medium	UoS
Action 3	Long	Residents
Action 4	Medium	NGOs, First Nations
Species at Risk		
Action 1	Medium	SCDC, Ministry of Environment, Environment Canada
Action 2	Medium	SCDC, UoS, First Nations
Action 3	Ongoing	Residents
Action 4	Ongoing	SCDC
Action 5	Medium	UoS, Ministry of Environment
Land Use and Development		
District Development		
Action 1	Medium	
Action 2	Long	
Action 3	Short	
Action 4	Short	Ministry of Environment, residents
Regional Development		
Action 1	Ongoing	Adjacent municipalities, District Planning Commission
Action 2	Ongoing	
Action 3	Short	
Solid and Liquid Waste		
Action 1	Medium	Adjacent municipalities
Action 2	Ongoing	Residents
Action 3	Short	
Communication Towers		
Action 1	Ongoing	Industry Canada
Action 2	Ongoing	Industry Proponents

Controlling Drainage and Contamination		
Petroleum-Based and Industrial Products		
Action 1	Short	Residents
Action 2	Ongoing	Ministry of Environment, Ministry of Highways and Infrastructure
Action 3	Medium	
Action 4	Ongoing	
Action 5	Medium	Residents
Fertilizers, Pesticides and Herbicides		
Action 1	Ongoing	Residents, businesses
Action 2	Medium	Industries, regional businesses
Action 3	Medium	Ministry of Environment
Action 4	Long	Ministry of Environment
Sediments Drainage and Sedimentation		
Action 1	Ongoing	Residents, Ministry of Highways
Action 2	Ongoing	SWSA, Fisheries and Oceans Canada
Action 3	Short	Ministry of Environment
Septic Tanks and Grey Water		
Action 1	Medium	Ministry of Health
Action 2	Short	
Action 3	Ongoing	Residents
Action 4	Short	Residents
Action 5	Short	Ministry of Health
Land of Lakes		
Shoreline Alteration		
Action 1	Ongoing	SWSA, Fisheries and Oceans Canada
Action 2	Short	SWSA, Fisheries and Oceans Canada
Action 3	Ongoing	Contractors, local businesses
Action 4	Ongoing	Ministry of Community Affairs
Action 5	Short	Residents
Action 6	Ongoing	Residents
Lake Water Quality		
Action 1	Ongoing	SWSA, Ministry of Environment, NGOs
Action 2	Ongoing	
Action 3	Ongoing	Residents
Algae and Weed Growth		
Action 1	Ongoing	Ministry of Environment
Lake Water Levels		
Action 1	Ongoing	SWSA
Boat Launches and Marinas		

Action 1	Ongoing	SWSA, Fisheries and Oceans Canada, local boating organisations
Responsible Recreation		
Off road Motorized Vehicles		
Action 1	Short	Residents
Action 2	Medium	Ministry of Environment, Ministry of Parks
Action 3	Ongoing	Ministry of Environment, Ministry of Parks
Action 4	Medium	Saskatchewan ATV Association
Action 5	Ongoing	Residents
Action 6	Long	Saskatchewan ATV Association
Number and Operation of Motorized Watercraft		
Action 1	Short	Fisheries and Oceans Canada
Action 2	Medium	Fisheries and Oceans Canada
Action 3	Ongoing	
Action 4	Medium	Ministry of Community Affairs, SWSA
Pressure from Provincial Park Expansion		
Action 1	Short	Ministry of Parks, Parks Advisory Committee
Living With Wildlife		
Negative Wildlife Interaction		
Action 1	Short	NGOs, SGI, Saskatchewan Wildlife Federation
Action 2	Medium	
Light and Noise Pollution		
Action 1	Medium	Residents
Action 2	Short	Residents
Northern Forests		
Spruce Budworm and Infestations		
Action 1	Ongoing	UoS, research institutions
Action 2	Ongoing	Industry
Action 3	Short	
Action 4	Short	Public schools, residents
Forest Fire Management		
Action 1	Medium	Ministry of Parks, Ministry of Environment, Ministry of Highways
Action 2	Short	Residents
Action 3	Short	Residents
Commercial Forest Harvesting and Reforestation		
Action 1	Ongoing	Ministry of Environment
Action 2	Ongoing	Sakâw Askiy Management Inc.

