North Saskatchewan Watershed Alliance

Mayatan Lake Watershed Management Plan

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The North Saskatchewan Watershed Alliance (NSWA) is a non-profit society whose purpose is to protect and improve water quality and ecosystem functioning in the North Saskatchewan River watershed in Alberta. The organization is guided by a Board of Directors composed of member organizations and individuals from within the watershed. It is the designated Watershed Planning and Advisory Council (WPAC) for the North Saskatchewan River under the Government of Alberta's *Water for Life Strategy*.

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Executive Summary

The North Saskatchewan Watershed Alliance (NSWA) has promoted watershed planning and management in this region of Alberta since 2000. The NSWA pursues its mission through strategic goals of leadership, collaborative planning and the generation of new knowledge. In particular, the development of collaborative partnerships with municipalities and local stewardship groups is seen to be a key mechanism for advancing watershed management.

The purpose of this document is to provide planning recommendations to support the prudent management of Mayatan Lake and its watershed, in alignment with the broad strategic goals identified in *Water for Life: Alberta's Strategy for Sustainability* (2003):

- Safe, secure drinking water
- Healthy aquatic ecosystems
- Reliable quality water supplies for a sustainable economy

This plan serves as advice to Parkland County, the Government of Alberta, the Mayatan Lake Management Association and all watershed stakeholders to guide future decision-making in their respective areas of responsibility and interest. It identifies specific actions that should be implemented, describes the roles and responsibilities of the various players to do so, and presents an implementation strategy based on both voluntary and statutory activities. A wide range of land and water characteristics may be considered in the development of lake and watershed management plans. Several key factors are discussed in this report.

Mayatan Lake is located on the *Carvel Pitted Delta*, an extensive area of hummocky, hilly terrain with numerous small "kettle" lakes (also known as "pothole" lakes) and wetlands. The kettle lakes of this area also share many hydrologic and morphometric features. They may be considered a unique sub-set of lakes in Parkland County because of their small watersheds, shallow depths, groundwater connections and limited surface hydrologic flushing.

The water quality of Mayatan Lake and other kettle lakes is considered highly sensitive to the effects of human encroachment. Strict water quality protection measures are required to minimize the potential for future degradation in these lakes resulting from shoreline disruption, or watershed land use changes.

The recommended management actions for Mayatan Lake are presented within the context of the *Integrated Watershed Management Plan for the NSR* (2012). The recommendations reflect the issues identified by stakeholders, and watershed management principles appropriate for this small lake. The recommendations are structured and formatted in alignment with the Goals and Actions of the IWMP and are further classified into policy, stewardship and technical actions. It is the opinion of NSWA that the recommendations fairly reflect the input received from all parties, and are supported by basic watershed management principles.

An Implementation Committee will be developed to ensure the success of this plan.

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Introduction

Watershed planning is a fundamental component of water resources management in Alberta and is strongly promoted by the province's 11 Watershed Planning and Advisory Councils (WPACs). The scope of watershed planning varies substantially across the province, and addresses a wide range of issues arising from human disturbances on Alberta's diverse landscapes and ecoregions. Watershed planning activities also vary in scale, from those associated with the water management needs of large river basins to those of smaller tributaries and lakes.

The North Saskatchewan Watershed Alliance (NSWA) has promoted watershed planning and management in this region of Alberta since 2000. The NSWA pursues its mission through strategic goals of leadership, collaborative planning and the generation of new knowledge. In particular, the development of collaborative partnerships with municipalities and local stewardship groups is seen to be a key mechanism for advancing watershed management.

The NSWA has supported several recent initiatives in lake management in this region through the provision of watershed assessments, riparian health assessments, water quality and hydrologic information, and environmental modelling. These technical projects have been designed to improve our understanding of local lakes and their watersheds, and to improve our collective planning and decision-making capabilities.

The NSWA was approached by the Mayatan Lake Management Association (MLMA) in 2010 to prepare a *State of the Watershed Report*. That report was completed in 2012, and the MLMA subsequently requested NSWA to undertake the development of a watershed management plan. The NSWA accepted this task and developed a collaborative process with the key jurisdictions (Alberta Environment and Parks; Parkland County), the MLMA and watershed residents.

Mayatan Lake and its watershed are located in a complex of small lakes and wetlands; the area has significant natural capital and biodiversity features (O2 Planning, 2014). These natural attributes are unique and are considered in this document.

Algal blooms are an unfortunate feature of summer water quality in many Alberta lakes, affecting water transparency, aesthetics and recreation, as well as other features such as oxygen concentrations, cyanotoxicity and the viability of fish communities. The control of summer algal blooms is therefore an important goal of lake management in this province. The management of excessive nutrient loadings derived from human activities in watersheds is a key element in achieving this goal. Therefore, a primary focus of this plan is to ensure long-term water quality management for the lake, based on the watershed management and eutrophication control concepts first summarized by the OECD (1982). These principles have been adopted and implemented by many jurisdictions.

Interest in lake management in Alberta is growing and progress is evident in many recent initiatives. The Government of Alberta, through Alberta Environment and Parks, is pursuing new policy initiatives aimed at protecting lakes in this region. The *Water Conversations* initiative addressed the topic of healthy lakes in its final report "*A Plan for Action*" (2014). That report

committed the GOA to address the need for prudent management, public awareness, knowledge improvement and a provincial lake policy to provide long-term guidance and protection for lakes. The *North Saskatchewan Regional Plan Regional Advisory Committee* was asked to address questions specific to the management of lakes in this region, and submitted a report to the GOA in autumn 2014. That report identified the need to guide development around lakes, recognizing the diversity of lake types and natural regions. The *Alberta Water Council* has developed a project team to provide recommendations for improved lake management in Alberta. This work will document and assess the current state of lake management planning and governance (i.e., roles and responsibilities) and the adequacy of the technical information base. The final report is due in 2016.

Parkland County invoked 2015 as the "*Year of our Lakes*" - a municipal leadership initiative to highlight the need for awareness and prudent management of lakes and their watersheds. The County is actively reviewing its Municipal Development Plan, and considering a range of sustainability issues. Parkland County is specifically undertaking the development of a lake land use plan for Lake Wabamun, and is proposing to develop equivalent plans for four other lakes, including Mayatan Lake. These plans will each guide land management decisions for their respective lakes, with a central goal of protecting individual lake ecosystems for future generations.

Population growth in the Capital Region of Alberta has been substantial in recent decades, and the associated demand for outdoor recreation opportunities has escalated. Lake-based recreation pressures have increased, but the number of regional lakes available to support the demand is limited when compared to other areas of Canada. Many of the lakes in Parkland County under development pressures are the small "kettle" lakes located on the groundwater recharge zone known as the Carvel Pitted Delta (Figure 1; Parkland County, 2014a). These lakes are situated in small watersheds and have limited water renewal. Many have marginal water quality, exacerbated by human activities along shorelines and in their watersheds. This has led to a complex array of environmental, social and economic conflicts around local lakes, which the various jurisdictions have found difficult to address.

The recent, warm, climatic trends have further influenced the challenge. Parkland County declared a *state of agricultural disaster* in 2015 due to low precipitation levels early in the growing season. Water levels in several of the kettle lakes, including Mayatan Lake, declined significantly in 2015. More importantly, many have experienced recurring hydrologic deficits and water levels have shown a declining trend for the past two decades.

It is within the context of provincial and municipal policy initiatives, regional growth trends, and the unique attributes of Mayatan Lake that the following management plan has been prepared.

The Purpose of This Plan

The purpose of this document is to provide recommendations to support the prudent management of Mayatan Lake and its watershed, in alignment with the broad strategic goals identified in *Water for Life: Alberta's Strategy for Sustainability* (2003):

- Safe, secure drinking water
- Healthy aquatic ecosystems
- Reliable quality water supplies for a sustainable economy

This document also aligns with the Water Management Principles outlined in *Water for Life: A Renewal* (2008), including:

- Alberta's water resources must be managed within the capacity of individual watersheds
- Citizens, communities, industry and government must share responsibility for water management in Alberta and work together to improve conditions within their local watershed
- Healthy aquatic ecosystems are vital to a high quality of life for Albertans and must be preserved
- Groundwater and surface water quality must be preserved while pursing economic and community development

This plan serves as advice to Parkland County, the Government of Alberta, the Mayatan Lake Management Association and all watershed stakeholders to guide future decision-making in their respective areas of responsibility and interest. It identifies specific actions that should be implemented, describes the roles and responsibilities of the various players to do so, and presents an implementation strategy based on both voluntary and statutory activities.

Background

Role of Watershed Planning and Advisory Councils

The North Saskatchewan Watershed Alliance is a multi-stakeholder, charitable organization led by an elected Board of Directors. Its purpose is to contribute to the protection of water quality, water supplies, ecosystem function and watershed health through the collaborative efforts of stakeholders and interested individuals.

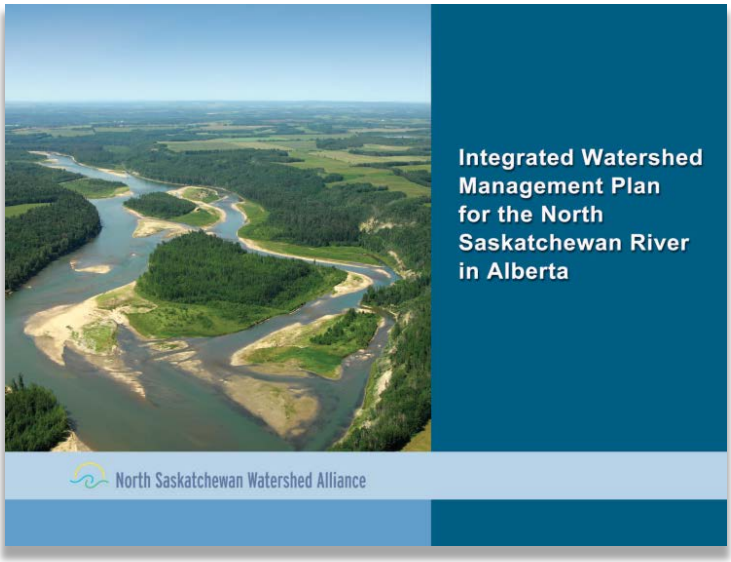
The NSWA provides an open, public forum for sharing information about issues affecting the North Saskatchewan River (NSR) watershed and initiates activities that positively impact the watershed. It has a diverse membership including individual citizens and representatives from numerous jurisdictions and organizations: municipal governments; utilities; the federal and provincial governments; industries; environmental and conservation groups; the agriculture

sector; the recreation, culture and tourism sectors; and the education and research sectors. The NSWA became a registered non-profit society in 2000 and a registered charity in 2016.

In 2005, Alberta Environment designated the NSWA as the *Watershed Planning and Advisory Council* (WPAC) for the North Saskatchewan River watershed, under *Water for Life,* with the following mandate:

> *"Water Planning and Advisory Councils will lead in watershed planning, develop best management practices, foster stewardship activities within the watershed, report on the state of the watershed and educate users of the water resource."*

The NSWA has made good progress under this mandate and in 2012 released a document entitled "*Integrated Watershed Management Plan for the North Saskatchewan River in Alberta"* (IWMP). This major undertaking provides advice and direction to protect the long-term supply and quality of water resources for future generations. The IWMP is based on extensive public engagement and consultation, and is supported strongly by its members, stakeholders and the GOA. IWMP implementation is now underway through work with municipal watershed partnerships and local stewardship groups. It provides the general direction for addressing water and watershed management issues, including the maintenance (protection) or improvement of water quality (Goal 1) and the aquatic ecosystem health of lakes (Goal 3).



Role of Watershed Stewardship Groups

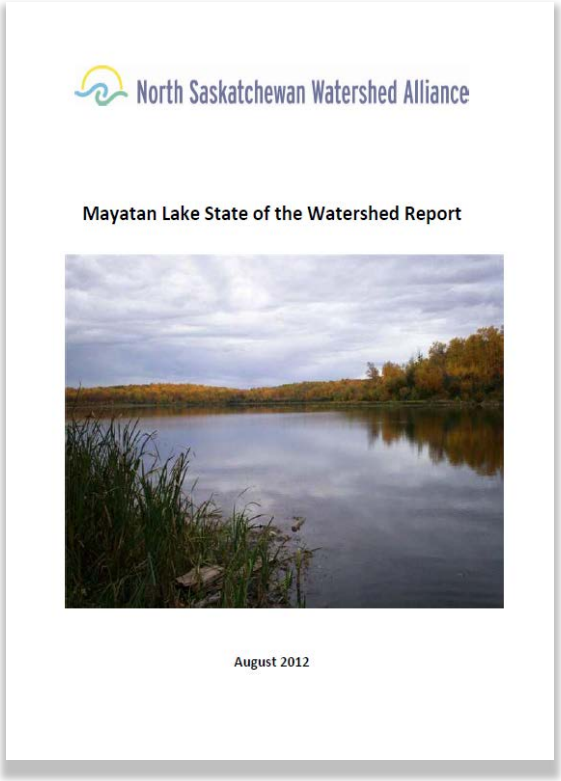
The Mayatan Lake Management Association has played an important role in engaging local area stakeholders and getting them involved in the consultation process to support the development of this management plan. The role of Watershed Stewardship Groups was clearly outlined in *Water for Life* (2003):

"Watershed Stewardship groups will be encouraged to participate at the Watershed Planning and Advisory Council level, for guidance, technical advice and mentoring. WSGs will share information and take action to protect and enhance their local watersheds. Outcomes include promotion of best management practices, collaboration with land managers, state of sub-basin reports recommendations in local water management plans, input into WPAC activities".