Action 3	Medium	Residents
Threats and Adaptation		
Exotic Invasive Species		
Action 1	Short	Saskatchewan Invasive Species Council, Ministry of Environment
Action 2	Short	Saskatchewan Invasive Species Council
Action 3	Medium	Public schools, resident
Action 4	Short	
Climate Change		
Action 1	Long	UoS
Action 2	Ongoing	

6.2 Plan Review

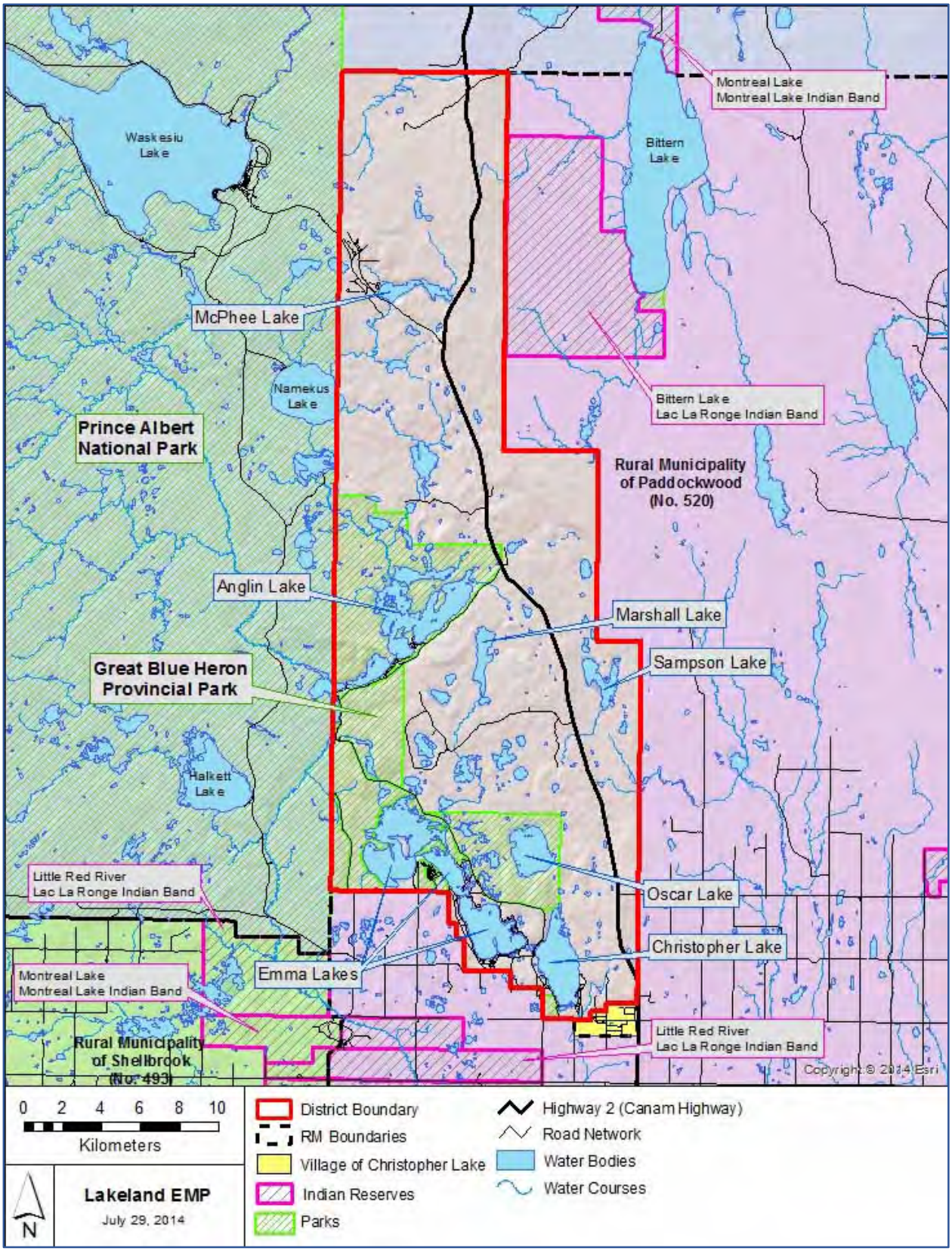
Following the five year planning cycle, a new Working Group will be formed to review the plan and assess accomplishments. New goals, objectives, management actions and implementation could be determined at that time, with corresponding updates to the plan.

APPENDICES

Data Sources for Maps:

Her Majesty In Right Of Saskatchewan. The incorporation of data sourced from *Her Majesty In Right Of Saskatchewan* within this product shall not be construed as constituting an endorsement by *Her Majesty In Right Of Saskatchewan* of such product.

GeoBase®


Waskesiu Lake
Montreal Lake
Montreal Lake Indian Band
Bittern Lake
McPhee Lake
Namekus Lake
Bittern Lake
Lac La Ronge Indian Band
Prince Albert National Park
Rural Municipality of Paddockwood (No. 520)
Anglin Lake
Marshall Lake
Sampson Lake
Great Blue Heron Provincial Park
Halkett Lake
Little Red River
Lac La Ronge Indian Band
Oscar Lake
Christopher Lake
Emma Lakes
Montreal Lake
Montreal Lake Indian Band
Rural Municipality of Shellbrook (No. 493)
Little Red River
Lac La Ronge Indian Band
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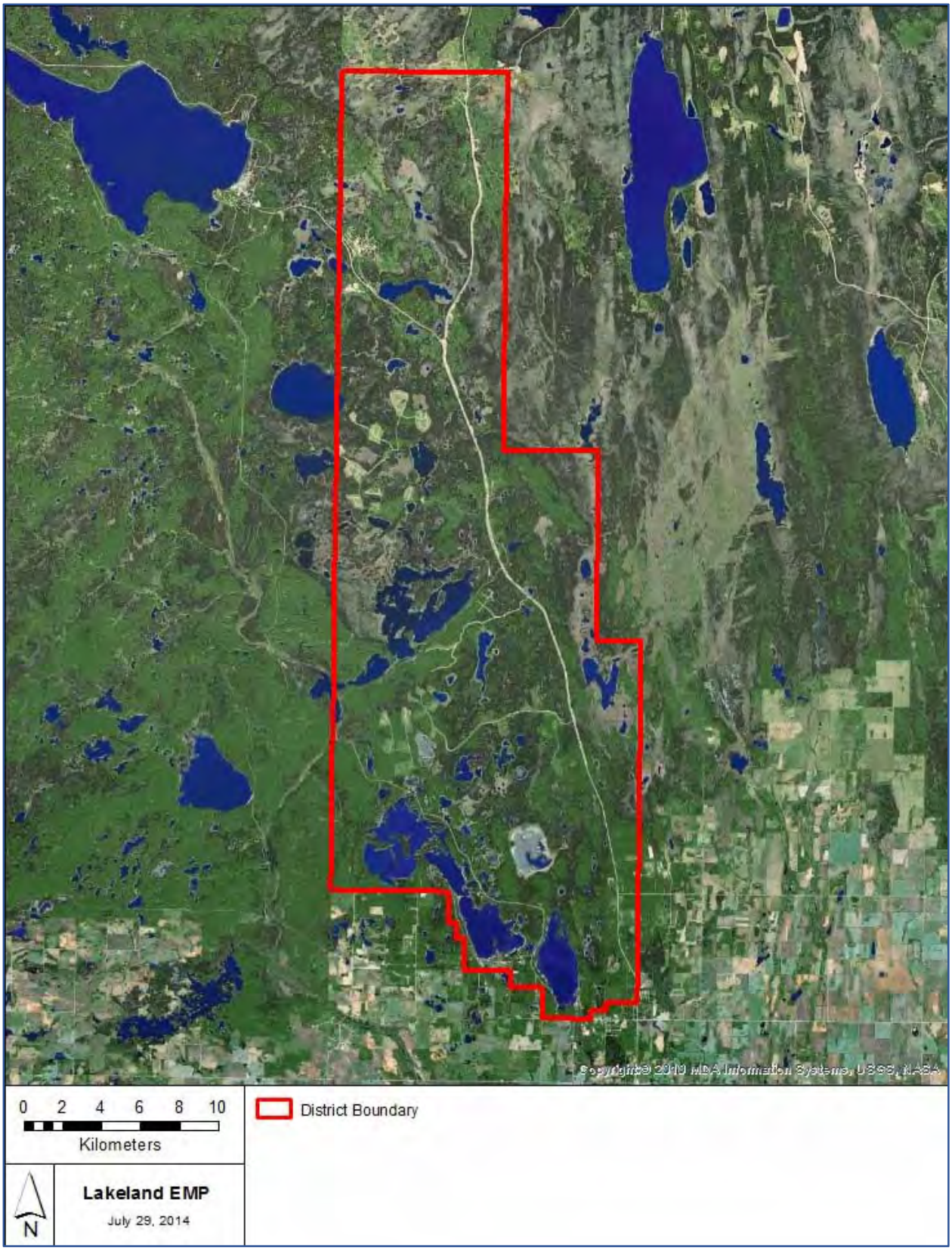
0 2 4 6 8 10
Kilometers
N
Lakeland EMP
July 29, 2014
District Boundary
RM Boundaries
Village of Christopher Lake
Indian Reserves
Parks
Highway 2 (Canam Highway)
Road Network
Water Bodies
Water Courses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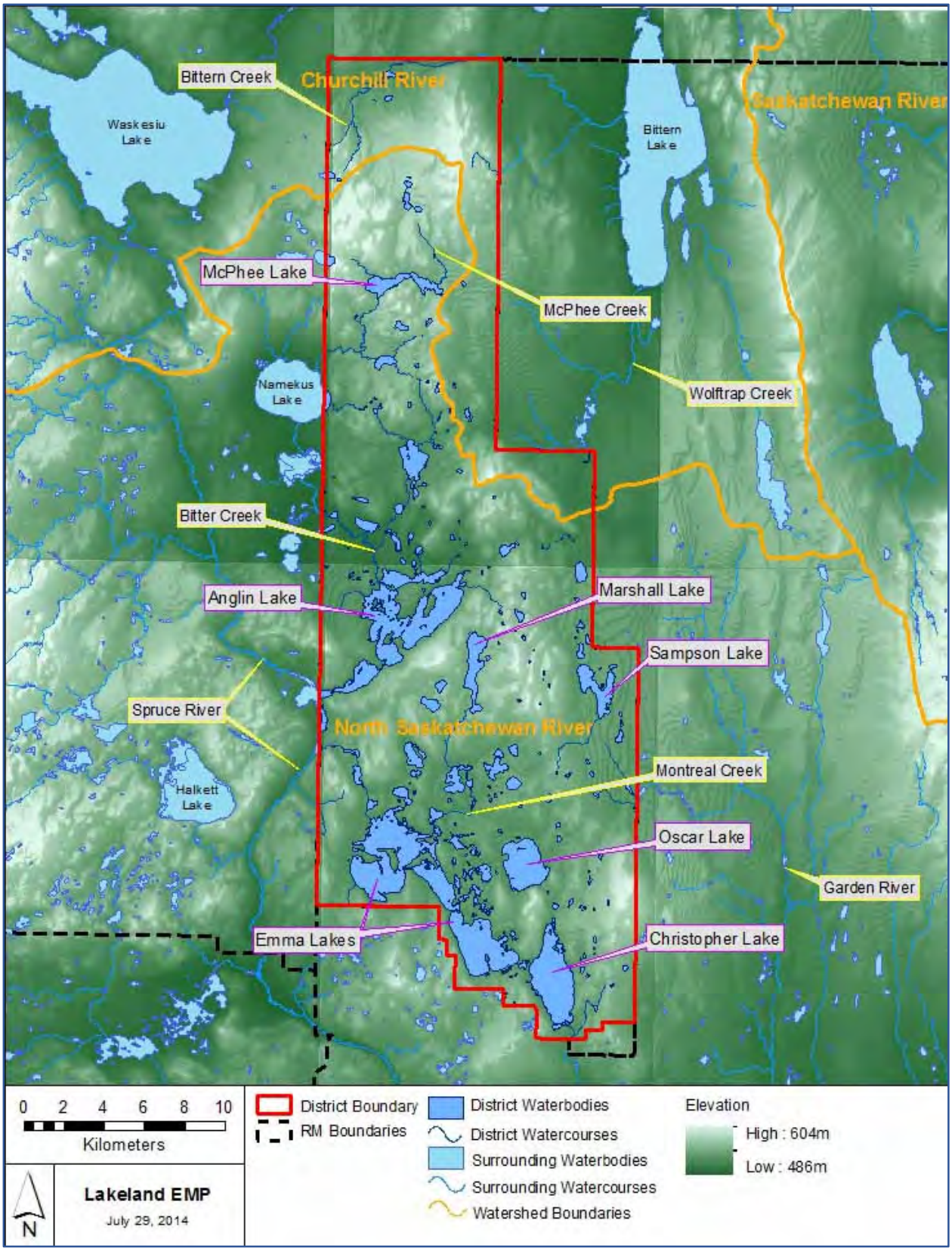
July 29, 2014
District Boundary