The MLMA has communicated extensively with Parkland County and Alberta Environment and Parks (AEP) regarding their concerns for the lake, and the need for a comprehensive approach to decision-making around recreational lakes in general. The Mayatan Lake Management Association collaborated with NSWA in hosting three successful rounds of public consultation sessions during 2014 and 2015 in order to gather feedback and support for the development of these watershed management recommendations.

State of Watershed Assessment

The NSWA prepared the *Mayatan Lake State of the Watershed Report* in 2012. This assessment was requested by the Mayatan Lake Management Association (MLMA) to support their need for a consolidation of land and water information, and in response to their concerns regarding the management of development pressures in the watershed. The *Mayatan Lake State of the Watershed Report* provides a comprehensive summary of land and water characteristics.



The report summarized all available data for the Mayatan Lake and its watershed, and identified a number of technical and policy information gaps that should be filled to support effective management of the basin. The report made the following recommendations:

- Investigate the interactions between surface water and groundwater in the area to more accurately determine lake flushing rates
- Develop a suite of indicators (biological, physical and chemical) to be used to monitor the health of the lake
- Encourage stewardship activities around the lake
- Address data gaps in report – riparian health, water quality, mapping of wildlife and waterfowl habitat including nesting/breeding/staging specific to the watershed
- Conduct a regular lake water quality monitoring program, perhaps through the Alberta Lake Management Society LakeWatch Program. Test for extra parameters such as fecal bacteria, metals, pesticides and others to increase baseline data
- Estimate phosphorus loadings from residential development, atmospheric inputs and groundwater, revise the estimated phosphorus budget as necessary
- Participate in programs such as "Living by Water" (http://www.livingbywater.ca/main.html)
- Support public education about water quality, shoreline management, maintenance of natural vegetation
- Track annual recreational use of the lake and watershed by campers, anglers, others
- Develop a Watershed Management Plan for the lake and its watershed, in alignment with the North Saskatchewan Watershed Alliance *Integrated Watershed Management Plan*

Subsequent studies have provided more information on water quality, riparian conditions and watershed/lake interactions. The Alberta Lake Management Society (ALMS) monitored the lake during 2011, 2012 and 2013 as part of the *LakeWatch Program,* providing further updates on summer water quality conditions.

Environmental Context

Natural Features

Mayatan Lake is located on the *Carvel Pitted Delta* (Figure 1), an extensive area of hummocky, hilly terrain with numerous small "kettle" lakes (also known as "pothole" lakes) and wetlands created by sediment deposition associated with glacial lakes, including Lake Edmonton (Alberta Soil Survey Report No. 24; 1968). The *Carvel Pitted Delta* is considered an extensive groundwater recharge zone (Hydrogeological Consultants Ltd., 1999) and is a key contributor to the hydrologic

function of the region. Surface water is able to pool amongst the hummocks and infiltrates the sandy tills to eventually recharge underlying groundwater aquifers. The soils are classified as silty to fine-sandy; the sloping cultivated lands are considered highly erodible when the soil is without plant cover.

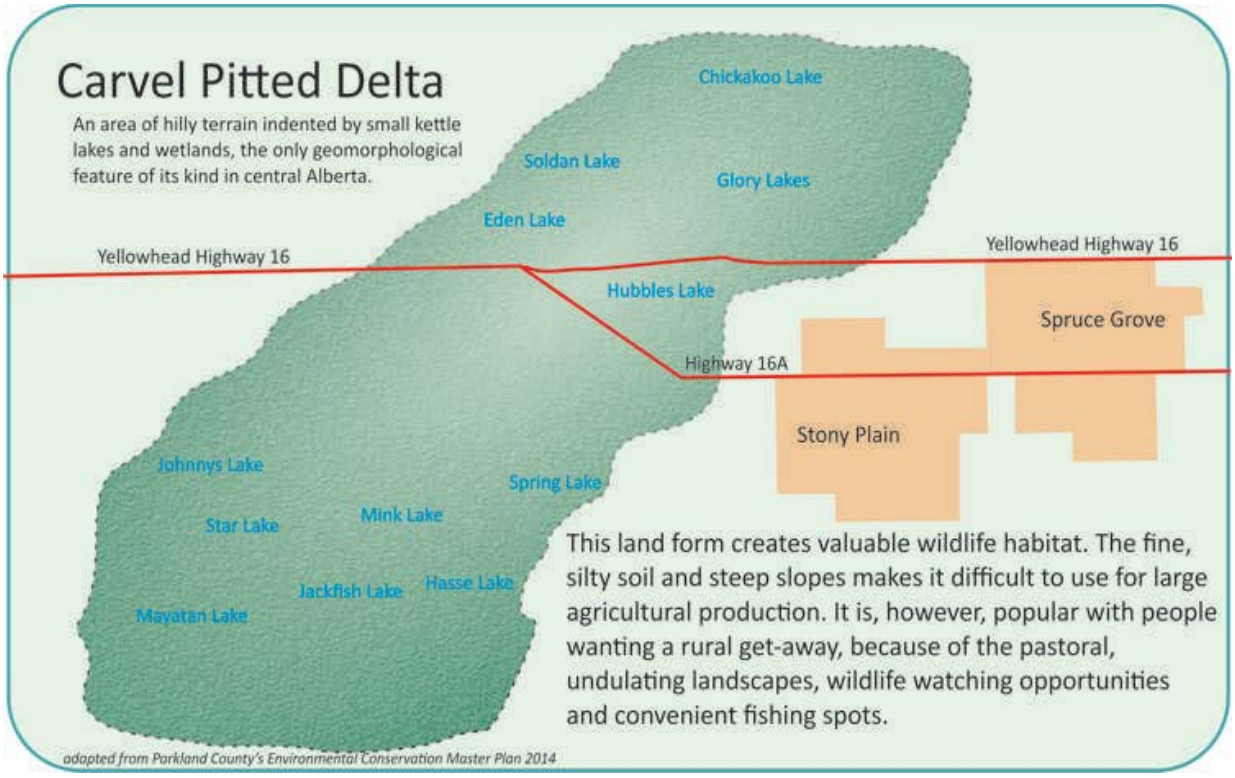


Figure 1. The Carvel Pitted Delta, a unique land form associated with glacial Lake Edmonton.

The kettle lakes of this area also share many hydrologic and morphometric features. They may be considered a unique sub-set of lakes in the North Saskatchewan region because of their small watersheds, shallow depths, groundwater connections and limited surface hydrologic flushing.

Historically, the Alberta Fish and Wildlife Division recognized the common features of these lakes and managed sport fisheries by means of annual stocking programs, referred to as the *"put and take"* trout fisheries. Mayatan, Jackfish and Mink were exceptions, having natural pike, perch and walleye populations (K. Zelt, Pers. Comm. 2016).

Mayatan Lake is unique among these lakes due to its relatively intact shoreline and upland forested areas, which provide valuable wildlife and waterfowl habitat. The shoreline is well populated with waterfowl, and there are numerous species of songbirds and raptors present. Mammals can be found in the area, particularly deer and moose (NSWA, 2012). This indicates a healthy upland area and the presence of local wildlife corridors for cover and passage.

Hydrology

Mayatan Lake has a very small watershed area: lake surface area ratio (approximately 3:1, based on the "effective" drainage area). There is no outflow and water levels are controlled by the balance of surface runoff, direct precipitation onto the lake, seepage to groundwater and evaporative losses. It has a theoretical residence time of 160 years (the time required to fully replace the lake volume), calculated as the ratio between lake volume and the net of (surface inflows + precipitation – evaporation) (Figliuzzi, 2011). Groundwater influences are presumably involved in the water balance, but site-specific information is not yet available. The lack of surface outflow and hydrologic flushing means that phosphorus, and other substances of concern entering the lake, will be retained and accumulate over time.

Climate Trends and Lake Levels

A long-term climate cycling pattern, with natural wet and dry periods, has been documented for the North Saskatchewan River basin. This information has been reconstructed from the analysis of tree rings and the inferred data extends back many centuries (Sauchyn et al., 2011; Sauchyn et al., 2015). The cycles typically extend over a decade or more.

These cycles are thought to be intricately linked to two climate drivers: the El Niño Southern Oscillation (ENSO) and the Pacific Decadal Oscillation (PDO). ENSO refers to Pacific Ocean temperatures off the coast of South America along the equator and cycles on timescales of 2—7 years (NOAA, 2015a). The PDO involves temperature shifts in the northern Pacific and a much longer cycle of 20-30 years (SCONC, 2015).

Alberta is currently in a warm PDO phase and this is having a measurable effect on regional lake levels, stream flows and groundwater levels around the Capital Region (NSWA 2016a; NSWA 2016b). Historic data showing declining levels over the past two decades for eight small lakes on the Carvel Pitted Delta are presented in Figure 2. These lakes include Chickackoo, Hubbles, Johnny's, Spring, Hasse, Jackfish, Mink and Star.

The lake levels for Jackfish Lake for the period 1968 – 2013 have been plotted with precipitation and temperature data from the Stony Plain weather station (Environment Canada, 2015) in Figure 3. The recent patterns of above average temperatures, below average precipitation and declining lake levels are clearly evident over the past two decades. The estimated loss of lake water volume from Jackfish Lake has been approximately 30%. Jackfish Lake experienced a blue green algal advisory in summer 2015, and a winter fish kill in March 2016 (NSWA 2016b).

There is no water level gauge in place at Mayatan Lake, however aerial photographs indicate that the lake has been in a receding pattern for many decades (Stantec 2011). The pattern of receding lake levels has isolated some of the smaller bays, and the channel between the two main basin was essentially impassable in 2015.

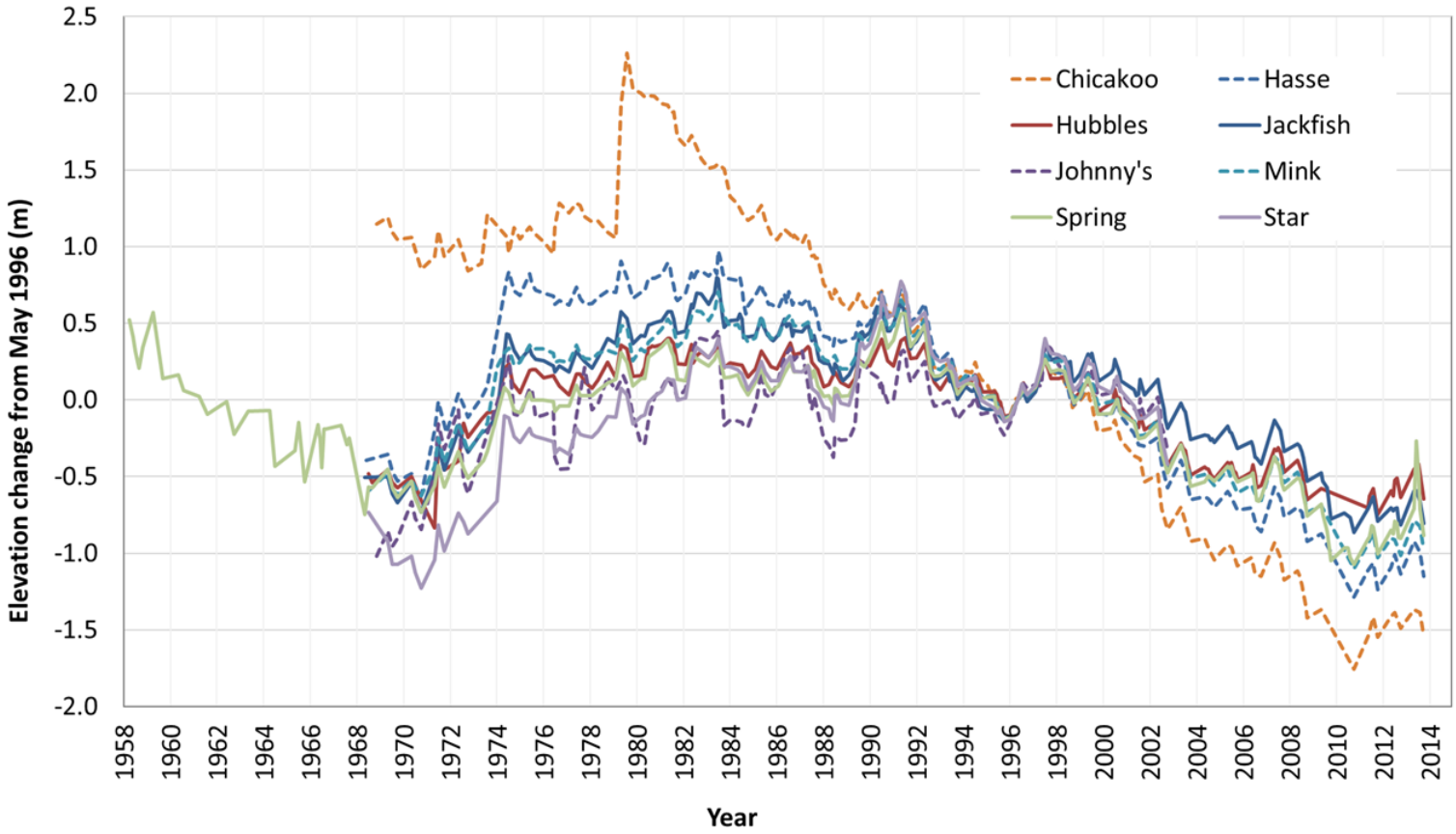


Figure 2. Regional decline of water levels in lakes of the Carvel Pitted Delta. Levels are graphed relative to May 1996 elevation. (Figliuzzi and Associates, 2015).