Bittern Creek
Churchill River
Saskatchewan River
Waskesiu Lake
Bittern Lake
McPhee Lake
McPhee Creek
Namekus Lake
Wolftrap Creek
Bitter Creek
Anglin Lake
Marshall Lake
Sampson Lake
Spruce River
North Saskatchewan River
Halkett Lake
Montreal Creek
Oscar Lake
Garden River
Emma Lakes
Christopher Lake
0 2 4 6 8 10
Kilometers
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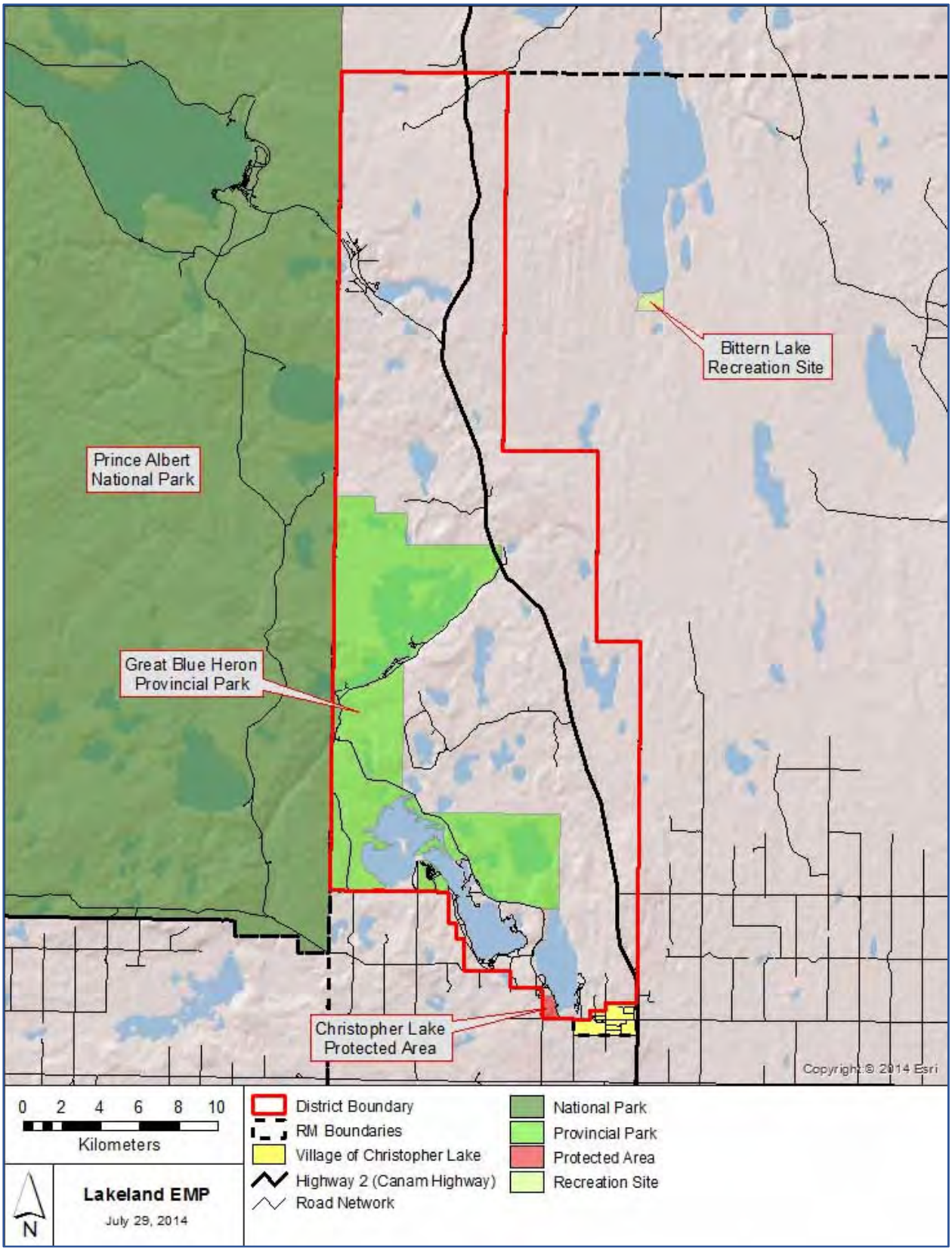
Lakeland EMP
July 29, 2014
District Boundary
RM Boundaries
District Waterbodies
District Watercourses
Surrounding Waterbodies
Surrounding Watercourses
Watershed Boundaries
Elevation
High : 604m
Low : 486m