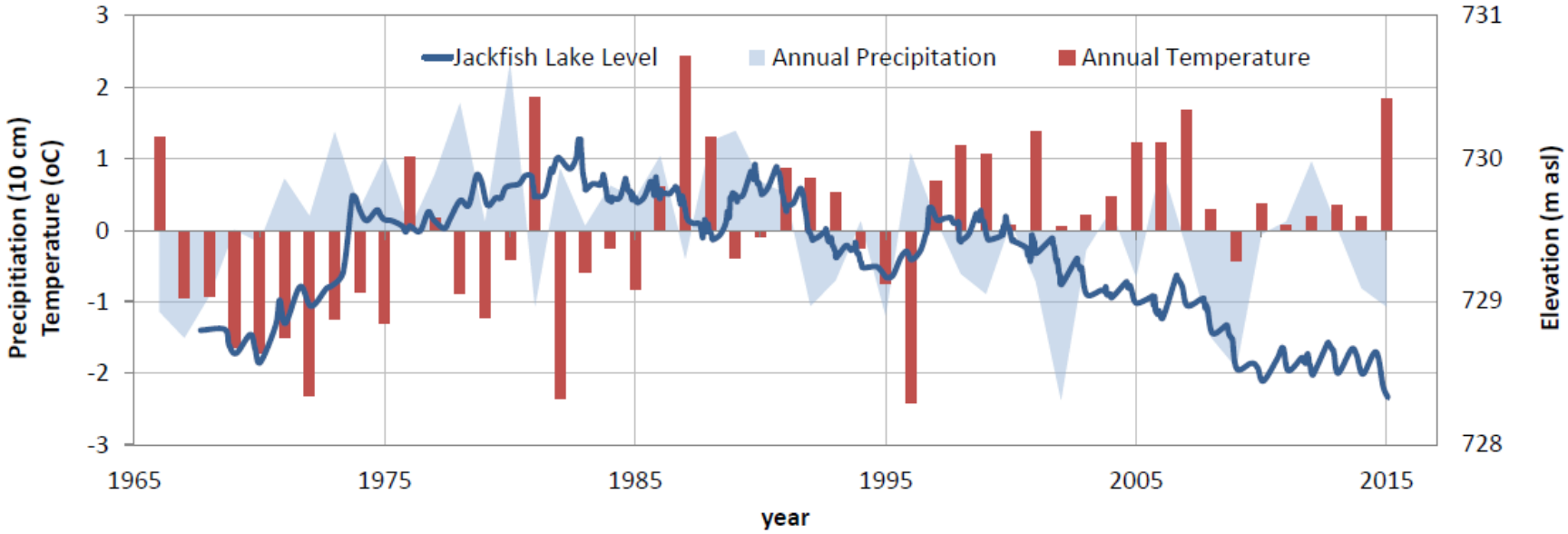


Figure 3. Jackfish Lake water levels compared to annual precipitation and temperature at Stony Plain (data from Alberta Environment, 2015b and Environment Canada, 2015)

This new pattern of declining lake levels and water volume loss, coupled with increasing air/water temperatures introduces a new and complicating factor into watershed planning for the small lakes of this region. It will be important to assess the future hydrologic character of these lakes, and if this proves impractical then precautionary principles should be considered in watershed planning.

Temperature, Dissolved Oxygen and Fisheries Winterkill

Mayatan Lake has two primary basins (west and east); the waters of these basins display very different physical and chemical characteristics.

At the time of original bathymetric survey (R.L. & L. Environmental Services Ltd., 1987) the west basin had a maximum depth of 26.5 m and an average depth of 9.6 m. However, the west basin appears to be poorly mixed due to its sheltered nature and the limited fetch (wind exposure). The deeper waters are devoid of oxygen below a depth of 6 m for most of the open water season and have a temperature of approximately 5^{o}C (ALMS, 2013). Spring and fall vertical mixing appear to be incomplete, which further reduces the potential for oxygen replenishment in deeper waters and renders the fish community of the west basin very prone to winterkill. The lake has a history of winterkill and the west basin was artificially aerated for several years by the Alberta Conservation Association (ACA, 2014).

The east basin had a maximum depth of approximately 8.5 m, with a mean depth of 3.3 m. Although the basin is shallow, there is also enough protection from prevailing winds to allow thermal stratification to develop below 4 m by mid-summer; waters below this depth also become anoxic but they display much higher bottom temperatures than the west basin (in the range of 15–20 ^{o}C). Spring/fall mixing appears to be complete in this basin. The east basin also has a history of fisheries winterkill, simply because of its shallow nature. The last winterkill occurred in 2015. Declining lake levels will accentuate this winterkill risk (Barica and Mathias, 1979; NSWA 2016b).

Recreational Water Quality

Recreational water quality is often assessed against summer algal concentrations, commonly measured as chlorophyll a. Cyanobacteria (“blue green algae”) are prevalent in most central Alberta lakes, and quickly dominate summer algal growth when nutrient-rich conditions occur. The concentration of total phosphorus in lake water is considered the key factor in determining algal growth in freshwater lakes in central Alberta. In shallow lake basins, the release of phosphorus from bottom sediments during mid-summer (internal loading) is the key mechanism stimulating growth (Bierhuzen and Prepas 1985).

In 2013 the deeper west basin of Mayatan Lake contained moderate levels of total phosphorus and chlorophyll a in the euphotic zone (Table 1). These summer average values were very similar to those found in Wabamun Lake (2012) and Jackfish Lake (2013). The west basin would be classified as *mildly eutrophic* based on these recent data; within the regional lake context these

values reflect reasonable water quality. Historic nutrient data for the west basin are unavailable, although the R.L. & L. report provided composite data for the lake as a whole.

Table 1. Recent Total Phosphorus and Chlorophyll a concentrations for Mayatan, Wabamun and Jackfish Lakes.

Lake	Chl a (µg/L)	TP (µg/L)
Mayatan Lake west (2013)	4.6	35
Jackfish Lake (2013)	7.4	34
Wabamun Lake (2012)	8.6	34
Mayatan Lake east (2013)	19.7	92

The shallow east basin presents a very different condition, and appears to have deteriorated significantly since 1983. The lake was sampled intensively by University of Alberta researchers in 1983 (Bierhuizen and Prepas, 1985). At that time, the east basin was classified as eutrophic, with moderate levels of total phosphorus (summer average = 27 µg/L) and chlorophyll a (summer average = 7.1 µg/L), very similar to the values of the west basin as presented in Table 1. However, the recent data collected by ALMS (2013) indicate that a three to four-fold increase in summer concentrations of both variables has occurred ([TP] = 92 µg/L, [Chl a] = 19.7 µg/L) placing the east basin in the *hypereutrophic* category. The deterioration in the east basin may be due to external factors (increased agricultural land use and riparian impacts since the 1983 study) and internal factors (declining lake levels, increased lake temperatures and increased vertical mixing of the nutrient rich bottom waters; Bierhuizen and Prepas, 1985). The effect of these differing algal densities on turbidity and light transmission is visible in Figure 4.

Riparian Health

The NSWA conducted a riparian health assessment of Mayatan Lake in 2014 using an unmanned aerial vehicle (drone) and analytical methods as described for Wabamun Lake (NSWA, 2014). Riparian health in the west basin of Mayatan Lake is generally good (Figure 3), with small, isolated patches that have been cleared for access or beaches. Riparian health in the east basin is impaired in larger sections, and evidence of cattle access is apparent. Loss of riparian areas can negatively impact water quality, waterfowl and fish populations, and biodiversity.

Human Footprint

The shoreline of Mayatan Lake is largely undeveloped compared to other recreational lakes within central Alberta. The watershed of the west basin is primarily forested land (75%) whereas the watershed of shallow east basin is primarily agricultural land (70%). Farm activity consists of cattle grazing, pasture, hay and cropland.

The lake is part of a larger complex of lakes and wetlands in an area known as the "*Jackfish and Johnny's Lakes Area (L31)*" (Westworth Associates Environmental Ltd., 2004). The area around

Mayatan Lake has been identified as a Regionally Environmentally Significant Area (ESA) by Parkland County in its municipal planning documents. As seen in the 2004 Westworth and Associates surveys, residents in the County are supportive of the protection of Environmentally Significant Areas in Parkland County.

Country residential development impinges on both basins, with 51 properties in Mayatan Lake Estates, located on the north central side of the lake (Figure 4), with an approximate population of 48 individuals. Lake property owners are utilizing different methods for sewage management, given the lack of a communal collection system. An informal survey conducted by MLMA in the Mayatan Lake residential areas revealed the following:

- 6 owners have pump-out holding tanks
- 3 have outhouses (seasonal use)
- 17 have a tank and septic field system
- 2 have a porta-potty system

Septic systems can affect ground and surface water quality in several ways. Failing systems or systems located improperly can discharge inadequately treated sewage, which can run into surface waters or contaminate groundwater supplies with nutrients and microbes. If properly maintained, pump-out holding tanks are an effective method of handling sewage wastes and minimizing impacts along lakeshores.

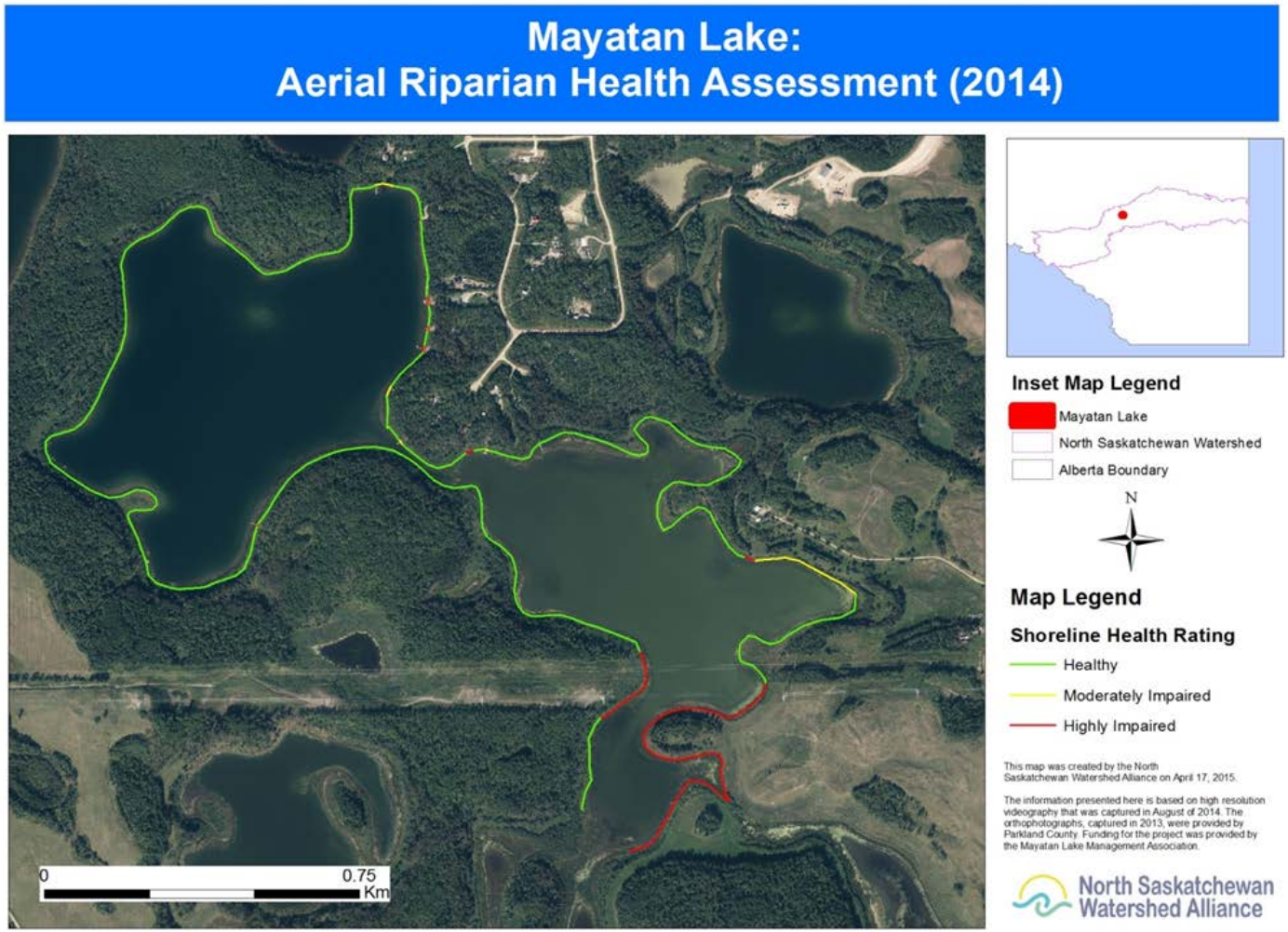


Figure 4. Riparian health assessment of Mayatan Lake (NSWA, 2014). Note the difference in water colour between the two basins.

Summary of Lake and Watershed Features

A wide range of land and water characteristics may be considered in the development of lake and watershed management plans. Several key factors have been discussed in this report. The challenge is to integrate the information contained in these various factors into an overall assessment of lake condition and management advice.

The Cariboo Regional Government in B.C. developed a practical screening tool to support lake planning in 2004 (Caribou Region District, 2004). The challenge they faced was to assess and determine the suitability of many different lakes in their jurisdiction for future recreational development. The Regional Government developed a series of land and water metrics to assess the risk of lake water quality degradation; those metrics included current trophic state, hydrologic characteristics, mean depth and watershed characteristics (size, land use). Many of these metrics were based on original lake water quality management principles published by the OECD (1981).

Hutchinson Environmental Sciences Ltd (HESL) have prepared a summary of lake and watershed risk assessment approaches used in British Columbia, Ontario and Minnesota. The information was presented by HESL at workshop hosted by NSWA and Alberta Environment and Parks in June 2015 (HESL, 2015). These various jurisdictions have also used key lake and watershed metrics to develop cumulative assessment approaches for assessing lake vulnerability to water quality degradation. Much planning guidance has been derived from this approach.

A similar screening and assessment tool has been developed for Mayatan Lake. The metrics used have been derived from lake management literature and water science principles. A summary of 15 key metrics is presented below and in Table 3. The potential to influence or impact lake water quality is used as the end-point for all of screening criteria. The condition of Mayatan Lake and its watershed with respect to each factor is screened either as low, medium or high concern, and then an overall interpretation is presented.

Watershed Factors:

- Watershed Land Cover
- Tributary Water Quality
- Watershed Area to Lake Surface Area Ratio

Shoreline Factors:

- Proportion of Shoreline Developed
- Riparian Zone Health
- Soil Suitability for Septic Fields
- Shoreline Complexity

Lake Water Quality Factors:

- Trophic Status
- Fisheries Summerkill Risk
- Fisheries Winterkill Risk
- Internal P-Loading Rate

Hydrologic and Morphometric Factors:

- Hydrologic Flushing Rate
- Groundwater Inflow
- Licensed Water Withdrawals
- Extent of Littoral Zone Extent

Data are currently available for Mayatan Lake to assess 13 out of the 15 metrics. Eight metrics indicate high concern, four indicate moderate concern and one indicates low concern (see highlighted red squares in Table 2). Based on these various characteristics, the water quality Mayatan Lake is considered highly sensitive to the effects of human encroachment. Strict water quality protection measures are required to minimize the potential for future degradation of the lake resulting from shoreline disruption, or watershed land use changes.

Table 2. Summary of lake and watershed features for Mayatan Lake. Metrics with insufficient data are denoted with an asterisk*

METRICS	LOW CONCERN	MODERATE CONCERN	HIGH CONCERN
WATERSHED FACTORS			
Watershed Land Cover	Natural State	(0-25% disturbance from Natural)	**(25% - 75% disturbance from Natural)**
Tributary Water Quality*	Good [TP] <100 ug/L	Fair [TP] 100-250 ug/L	Poor [TP] >250 ug/L
Watershed Area: Lake Surface Area Ratio (surrogate factor for water supply)	High Ratio >10	Medium Ratio 5- 10	**Low Ratio** **<5**
SHORELINE FACTORS			
Proportion of Shoreline Developed	Natural State	**Moderate Development** **0% - 25%**	High Development 25% - 75%
Riparian Zone Health	Healthy	**Moderately Impaired**	Highly Impaired
Soil suitability for septic (depth to groundwater) *	Depth to GW >3.0 m	Depth to GW 1.0 -3.0 m`	Depth to GW <1.0m
Shoreline Complexity (shoreline development factor)[1]	SDF 1-2	SDF 2-3	**SDF >3**

[1] The shoreline development factor (SDF) is the ratio of the lake shoreline length to the circumference of a circle of the same area. It is often used by fisheries biologists with a high SDF resulting in more abundant fish habitat. In this case, a high SDF is of high concern because it means there is a greater length of shoreline that could potentially be impacted by development.

METRICS	LOW CONCERN	MODERATE CONCERN	HIGH CONCERN
WATER QUALITY CONDITIONS			
Trophic Status	Oligo-Mesotrophic	Meso-Eutrophic	**Eutrophic**
Summerkill Risk	Well mixed – high [DO]	Moderate rate of hypolimnetic [DO] depletion, spring/fall mixing	**Extended hypolimnetic [DO] depletion**
Winterkill Risk	Mean depth >3.0 m	**Mean depth 2.0 - 3.0 m**	Mean depth < 2.0 m
Internal Phosphorus Loading	< 1 mg/m2/day	**1 – 5 mg/m2/day**	>5 mg/m2/day
HYDROLOGIC AND MORPHOMETRIC FACTORS			
Flushing Rate (% of Lake Volume/yr)	>10%/yr	3% - 10%/yr	**<3%/yr**
Groundwater Inflow to Lake*	High Inflow	Medium Inflow	Low Inflow
Water Allocation Volume % of Inflow* (not enough data for this watershed)	**< 10%**	10% -20 %	>20%
Littoral Zone (< 4m) as % of Lake Area	Low (< 25%)	Moderate (25% - 50%)	**High (> 50%)**

Policy Context

A number of overarching legislative and planning initiatives are applicable to the management of the Mayatan Lake watershed, as described in the *Mayatan Lake State of the Watershed Report* (2012). Municipal planning initiatives generally follow the hierarchy demonstrated in Figure 5.

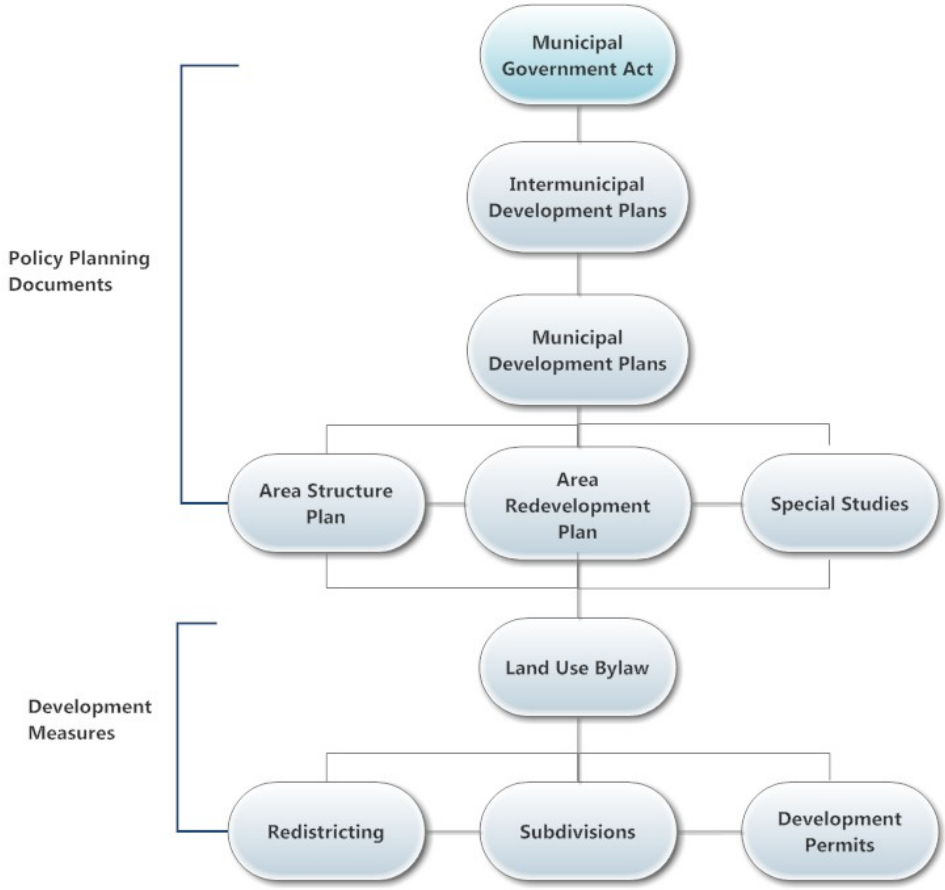


Figure 5. Municipal planning hierarchy.

Parkland County Environmental Conservation Master Plan (ECMP) – 2014

Parkland County initiated the development an *Environmental Conservation Master Plan* (ECMP) and published the Phase 1 report in 2014. It addresses a wide range of issues and geographic areas with in the county. It specifically identifies *Environmentally Significant Areas* (ESAs) in the County and assigns environmental sensitivity ratings. The report identifies the Mayatan Lake Complex as a *Regionally Significant ESA*, with a high rating with respect to environmental sensitivity. The high sensitivity was based on the following factors: Mayatan Lake watershed is

situated in a groundwater recharge zone; the sensitivity of its lakeshores and wetlands to disturbance; and the relatively intact nature of the lake/forest habitat complex (O2 Planning, 2014). It is noted in this report that all ESAs in Parkland County include a 100 m buffer from the shoreline. This buffer is not to be interpreted as a development restriction zone, but rather a precautionary planning zone in which development must be managed with extreme care for the conservation of riparian environments (Parkland County, 2014a).

Lake Land Use Plans – Parkland County

Parkland County is currently working towards the development of a *Lake Land Use Plan* for Wabamun Lake, along with a management "toolbox" that can be applied to other lakes (Stantec, 2015). Parkland County intends to apply the knowledge and tools derived from the Wabamun lake project to Lake Isle, Hubbles Lake, Jackfish Lake and Mayatan Lake.

Parkland County Land Use Bylaws Consolidation (2014)

One of the most powerful statutes that Alberta municipalities can utilize to control land use is the *Land Use Bylaw*. Parkland County has specific tools in its *Land Use Bylaw* that can be used to prudently manage the watershed of Mayatan Lake. For example, Section 5.6 (*Lakeshore Residential Districts)* provides specific details regarding allowable development on lakeshores. Section 8.1 (*Conservation Districts*) limits usage to activities such as passive recreation and education. Land Use Bylaw 04-2010 clearly states that tree removal will be restricted within 30 meters of a water body.

The subdivision authority within the County provides subdivision approvals, and can attach conditions to those approvals, which may include providing land as *Environmental Reserve*. These conditions could be used to protect riparian lands in future subdivision applications. The development authority has control over the approval of development applications, and may also apply conditions to a development permit requiring the applicant to comply with the *Alberta Land Stewardship Act*, and the *Land Use Bylaws*. This provides Parkland County with a large amount of control over activities on the land.

As seen in Figure 7, the Mayatan Lake complex is currently zoned as three districts: *Agricultural General, Country Residential* and *Agricultural Restricted*. Some parcels of Crown land are present along the watershed of the eastern basin. The *Environmentally Significant Areas* around the lake (diagonal lines) have been overlain onto the land use districts to illustrate the dilemma associated with the duality of land designations within the ECMP and the LUB. Potential wildlife corridors are also indicated (green arrows). *Conservation Districts* have not been identified in this watershed.