Bittern Lake Recreation Site
Prince Albert National Park
Great Blue Heron Provincial Park
Christopher Lake Protected Area
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Kilometers
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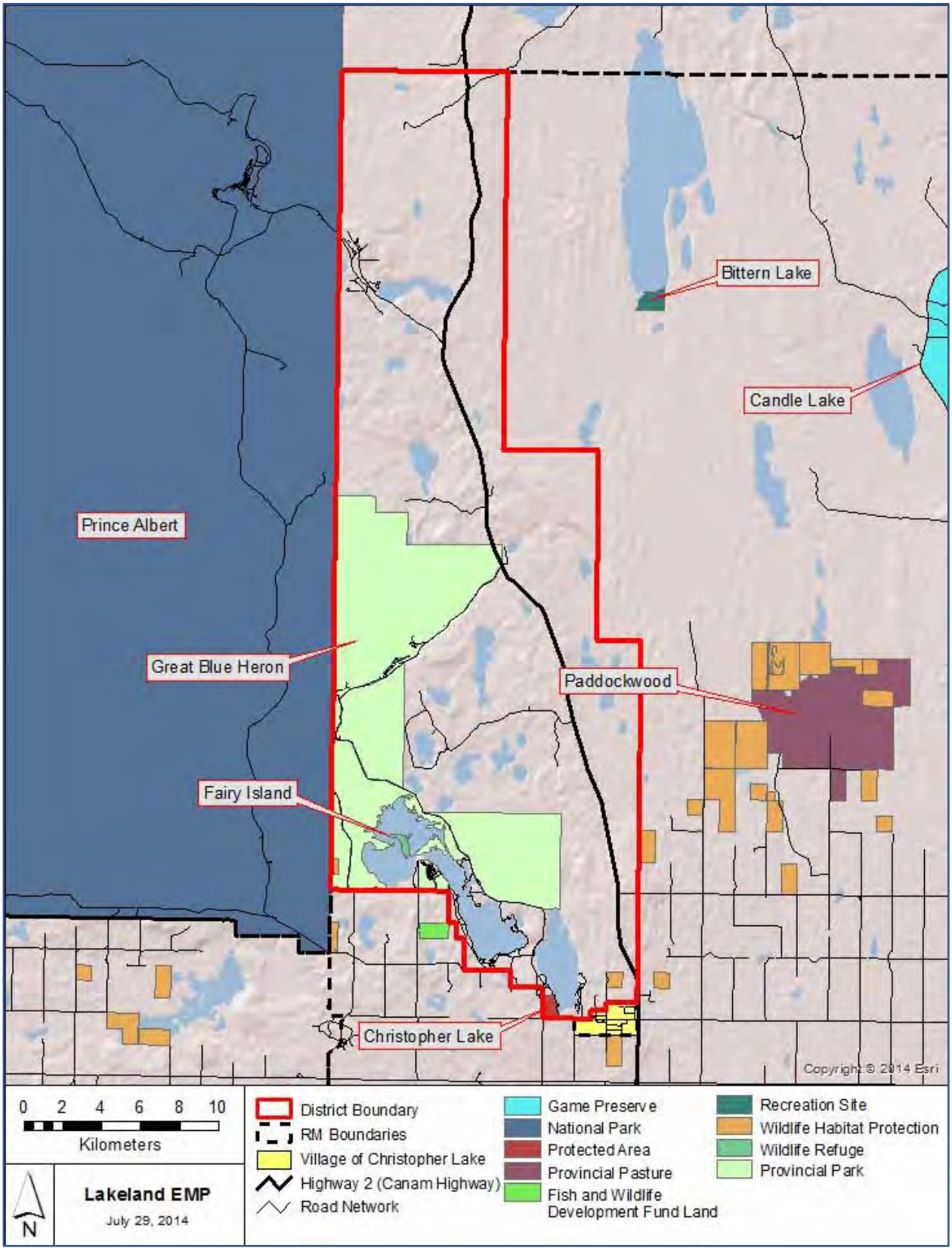
Lakeland EMP
July 29, 2014
District Boundary
RM Boundaries
Village of Christopher Lake
Highway 2 (Canam Highway)
Road Network
National Park
Provincial Park
Protected Area
Recreation Site