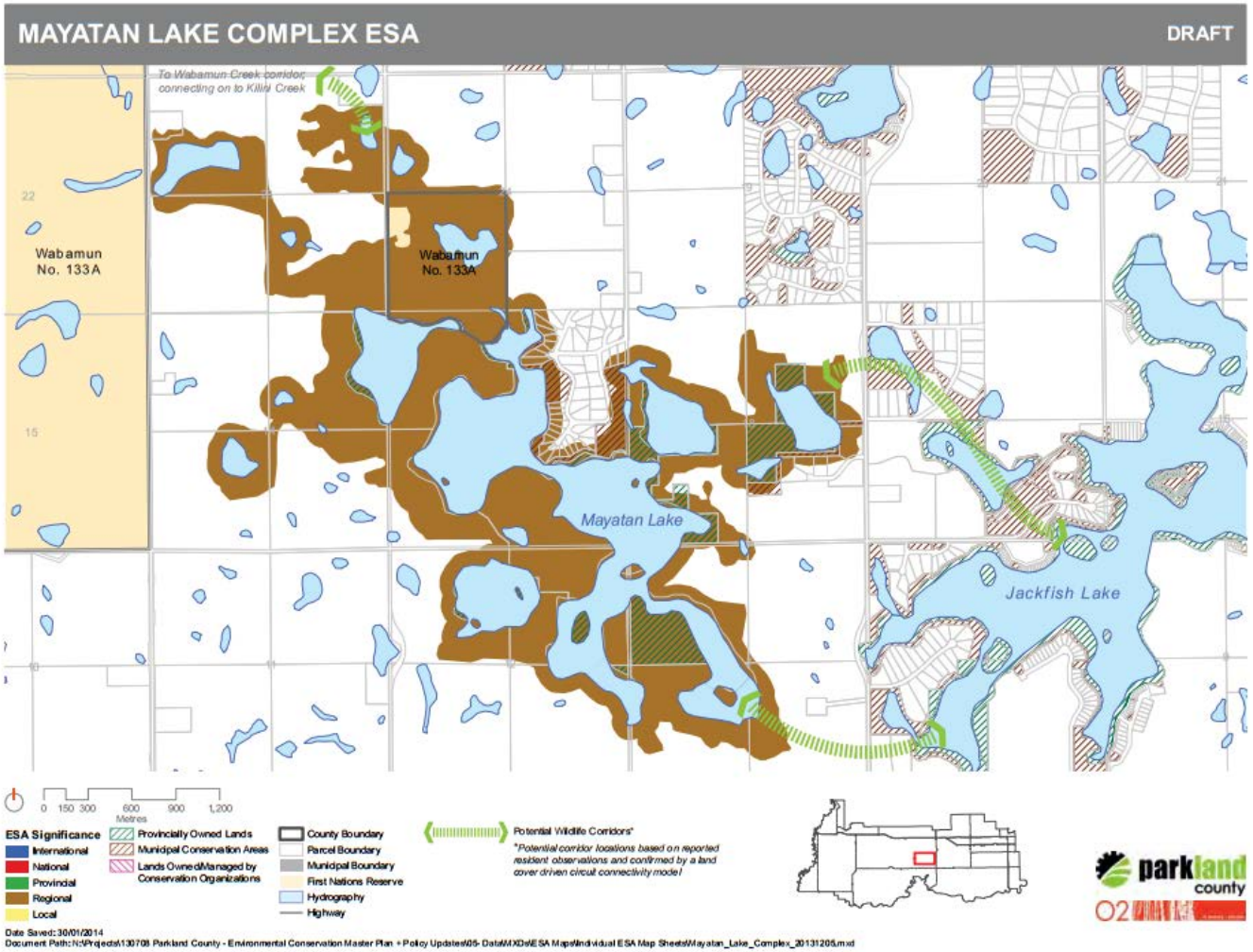


Figure 6. Map of the Mayatan Lake Complex showing *Regionally Significant ESAs* (Parkland County, 2014a).

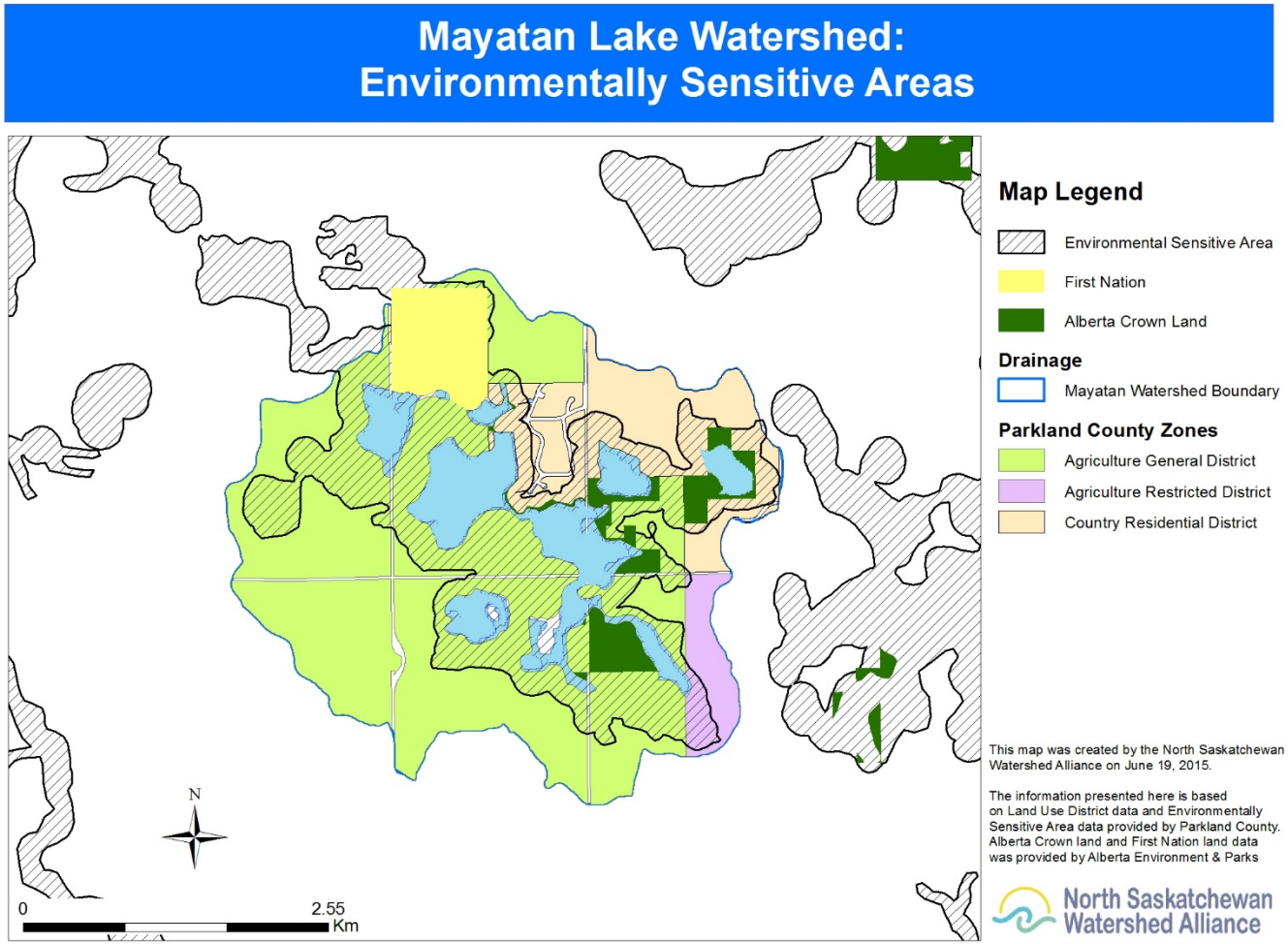


Figure 7. Land zoning in the Mayatan Lake watershed, overlain with the identified Regionally Significant ESAs (NSWA, 2015).

Stakeholder and Public Consultation Process

The public consultation process was derived in part from the International Association for Public Participation (IAP2), and is based on the principle that people who are affected by a decision should have a role in shaping that decision. The Government of Alberta *Water for Life* policy is predicated on this principle, and enshrines partnership and community engagement as key building blocks of watershed governance and management. Two public stakeholder consultation sessions were held on May 24 and July 17, 2014 to gather responses from stakeholders.
Participants were asked three basic questions:

- *What are the perceived issues in the lake and the watershed?*
- *What are the stakeholder aspirations for the future of Mayatan Lake?*
- *What are some suggested solutions to the perceived issues?*

The intent for asking these questions was to give the planning team a sense of the breadth and depth of interest stakeholders have for Mayatan Lake and their aspirations for the future of the lake, to solicit anecdotal information and stories about life on and around the lake, and ultimately, to ascertain what priorities would be supported for the long-term management of the lake and its watershed.

The planning team proceeded with these questions on the understanding that science and management experts would also be consulted by the NSWA, and that issues and solutions not identified by the public would be added to the list. It was agreed that all suggested goals, objectives, and management actions would be shared with the public and with stakeholders in the form of the final draft plan, with the goal of finding gaps, adding or altering management priorities and actions, and gaining acceptance and buy-in for later implementation.

Further information was gathered through one-on-one phone calls, face to face interviews, an email survey, and through a community mail-out which provided an update on the consultation process and contact information (phone, email, website) where further input could be provided.

A full summary of the consultation sessions, including, attendance numbers, methodology and verbatim comments, is included in the Appendix 1 of this plan. Attendees were mainly from the general public living in the Mayatan Lake area.

The following tables provide a brief overview of the issues identified by stakeholders regarding the lake and watershed, and the number of comments received specific to each topic. The second table summarizes the issue ranking, using perceived urgency and importance as criteria.

Table 3. Issues identified by stakeholders and number of comments received, ranked in order from highest to lowest.

Issue	Number of Comments Received				
	Concerns	**Aspirations**	**Solutions**	**Questions and Other Comments**	**Total Number of Comments Per Issue**
1. Lake Management Roles and Responsibilities	27	41	37	33	**138**
2. Water Quality	55	16	25	27	**123**
3. Impacts of Development	53	21	19	25	**118**
4. Recreational Activities	23	20	22	9	**74**
5. Wildlife Impact	18	12	11	10	**51**
6. Fish and Fishing	21	6	9	10	**46**
7. Lake Water Level	18	7	0	15	**40**
8. Disturbance of Wetlands and Riparian Areas	12	12	8	5	**37**
9. Groundwater Quality and Quantity	2	2	5	16	**25**
10. Climate Change	4	0	1	6	**11**
11. Invasive Species	3	0	1	0	**4**

The top 3 areas of concern for the stakeholders included lake management roles and responsibilities, water quality and the impacts of development within the watershed. It should be noted that some comments were applied to more than one category.

Table 4. Stakeholder ranked issues according to perceived urgency and importance.

Issue	High Importance/ High Urgency	High Importance/ Low Urgency	Low Importance/ High Urgency	Low Importance/ Low Urgency	Undecided
Watershed management	**25**	2	0	0	
Development pressure on wildlife and habitat	**23.5**	1.5	0	0	
Agricultural impacts on lake and riparian areas	**22**	5	0	0	
Jurisdiction and management responsibility	**22**	4	0	2	
Algal blooms	**22**	5	0	0	
Recreational use	**22**	2	2	0	
Groundwater influence	13	12	0	3	1
Climate change impacts	9	11	0	8	
Fish kills	7	13	1	7	1
Other: Vegetation removal	7	1	0	0	
Other: Lack of enforcement at municipal level	6	0	0	0	
Receding water levels	5	13	3	7	
Other: People	5	1	0	0	
Other: Lack of capacity	5	1	0	0	
Other: Signage	4	0	0	0	
Other: Wetlands	2	3	0	0	
Other: Funding	1	0	0	0	

In the table above, it can be seen that the top 6 stakeholder issues ranked of high importance and high urgency are:

- Watershed management
- Development pressure on wildlife and habitat
- Agricultural impacts on lake and riparian areas

- Jurisdiction and management responsibility
- Algal blooms
- Recreational use

It can be concluded that stakeholders in the watershed perceived an urgent need for a watershed management plan to address development and agricultural pressures on wildlife habitat and water quality protection within the Mayatan Lake watershed.

Stakeholders offered a variety of solutions to the identified issues, including:

- *Cattle fencing to prevent lake access*
- *Making cisterns and pumpouts mandatory in new developments*
- *Restricting the use of power boats*
- *Removal of in-lake phosphorus and prevention of further phosphorus loading*
- *Fish restocking programs and aeration to prevent fish kills*
- *Limiting oil and gas, and cottage development*
- *Protecting riparian areas, waterfowl nesting areas and wildlife use areas*
- *Reintroducing beavers*
- *Implementing "smart development" solutions*
- *Increased regulations and enforcement regarding recreational uses of the lake*
- *Cooperation between all levels of government towards the protection of the lake*
- *An opportunity for lake users and residents to provide feedback on development applications*
- *Increased monitoring of the lake water quality*
- *Educational opportunities and signage about the importance of protecting the environmental integrity of the lake*
- *Signage, boat inspections and cleaning stations to prevent the spread of invasive species*

Third Stakeholder Consultation Session

The draft watershed management plan recommendations were vetted through the stakeholders in a third consultation session on June 20, 2015. Thirty individuals attended this event, held in Carvel Community Hall. A full summary of the verbatim comments is included in the stakeholder consultation report in Appendix 2.

All of the draft recommendations received strong support, although it was apparent some wording changes were needed for broader understanding. One of the main questions surrounding the recommendations was regarding the roles and responsibilities for implementation. There was strong support for initiatives such as shoreline setbacks; public education and signage; enforcing limits in boat usage and speeds; implementation of best management practices, and protection of wildlife and fish populations.

Recommended Management Actions and Responsibilities

The recommended management actions for Mayatan Lake are presented within the context of the *Integrated Watershed Management Plan for the NSR* (2012). The recommendations reflect the issues identified by stakeholders, and watershed management principles appropriate for this small lake. The recommendations are structured and formatted in alignment with the Goals and Actions of the IWMP and are further classified into policy, stewardship and technical actions.

This plan serves as advice to Parkland County, the Government of Alberta, the Mayatan Lake Management Association and all watershed stakeholders to guide future decision-making in their respective areas of responsibility and interest. It identifies specific actions that should be implemented, describes the roles and responsibilities of the various players to do so, and presents an implementation strategy based on both voluntary and statutory activities.

It is the opinion of NSWA that the ensuing recommendations fairly reflect the input received from all parties, and are supported by basic watershed management principles.

NSR IWMP GOAL 1: WATER QUALITY IS MAINTAINED OR IMPROVED

WATERSHED MANAGEMENT DIRECTION 1.0: *Develop and implement a water quality management program for Mayatan Lake, including the development of water quality objectives, management of watershed and shoreline nutrient sources to ensure water quality objectives are met, and implementation of appropriate water quality monitoring programs.*

Policy Actions:

1.0.1 AEP to set water quality objectives for the lake, with associated thresholds to trigger protective or restorative actions.

1.0.2 Parkland County and AEP to implement water quality non-degradation policies, appropriate for their areas of jurisdiction, for the management of Mayatan Lake and its watershed.

1.0.3 Parkland County to specify the mandatory use, maintenance and inspection of sewage holding tanks for all existing and proposed residential, recreational or commercial development.

Stewardship Actions:

1.0.4 Parkland County/ALUS to facilitate the adoption of livestock and manure best management practices to reduce shoreline impacts and associated nutrient loading to the lake (i.e. offsite watering, exclusion fencing, manure removal).

1.0.5 Parkland County/ALUS to facilitate adoption of the Green Acreages Guide for all watershed residents to reduce shoreline and watershed impacts associated with cosmetic fertilizer use, storm water management, wastewater management and riparian zone vegetation removal.

Technical Actions:

1.0.6 AEP to work with MLMA and regularly monitor lake levels through use of a permanent gauge installed in the lake.

NSR IWMP GOAL 2: AQUATIC ECOSYSTEM HEALTH IS MAINTAINED OR IMPROVED

WATERSHED MANAGEMENT DIRECTION 2.0: *Develop aquatic ecosystem health objectives for Mayatan Lake; monitor and manage aquatic ecosystem health.*

Policy Actions:

2.0.1 Alberta Environment and Parks to develop aquatic ecosystem health objectives for Mayatan Lake, including fish and wildlife biodiversity targets, and monitor effectively.

2.0.2 Parkland County to lead the protection of natural vegetation buffers around lakeshore and improve riparian zone health in damaged areas. Implement larger buffers in areas of high wildlife and waterfowl use (using tools such as the *Riparian Setback Matrix Model* or guidelines from AEP) while allowing for controlled lake access.

Stewardship Actions:

2.0.3 MLMA to install invasive species signage at boat launch.

Technical Actions:

2.0.4 AEP to identify waterfowl nesting and staging areas in lake and watershed, and develop an action plan for their protection.

2.0.5 AEP to assess sport fish capability and develop a fisheries management plan.

2.0.6 AEP to evaluate cyanotoxicity risk and develop an advisory plan.

2.0.7 Parkland County to work with Alberta Environment and Parks to assess the feasibility of a regional boat inspection and washing station to prevent the introduction of invasive aquatic species into local lakes.

WATERSHED MANAGEMENT DIRECTION 2.1: *Minimize or reduce the impacts of residential, commercial and industrial development, agricultural land use and recreational activities on watershed ecosystem health.*

Policy Actions:

2.1.1 Parkland County to develop a lake land use plan with bylaws and districts containing protective measures for the management of the lake and its watershed, including riparian areas and *Environmentally Significant Areas.*

2.1.2 AEP and AER to consider natural attributes, ecosystem services and *Environmentally Significant Areas* of the Mayatan Lake watershed when reviewing water withdrawal, resource extraction or transmission proposals.

2.1.3 Parkland County to consider natural attributes, ecosystem services and *Environmentally Significant Areas* of the Mayatan Lake watershed when reviewing development proposals.

2.1.4 AEP and Parkland County to review federal and other policies to control mechanized recreation on the lake (boat speeds and horsepower limits) and in the watershed, including exclusion of motorized vehicles in riparian areas and environmentally significant areas.

2.1.5 Parkland County to consider an Environmental Impact Assessment and low impact development practices for all new developments. The objective will be to meet water quality and aquatic ecosystem health objectives set for the lake, and ecosystem health targets set for the watershed.

Stewardship Actions:

2.1.6 Alberta Environment and Parks, Parkland County and MLMA to develop and implement education and awareness programs that promote responsible recreational use.

2.1.7 Parkland County, in cooperation with MLMA, to track lake usage through seasonal and annual surveys.

Technical Actions:

2.1.8 Alberta Environment and Parks, Parkland County and MLMA to develop ecosystem health and biodiversity objectives for the watershed of Mayatan Lake.

WATERSHED MANAGEMENT DIRECTION 2.2: *Maintain or restore wetlands in the Mayatan Lake watershed.*

Policy Actions:

2.2.1 Parkland County to work closely with AEP on any future development applications involving wetland drainage and compensation, and work towards incorporating existing wetlands into development designs.

2.2.2 AEP and Parkland County to require any such wetland compensation projects to occur within the watershed boundaries, based on the guidelines in the new Alberta Wetland Policy.

Stewardship Actions:

2.2.3 Parkland County, AEP and MLMA to educate landowners on the importance of wetland conservation.

Technical Actions:

2.2.4 Parkland County to complete inventory of existing, drained and altered wetlands within the Mayatan Lake watershed and recommend restoration priorities.

WATERSHED MANAGEMENT DIRECTION 2.3: *Maintain or restore forested land and vegetation cover in the Mayatan Lake Watershed.*

Policy Actions:

2.3.1 Parkland County to develop policies/incentives to encourage reforestation within the Mayatan Lake watershed where forest and vegetation cover have been removed.

2.3.2 Parkland County to encourage planting of native species, particularly in identified Environmentally Significant Areas.

2.3.3 Parkland County to enforce existing Tree Clearing Bylaw (04-2010, Section 11.9.4) which states:

> *"A 30.0 m (98.5 ft) of setback from waterbodies shall be restricted from Tree Clearing."*

Stewardship Actions:

2.3.4 Parkland County and landowners to work with local nature groups to determine which native species would be appropriate for planting.

Technical Actions:

2.3.6 Alberta Environment and Parks or Parkland County to complete wildlife habitat and corridor mapping.

WATERSHED MANAGEMENT DIRECTION 2.4*: Improve public knowledge and understanding of the importance of healthy aquatic ecosystems*

Stewardship Actions:

2.4.1 AEP to work with MLMA to engage residents and lake users in "Respect our Lakes" program and to attend the annual Central Alberta Recreational Lakes Forum, hosted by AEP.

2.4.2 Parkland County and MLMA to install educational signage at various locations around the lake to communicate key environmental messages, including the removal of debris left on ice by anglers and boat washing to prevent the spread of invasive species.

2.4.3 MLMA to continue the annual local stewardship lake cleanup program, and recruit more individuals through newspaper advertisements, posters, etc.

NSR IWMP GOAL 3: THE QUALITY AND QUANTITY OF GROUNDWATER ARE MAINTAINED AND PROTECTED FOR HUMAN CONSUMPTION AND OTHER USES

WATERSHED MANAGEMENT DIRECTION 3.0: *Improve knowledge and understanding of groundwater quality and quantity in the Mayatan Lake watershed.*

Policy Actions:

3.0.1 Alberta Environment and Parks to develop aquifer management plan(s) that include features such as sustainable pumping rates, monitoring programs, appropriate sites for sewage holding tanks and comprehensive annual evaluations of groundwater use.

3.0.2 Alberta Environment and Parks and Parkland County to incorporate protection of recharge areas into land use planning and resource management.

Technical Actions:

3.0.3 Alberta Health Services and Parkland County to encourage landowners to complete regular testing of domestic well water.

3.0.4 Alberta Environment and Parks/Alberta Geologic Survey to initiate a study on surface and groundwater interactions in the local region.

NSR IWMP GOAL 4: WATERSHED MANAGEMENT IS INCORPORATED INTO LAND USE PLANNING AT ALL SCALES

WATERSHED MANAGEMENT DIRECTION 4.0: *Improve cooperation and communication about watershed management among local and provincial planning initiatives.*

Policy Actions:

4.0.1 Parkland County and AEP to work closely in all future regulatory decisions and development applications affecting Mayatan Lake, and other lakes on the Carvel Pitted Delta.

4.0.2 Parkland County and AEP to solicit public input on water and watershed management initiatives, and bylaw changes, related to these lakes.

Implementation

A Mayatan Lake Watershed Management Plan Implementation Committee should be established after submission of this plan to Parkland County, and Alberta Environment and Parks. This committee should include representatives from all major stakeholder groups in the area, and will be responsible for the development of appropriate technical and policy initiatives, and identifying best management practices and stewardship opportunities to meet the goals in this plan.

Implementation of recommendations will be achieved through the voluntary choices and actions of individual decision makers in government, industry, Parkland County, NGOs and other stakeholders. The value of the plan will only be realized to the extent that stakeholders, individually and in collaboration, act on the recommendations, as there are no specific statutory requirements to require the adoption and implementation of watershed management plans.

Parkland County is a leader in local land-use planning and development decision-making, and will have a critical role to play in the implementation of these recommendations.

The NSWA will undertake an ongoing role as a bridging organization, and a provider of technical advice and information. The NSWA will also provide assistance to stakeholders to implement the recommendations in this plan, and to monitor and report on its uptake.

Roles and Responsibilities

The NSWA recommends the following roles and responsibilities:

Alberta Environment and Parks – Provincial Water Resources Manager

Implementing this watershed management plan will require ongoing leadership by Alberta Environment and Parks as described in the *Framework for Water Management Planning* and the *Strategy for the Protection of the Aquatic Environment*. The policies outlined in the *Framework*, enabled under the *Water Act*, confirm AEP's commitment to "…….. maintaining, restoring or enhancing current conditions in the aquatic environment."

These policies also confirm AEP's commitment to conduct monitoring, evaluation and reporting programs that include long-term data collection and assessments. This monitoring commitment requires future collaboration and partnerships with watershed stakeholders. Access to information and data are needed so that watershed stakeholders and the public can better understand the health of aquatic ecosystems and the effects of watershed management actions being undertaken.

The Ministry is requested to:

- Participate in the Implementation Committee for this watershed plan

- Consider these recommendations in statutory planning, policy development and regulatory decisions
- Direct staff to continue assisting WPACs and Watershed Stewardship Groups in their activities
- Request other Ministries, with responsibilities related to the recommendations in this plan, to participate in initiatives established to address specific actions and to consider these recommendations in their own statutory planning, policy development and regulatory decisions
- Include lake management in the development of the *North Saskatchewan Regional Plan* under the Land Use Framework

Parkland County is requested to:

- Participate in the Implementation Committee for this watershed plan
- Use these recommendations to guide the preparation and implementation of their municipal development plans, land use bylaws, area structure plans and lake land use plans
- Work with governments and other watershed stakeholders to communicate and implement best management practices

The Mayatan Lake Management Association is requested to:

- Participate in the Implementation Committee for this watershed plan
- Continue working with Mayatan residents in an outreach and educational capacity
- Partner with Parkland County and AEP on the installation of educational signage at Mayatan Lake
- Collaborate with the Alberta Lake Management Society to implement regular monitoring of water quality on the lake
- Liaise with AEP Invasive Species specialists to implement a citizen science invasive species monitoring program

Industry and landowners are requested to:

- Participate in the Implementation Committee for this watershed plan
- Continue to improve their water and land management practices

Recreational and other users of private and public lands are requested to:

- Participate in the MLMA's ongoing stewardship activities
- Minimize and reduce impacts to the watershed (land and water) by practicing and promoting responsible recreation

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Appendix 1

Stakeholder Consultation Report

Mayatan Lake Watershed Management Public Consultation

Table of Contents

Executive Summary

The North Saskatchewan Watershed Alliance (NSWA), in partnership with the Government of Alberta, Parkland County and the Mayatan Lake Management Association (MLMA) are working towards the development of a watershed management plan for Mayatan Lake. The process for writing a management plan is clearly outlined in the "*Guide to Watershed Management Planning in Alberta*", published by the Government of Alberta in 2014.