Bittern Lake
Candle Lake
Prince Albert
Great Blue Heron
Paddockwood
Fairy Island
Christopher Lake
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0 2 4 6 8 10
Kilometers
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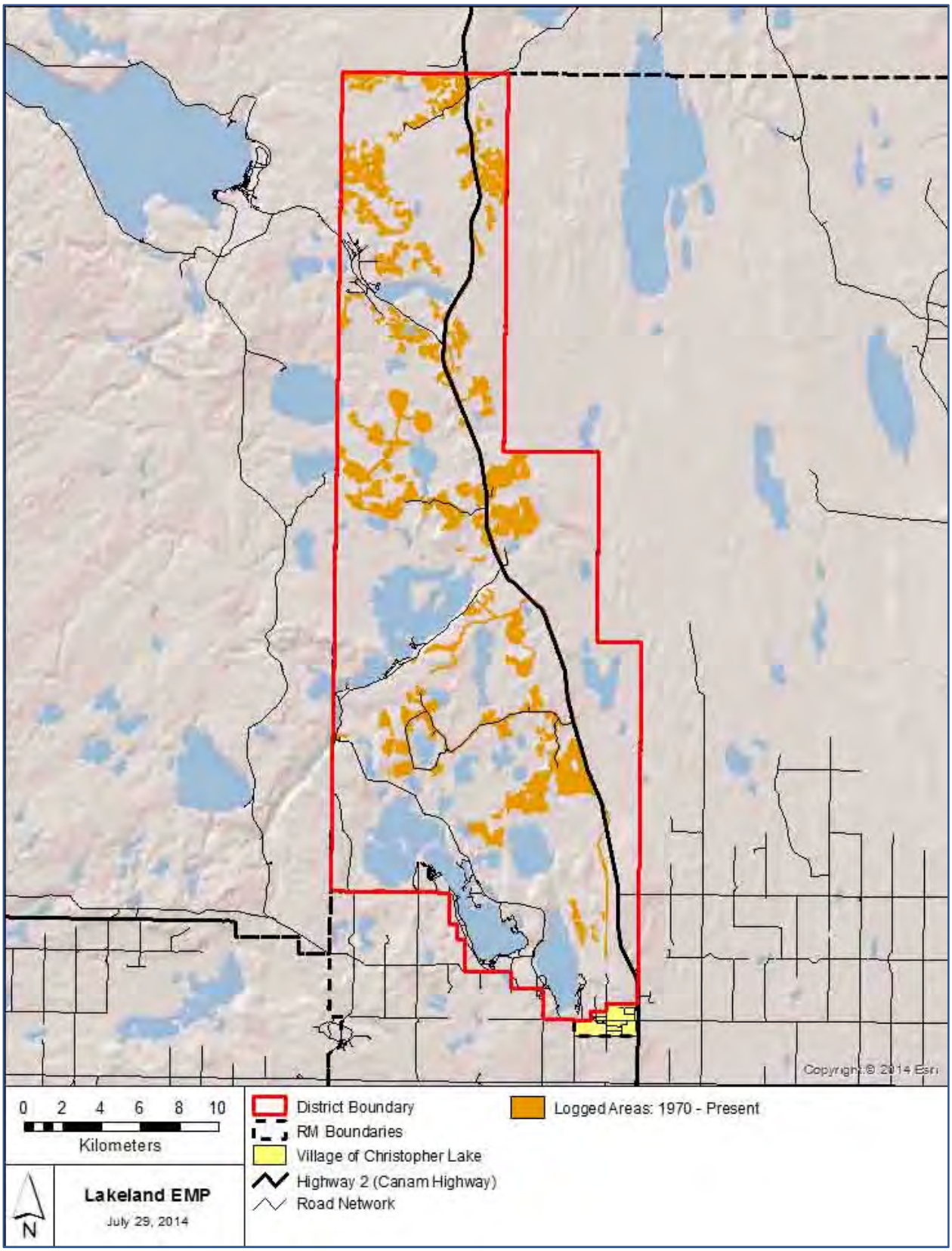
Lakeland EMP
July 29, 2014
District Boundary
RM Boundaries
Village of Christopher Lake
Highway 2 (Canam Highway)
Road Network
Game Preserve
National Park
Protected Area
Provincial Pasture
Fish and Wildlife Development Fund Land
Recreation Site
Wildlife Habitat Protection
Wildlife Refuge
Provincial Park

Common Name	Latin Name	Taxon	COSEWIC Status	Schedule	SARA Status
Alkaline Wing-nerved Moss	Pterygoneurum kozlovii	Mosses	Threatened	Schedule 1	Threatened
American Badger taxus subspecies	Taxidea taxus taxus	Mammals	Special Concern	No schedule	No Status
Baird's Sparrow	Ammodramus bairdii	Birds	Special Concern	No schedule	No Status
Bank Swallow	Riparia riparia	Birds	Threatened	No schedule	No Status
Barn Swallow	Hirundo rustica	Birds	Threatened	No schedule	No Status
Bigmouth Buffalo	Ictiobus cyprinellus	Fishes	Special Concern	Schedule 1	Special Concern
Bobolink	Dolichonyx oryzivorus	Birds	Threatened	No schedule	No Status
Buff-breasted Sandpiper	Tryngites subruficollis	Birds	Special Concern	No schedule	No Status
Canada Warbler	Cardellina canadensis	Birds	Threatened	Schedule 1	Threatened
Chestnut Lamprey	Ichthyomyzon castaneus	Fishes	Non-active	Schedule 3	Special Concern
Common Nighthawk	Chordeiles minor	Birds	Threatened	Schedule 1	Threatened
Eastern Whip-poor-will	Antrostomus vociferus	Birds	Threatened	Schedule 1	Threatened
Eskimo Curlew	Numenius borealis	Birds	Endangered	Schedule 1	Endangered
Great Plains Toad	Anaxyrus cognatus	Amphibians	Special Concern	Schedule 1	Special Concern
Gypsy Cuckoo Bumble Bee	Bombus bohemicus	Arthropods	Endangered	-	-
Horned Grebe	Podiceps auritus	Birds	Special Concern	No schedule	No Status
Lake Sturgeon	Acipenser fulvescens	Fishes	Endangered	No schedule	No Status
Little Brown Myotis	Myotis lucifugus	Mammals	Endangered	No schedule	No Status
Loggerhead Shrike Prairie subspecies	Lanius ludovicianus excubitorides	Birds	Threatened	Schedule 1	Threatened
Monarch	Danaus plexippus	Arthropods	Special Concern	Schedule 1	Special Concern
Northern Leopard Frog	Lithobates pipiens	Amphibians	Special Concern	Schedule 1	Special Concern
Northern Myotis	Myotis septentrionalis	Mammals	Endangered	No schedule	No Status
Olive-sided Flycatcher	Contopus cooperi	Birds	Threatened	Schedule 1	Threatened
Peregrine Falcon anatum/tundrius	Falco peregrinus	Birds	Special	Schedule 1	Special