As outlined in the Guide, a key component of plan development is public consultation at all stages of the planning process. The following excerpt is taken from the guide:

> "*The principles of watershed management planning:*
>
> - ***All stakeholders have the opportunity to participate in watershed management planning and work together to maintain and improve watershed conditions***
> - *The process considers desired social, economic and environmental outcomes*
> - ***Watershed management planning is based on consensus***
> - *Identified outcomes are measureable*
> - *Actions are measureable and result in improved watershed conditions*
> - *The process is adaptive to address emerging challenges and new information*
> - ***Stakeholders willingly implement actions and report on progress toward agreed-upon outcomes"***

Since watershed management plans are non-regulatory, stakeholder participation and ownership of the plan are critical to its success and implementation into the future. The NSWA hosted two consultation sessions prior to writing the watershed management plan for Mayatan Lake. The sessions were designed to gather feedback from residents and lake users about how they envision Mayatan Lake looking into the future, what their concerns are with the watershed and what are some of their suggested solutions to their concerns.

The document that follows is a complete summary of the consultation process, including the design of the process, the full verbatim comments recorded from the participants, and categorized issues and priorities. The top three areas of concern from the stakeholders included: water quality, impacts from development, and lake management roles and responsibilities.

Stakeholder recommendations are being incorporated into the final watershed management plan. Issues and solutions identified by stakeholders will be augmented where appropriate through a review by science and management experts, and inclusion of published scientific knowledge. The final plan will also be reviewed by various levels of government. A third round of public and stakeholder consultation on the plan's recommendations will be carried out in order to gain acceptance and buy-in for later implementation.

Rationale for the Management Plan

Rationale

This report contains two important bodies of information: first, a summary of public aspirations for Mayatan Lake, what they think the lake's issues are, and what actions can be taken to resolve those issues; and second, a list of potential management actions that could be taken to protect the lake's condition and values.

Why a Management Plan?

A watershed management plan for Mayatan Lake will take stock of the lake's past and present conditions and the trends in important landscape and water indicators then outline a series of recommended objectives and actions that are intended to protect the natural values and assets that the lake and its watershed provide to users and residents. The plan will provide science-based guidance for appropriate levels of various human activities on the lake and in its watershed, and special measures for restoring some lake values as necessary. The reason for developing such a plan is that lakes like Mayatan are under significant pressure from various forms of human activity, and are known to be susceptible to significant deterioration of their natural and aesthetic values unless activities are guided by a plan that takes into consideration the natural limits and resiliency of the lake.

Why Public Consultation?

The rationale for the public consultation process for Mayatan Lake rests on the assumption that long-time residents and users of the lake have significant knowledge and insight into history and conditions of the lake and its watershed and the problems it experiences, that they have a voice in determining the lake's long term future, and that they can have a meaningful role in management of the lake. It also rests on the Province of Alberta's partnership-based approach to watershed planning under the Water for Life Policy, which extends an opportunity for residents and users of a watershed to participate in the stewardship and care of water and watershed resources. As stated in "Water for Life – a Renewal", (http://environment.gov.ab.ca/info/library/8035.pdf), *"…the Government of Alberta will continue to manage Alberta's water resources using the [principle that] … [c]itizens, communities, industry and government must share responsibility for water management in Alberta and work together to improve conditions within their local watershed*."

Methodology

Consultation Design

The design of the public consultation process employed was derived in part from the International Association for Public Participation, and based on the principle that people who are affected by a decision have a role in shaping that decision. The Government of Alberta *Water for Life* policy is predicated on this principle, and further, enshrines partnership and community engagement as key building blocks of watershed governance and management.

Given this, the design of the public consultation process centered on three basic questions:

- What are your aspirations for Mayatan Lake and its watershed?
- What are the issues or threats of greatest concern for Mayatan Lake?
- What are the solutions you think will help resolve the issues facing Mayatan Lake?

The intent of asking these questions was to give the planning team a sense of the breadth and depth of interest stakeholders have for Mayatan Lake and their aspirations for the future of the lake, to solicit anecdotal information and stories about life on and around the lake, and ultimately, ***to ascertain what priorities ought to guide the long term management of the lake and its watershed.***

The consultation team proceeded with these questions on the understanding that informed science and management experts would also be consulted, and that issues and solutions not identified by the public could be added to the list. The assumption was made that ***all*** suggested goals, objectives, and management actions would be shared with the public and with stakeholders in the form of the final draft plan, with an aim to finding gaps, adding or altering management priorities and actions, and gaining acceptance and buy-in for later implementation.

The bulk of the information was gathered at meetings held at community halls throughout 2014. Some information was gathered through one-on-one phone calls, face to face interviews, an email questionnaire, and through a community mail-out which provided an update on the consultation process and contact information (phone, email, website) where further input could be provided.

Facilitation and Data Gathering

An initial meeting, facilitated by AESRD, was held in the Carvel Hall on June 19, 2013. The focus was on providing participants with opportunities to learn about lake management planning, network, share resources and lessons learned, and hear updates on lake related initiatives. The workshop included presentations by various speakers from the North Saskatchewan Watershed Alliance, Alberta Lake Management Society, Alberta Environment and Sustainable Resources, and various municipality representatives. In order to maximize value to the greater community, the workshop was open to all interested parties. Representatives from 10 different lakes and three municipalities attended.

Two further public meetings, facilitated by the NSWA, were held in May and July of 2014 and focussed on consulting with Mayatan Lake stakeholders.

At the first of these two meetings, held at Keephills Hall on May 24, 2014, participants were provided with background material on watershed management planning, a description of Mayatan Lake and its watershed based on the NSWA report, “State of the Mayatan Lake Watershed”, and a framework for collecting stories, information, issues, and aspirations of participants. Large-format maps were provided that allowed participants to link their observations and historical recollections to geographic locations within the lake watershed. Responses were recorded in a variety of ways, mostly by the participants themselves on maps and forms, but also by facilitators on flip charts and note paper.

The second meeting, held July 17th 2014 at the Keephills Hall, built on the feedback obtained at the May 24th meeting. Expert speakers from AESRD, NSWA and Agriculture and Agri-food Canada (AAFC) provided participants with information in response to questions raised at the May 24th meeting. Participants ranked issues raised at the previous meeting by importance and urgency and provided further input on values and aspirations.

A fourth meeting will be held in spring of 2015 to provide stakeholders with an additional opportunity to provide input on the future of Mayatan Lake. All data collected has been posted on the NSWA website at https://www.nswa.ab.ca/content/mayatan-lake-public-participation.

Data Analysis

The data received from stakeholders was transcribed, categorized, and analysed to produce meaning summaries.

1. **Transcription**

   In total, 380 comments were received from stakeholders at the two stakeholder workshops. These comments were transcribed from various sources at the workshops, including maps, worksheets, and other comment sheets. All comments are posted on the NSWA website. Additional comments from other sources will be added.

2. **Categorization**

   The comments were categorized by the type of comment received:

Comment Category	Definition
1. Issues:	Statements outlining Stakeholder concerns about the watershed.
2. Aspirations:	Statements outlining Stakeholders' desires for the future of the watershed.
3. Solutions:	Statements describing actions that should be taken to preserve value and/or make improvements for the future of the watershed.
4. Questions:	Statements requesting clarification or further information.
5. People:	Statements regarding groups or individuals that should be involved in the stakeholder process.
6. General:	Statements that did not fall into any of the above categories.

Many comments were categorized into multiple categories due to their complex content.

3. **Analysis**

The comments were analyzed to identify the issues of concern to stakeholders. Eleven major themes surfaced. The themes are defined and analyzed in the next section of this document, and all stakeholder comments contributing to each theme are listed in full in Appendix I.

Issues Definitions and Public Comments

This section describes the issues identified by public comments received to date. Appendix I contains complete lists of comments received for each of the issues during Stakeholder Workshops held May 24, 2014 and July 17, 2014. Table 1 indicates the number of comments received for each issue[2].

	Number of Comments Received				
Issue	**Concerns**	**Aspirations**	**Solutions**	**Questions and Other Comments**	**Total Number of Comments Per Issue**
12. Water Quality	55	16	25	27	**123**
13. Lake Water Level	18	7	0	15	**40**
14. Impacts of Development	53	21	19	25	**118**
15. Fish and Fishing	21	6	9	10	**46**
16. Lake Management Roles and Responsibilities	27	41	37	33	**138**
17. Groundwater Quality and Quantity	2	2	5	16	**25**
18. Recreational Activities	23	20	22	9	**74**
19. Disturbance of Wetlands and Riparian Areas	12	12	8	5	**37**
20. Invasive Species	3	0	1	0	**4**
21. Wildlife Impact	18	12	11	10	**51**
22. Climate Change	4	0	1	6	**11**

Table 5 Number of Comments Received per Issue

1. Water Quality

A number of human activities can reduce water quality in Mayatan Lake, and individually or together, contribute to measurable changes that can be difficult to reverse. Activities that directly affect water quality include: direct deposition of nutrients in Mayatan Lake by cattle grazing near or in the water; nutrient-laden runoff from fields and pastures; seepage of sewage from cottage

[2] Some comments contained comments on multiple issues and are therefore counted under more than one issue.

septic systems; surface runoff containing dissolved cosmetic fertilizers from lawns and gardens, etc.

The majority of stakeholder concerns about water quality can be summarized into 6 categories: land use and development; sewage inputs from septic fields; ice fishing debris; agricultural nutrient inputs from manure and fertilizer; disturbance from power boat engines, and spillage of hydrocarbons from gas engines. There is an overall concern that the lake will reach a tipping point with respect to water quality and become unsalvageable. Algae blooms surface as an issue, along with pesticides, and stakeholders are worried that fish and wildlife will be adversely affected if water quality declines.

Aspirations for the lake include maintaining or improving the water quality in the lake; preserving the existing natural areas, and generally sustaining the lake for the enjoyment of future generations. There is an overall recognition for the need of good lake science to inform policy and development decisions.

Meeting attendees offered a number of solutions for management of the lake. Suggestions included fencing off cattle access; using cisterns and septic pump outs in new developments; restricting the use of power boats on the lake; removal of phosphorus in the lake and prevention of phosphorus loadings, and aeration programs to help prevent fish kills.

2. Lake Water Levels

Water levels in Mayatan Lake are a concern to many people. Falling water levels have stranded the east basin over time, cutting it off from the cooler and deeper main body of the lake. Human activities may have some impact on lake levels; for example, local well water draw-down may affect groundwater flows into Mayatan Lake, but this has not been investigated scientifically. Lake levels are responsive to regional climate changes, which over the past several decades have seen gradual warming, which may affect groundwater recharge.

Area residents have noticed fluctuations in the water level in Mayatan Lake over the years, and the narrows linking the two bays of the lake are becoming increasingly dry and impossible to navigate by boat. Other concerns include the impacts of declining water levels on water quality and fish populations, algae bloom frequency and fears that the lake will completely dry up over time or become marshland.

Aspirations for the lake with respect to water levels include a rise in current lake water levels; keeping the shoreline and forested areas intact; opening the Narrows for boat passage, and maintenance of groundwater levels.

3. Impacts of Development

Land development for various human purposes has changed the landscape within the Mayatan Lake watershed over time. Agriculture, roads, residential development, and utility corridors have

changed the landscape from one that was once mostly forested to one where forests are fragmented. These changes are exacerbated by the construction of residences with yards and gardens, the opening of access corridors to the lakeshore, property fencing, forest clearing, and other forms of alteration. These changes have an effect on the rates of surface run-off within the watershed, and have likely changed the diversity and numbers of native plants and wildlife, the age class structure of existing forests, the connectivity of wildlife habitat areas, etc.

This category elicited a large response from stakeholders and tends to incite a strong emotional response. Residents and lake users had comments over a number of themes, including increased recreational usage of the lake; increased resort, potential golf course and residential development pressures; agricultural activities within the watershed (particularly cattle operations); development-related tree removal, and sewage management. There is also the desire to provide feedback to the County on future development applications.

Stakeholder aspirations for the lake are varied in this category, but include aspects such as limiting the type and intensity of development around the lake; preserving existing forest and riparian areas; encouraging “quiet” recreation and enjoyment of nature; preserving the natural ecology of the lake, and harmonization of regulations and objectives at all levels of government, with the incorporation of community feedback.