	anatum/tundrius		Concern		Concern
Piping Plover circumcinctus subspecies	Charadrius melodus circumcinctus	Birds	Endangered	Schedule 1	Endangered
Plains bison	Bison bison bison	Mammals	Threatened	No schedule	No Status
Red Knot rufa subspecies	Calidris canutus rufa	Birds	Endangered	Schedule 1	Endangered
Rusty Blackbird	Euphagus carolinus	Birds	Special Concern	Schedule 1	Special Concern
Short-eared Owl	Asio flammeus	Birds	Special Concern	Schedule 1	Special Concern
Shortjaw Cisco	Coregonus zenithicus	Fishes	Threatened	Schedule 2	Threatened
Sprague's Pipit	Anthus spragueii	Birds	Threatened	Schedule 1	Threatened
Verna's Flower Moth	Schinia verna	Arthropods	Threatened	Schedule 1	Threatened
Western Bumble Bee occidentalis subspecies	Bombus occidentalis occidentalis	Arthropods	Threatened	-	-
Western Grebe	Aechmophorus occidentalis	Birds	Special Concern	-	-
Western Tiger Salamander	Ambystoma mavortium	Amphibians	Special Concern	No schedule	No Status
Wolverine	Gulo gulo	Mammals	Special Concern	No schedule	No Status
Woodland caribou	Rangifer tarandus caribou	Mammals	Threatened	Schedule 1	Threatened
Yellow Rail	Coturnicops noveboracensis	Birds	Special Concern	Schedule 1	Special Concern

Common Name	Latin Name	Taxon	Wildlife Act, 1998
Piping Plover	Charadrius melodus	Birds	Endangered
Sand Verbana	Abronia microantha	Vascular Plants	Endangered
Western Spiderwort	Tradescanthia occidentalis	Vascular Plants	Endangered
Tiny Cryptanthe	Crytantha minima	Vascular Plants	Endangered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Kilometers
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Lakeland EMP
July 29, 2014
District Boundary
RM Boundaries
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Highway 2 (Canam Highway)
Road Network
Logged Areas: 1970 - Present

Terrestrial Plants	Aquatic Plants
Common Tansy Black Henbane Common Burdock Dames Rocket Field Scabious Garlic Mustard Himalayan Balsam Jointed Goatgrass Leafy Spurge Oxeye Daisy Red Bartsia Russian Knapweed Salt Cedar Scentless Chamomile Spotted Knapweed Squarrose Knapweed Wild Parsnip Yellow Starthistle Yellow Toadflax	Curlyleaf Pondweed Eurasian Watermilfoil Flowering Rush Purple Loosestrife Water Soldier
Insects	**Animals**
Ash Leaf Cone Roller Cottony Ash Psyllid Gypsy Moth	Asian Tapeworm Fishhook and Spiny Waterfleas New Zealand Mudsnail Rusty Crayfish Zebra Mussels

DISTRICT OF LAKELAND NO. 521