Proposed solutions from the stakeholders were varied. Limiting cottage and oil and gas development, keeping cattle away from the lake, protection of the riparian area and finding smart development solutions through working with developers were all suggested.

4. Fish and Fishing

Fish populations are an important asset in Mayatan Lake and an issue of common concern among area stakeholders. Fish have experienced winter die-offs as a result of low oxygen levels in water under winter ice, and have been subjected to seasonal recreational fishing pressures.

Concerns related to fisheries in Mayatan Lake include the effects of water quality on fish; the low oxygen levels and related fish kills; lower water levels in the lake; the stoppage of the government aeration program, and the inability of the fish to travel through the narrows to the deeper portion of the lake for overwintering. Related to this are fears that people will no longer be able to enjoy fishing on the lake, and that bird populations will suffer from lack of food.

Quiet recreation, including fishing and canoeing, is important to area residents. Stakeholders would like to see removal of power boats from the lake and a re-establishment of a healthy, thriving fish population. Healthy wildlife populations in riparian areas are also important, including birds.

Suggested solutions include measures such as in-lake aeration; regulations around the use of treble hooks; fish stocking programs and increased regulations on recreational use of the lake.

5. Lake Management Roles and Responsibilities

The way in which Mayatan Lake is managed and protected is a concern to many area stakeholders. The "management system" is a conglomeration of municipal, provincial, and federal legislation, where the three levels of government have responsibilities for various components of the lake and its watershed. The effectiveness of the system depends on the level of effort of governments to enforce regulations and legislation, how they interpret and act on their respective legislation, how well citizens comply with regulations, and many other factors.

Stakeholder concerns about land management included development in and alteration of riparian areas; motorized recreation and noise; sewage management; public access; agricultural impacts; habitat loss from tree clearing; a perceived lack of government enforcement of regulations, and the type and density of new developments.

The overwhelming theme of the feedback in this category is one of preserving the environmental integrity of the lake well into the future. This includes limited development; conservation areas; healthy riparian areas; abundant wildlife; good water quality; healthy fisheries; educational signage; and good environmental stewardship from all lake users. There is also a desire for increased educational opportunities for residents and users on the importance of good stewardship, and cooperation between all levels of government for the protection of the lake. Users and residents would like the opportunity to provide feedback on development applications before they are approved. The ALUS Program was mentioned many times as a potential resource for agricultural producers to assist with implementation of best management practices, as well as development decisions based on sound lake science.

6. Groundwater Quality and Quantity

Groundwater is likely an important factor in the maintenance of water quantity and quality in Mayatan Lake. Residents express concern for the quality of groundwater as well as the quantity of groundwater flows into the lake.

Concerns were limited in this category, but included the impact of fluids leaking from old vehicles and seeping into the ground, as well as questions about the quality of groundwater and if it still suitable for human consumption. There is a general concern about the amount of groundwater in the area, and whether or not it is declining.

Aspirations for groundwater in the area included keeping levels up and improving recharge to the water table.

A few solutions were offered for preserving groundwater. Suggestions included limiting oil and gas development, as well as fracking; no septic fields and further study on groundwater use and flow in the area. Water conservation should be emphasized with residents.

The limited feedback in this category is a reflection of the general state of knowledge about groundwater. Further study and a general increase in education with respect to this resource would be prudent.

7. Recreational Activities

Mayatan Lake is an important recreational resource to area residents and visitors, especially in spring, summer, and fall. Recreational activities are known to have significant impacts on many watershed values. Recreational activities in and around Mayatan Lake include ATV riding on private property, fishing on the lake, motorized and non-motorized boating, swimming, bird watching, and many others.

Comments surrounding recreation are echoed in many of the other feedback sections. Residents do not feel gas powered boats are appropriate for Mayatan Lake, and ATV use is also an issue. Ice fishing debris is a common occurrence every winter, and soil compaction and trespassing are identified as problems. There is concern that weekend lake users will "spill over" from other more crowded lakes in the area.

Aspirations are also repeated in many categories. Maintaining peace and quiet on the lake and enjoyment for future generations are in the forefront, along with limited, responsible development. A shared, and informed, responsibility for the lake between residents, users and all levels of government is sought.

Solutions include banning gas powered motor boats; educational opportunities and signage; monitoring and enforcement; limited development of all kinds, and a shared responsibility for the resource between all stakeholders involved.

8. Disturbance of Wetlands and Riparian Areas

Wetted soils on the margin of Mayatan Lake, and wetlands near and around the lake mark the transition from open water to dry upland in the watershed. They are an important part of the watershed ecosystem, buffering the lake itself from incursions of sediment and nutrients, as well as providing essential habitat to plant and animal species, responsible for the greatest biodiversity of any component of the watershed.

Stakeholder concerns about wetlands and riparian areas include: loss of wildlife habitat and disturbance of wildlife populations; development infringing upon riparian areas and water quality decline in the lake.

Aspirations include many that have been mentioned in previous sections; healthy riparian areas and wildlife populations (including fish) and a generally "natural" environment around the lake. Solutions suggested include limitations for lot clearing; preservation of buffer areas; enforcement with respect to unlawful removal of vegetation on the lakeshore, and preservation of waterfowl nesting sites.

9. Invasive Species

Invasive species pose a significant risk to the health of the Mayatan Lake ecosystem, both its aquatic component, and its upland areas. The list of species of greatest threat includes Purple Loosestrife, Zebra Mussels, Quagga Mussels, Eurasian Milfoil, and others. These species can individually or in combination with each other radically change the ecology and biodiversity of the lake and its watershed.

Stakeholder concerns and aspirations were limited in this topic as well, which may indicate a general lack of knowledge about the topic.

Solutions included signage, boat inspections, education, and cleaning and drying of boats.

10. Wildlife Impact

Stakeholders express concerns over the biodiversity around the lake. There is an impression that frog and amphibian populations have declined, and the fish kills are an obvious concern. Questions arose regarding the bird, waterfowl and wildlife populations and their associated habitat and breeding areas. Lake users fear that development encroachment, pollution and noise from motor boats, as well as wakes from the boats, are affecting wildlife and shorebirds, particularly loons. There is a general impression that their observed changes in wildlife populations are a “canary in a coal mine” and are indicative of problems within the lake.

Aspirations for the lake include finding a balance between lake users and the natural environment; having the lake and wildlife healthy for the enjoyment of future generations, along with enforcement to ensure human activities are appropriate around the lake.

Suggestions for solutions included sustainable use of the lake based on science; reintroducing beavers; limiting development and shoreline alterations; using riparian setbacks; banning motor boats, and preserving wildlife usage areas.

11. Climate Change

Climate change is a global-scale issue that translates into regional temperature changes, and subsequent changes in ground water and surface water supplies. In some areas, falling water levels and water quality in lakes may be attributed in part to climate change, or long-term climate fluctuations. Climate change may also have an impact on fish populations, and may also increase the susceptibility of Mayatan Lake to certain invasive species. While few watershed management actions can address climate change directly, it remains a factor that must be considered, perhaps through adaptive measures.

Feedback on this topic included concerns about potentially rising lake water temperatures, and the associated issues of water quality changes and algal blooms.

No aspirations were listed for this topic.

One solution offered for climate change was to study long term trends in aspects such as rainfall, beaver populations and the impact of human settlement.

Next Steps in the Lake Management Planning Process

Table 2 contains detail s of the steps that will be taken to complete the Mayatan Lake Watershed Management Public Consultation.

Step to be Completed	Details	Who	By When
1. Complete consultation section of MLWMP	Summarize comments from stakeholders and add to issue descriptions	Walt Neilson	Jan 5 2015
	Write rationale	Dave Mussell	Dec 22 2015
	Write Methods section	Dave Mussell	Early January 2015
2. Develop newsletter for Parkland County mail-out	Brief story about what we are doing and why, what we've heard to date. Steering committee input needed, announce date of final consultation public meeting (March 21?)	Elisa Brose	Mid-January 2015
3. Solicit and compile internal / external expert input	Develop tables or narrative summarizing feedback received to date on the three big questions; use to solicit expert opinion and input on issues, solutions, etc.	Dave Trew / Melissa Logan	Mid-January 2015
	Host an experts' workshop on Mayatan	NSWA	Late January 2015
	Consolidate additional comments from experts and add	NSWA	February 2015

	this into the report, perhaps color-coded to indicate a different source		
4. Develop final consultation version of draft MLWMP	Add in references, consolidated comments from public, summary of biophysical description	NSWA	Early March 2015
	Add photos, formatting, etc. to complete the final consultation version of report	NSWA	Early March 2015
5. Host final consultation	Announce / promote final consultation meeting	Steering Committee (SC)	Early March
	Send out draft report prior to meeting	SC / NSWA	Early March
	Book venue and prepare logistics	SC	Early March
	Host the meeting	SC / NSWA	March 21
6. Develop final plan	Consolidate and add in new comments and consultation content	NSWA / SC	March / April 2015
	Final internal review / edit loop	NSWA	May 2015
7. Submit completed MLWMP	Deliver copies of plan to Parkland County, GoA	NSWA	Late May / early June 2015

Table 6 Next Steps in Completing the Stakeholder Analysis

How to Contribute

The draft Mayatan Lake Watershed Management Public Consultation will be brought to the community for discussion and revision in March 2015.

Stakeholders are encouraged to continue to be involved in planning a great future for Mayatan Lake. Input on issues, aspirations and solutions is welcome. Comments or questions should be sent by email to mailto:water@nswa.ab.ca.

Appendix I Detailed Stakeholder Comments

All Stakeholder Comments from two Stakeholder Workshops on May 24, 2014 and July 17, 2014 are listed in this Appendix, under the Issue to which each comment pertains. Comments which contain information relevant to multiple issues will be listed more than once.

1. Water Quality

Stakeholder Concerns:

1) No gas/diesel vehicles left on lakes when fishing time is on. They can leak poisonous fluids like antifreeze.
2) No septic fields in effective drainage area.
3) Monitor the garbage left behind during winter use.
4) How much runoff contains phosphorous and nitrogen from agricultural sources?
5) What is the cost to remove phosphorus? Are there matching grants available if $ is raised to improve H2O quality? (Could it be a charitable donation?)
6) Can we ban septic fields?
7) Does anyone keep an eye on the lake during ice fishing season? Making sure they remove their garbage?
8) What can we do to support the ALUS program and make farmers aware? What can be done to take the gas motors off the lake? How are these oil/gas wells marked?
9) Fish winter-kill. The loons, herons, etc. depend on having fish in the lake, and fishing is a popular recreational use of the lake. It appears that the aeration program may have been ended. Should or could this be reinstated, if it was a successful program in the past.
10) Pesticide? What's it doing? Can we make no power boats? How do we test the water?
11) A lake that is preserved ecologically (increase water quality & habitats.)
12) Water quality & nutrient going into lake
13) Sewage Maintenance
14) Cattle in the water. ALLUS.
15) Fertiliser runoff
16) Fear – lake levels go down. Algae increase. Fish kill. Want lake levels in same or better shape than now.
17) Our dying plants absorb all the O2 through the winter.
18) Algae is a concern.
19) ALUS helps but more money is needed; fencing is expensive, use solar energy for watering livestock
20) Parking lot dripping oil and antifreeze.
21) Enforce the boat speed or no gas motors (because you apparently can't enforce speed limit…) It won't change the phosphorus content of lake, but it will reduce the phosphorus mixing and the algae blooms.

22) My Fear – a large golf course development. Lots of land cleared, lots of fertilizer in run off. Argument: AB likes to encourage business development. Jobs. Lots of money for a few people.
23) Fear: development of Intensified Agriculture, such as feedlot, manure and associated nutrient runoff. Manure is spread on adjacent land – straight into water. Argument: economic incentive, lots of profit. ↓ Food cost. Export efficiency.
24) Worse case – no aquatic insects & fish, stagnant water.
25) Quality of fisheries - the canary? Relates to water quality & riparian vegetation.
26) A resolve: inappropriate development that affects lake water quality, riparian areas and habit etc.
27) Priority Issue: management of agriculture use of the lake, (reduce the use by cattle)
28) Runoff from household septic systems.
29) My main concerns are continued usability and water quality of the lake. Many lakes in the parkland region seem to be suffering from the pollution and development that have occurred around their shores. As a small lake I imagine Mayatan is less tolerant of the added strain put on it by farming and increased usage/development. I have already noticed an increased amount of activity around the lake in recent years and do not want the lake to be negatively affected.
30) Another concern or comment would be that it appears that the narrows between the two sections of the lake is closing off quite quickly. While the second part used to be easily accessible by boat but now even a kayak now can barely make it through the narrows. Is this natural or due to water loss in the lake or is it related to development? I am concerned if this will affect water quality or water levels as when paddling through these narrows it has seemed to me that the water usually flows from the smaller section into the "main" part of the lake. If this narrows does close off I am unsure how it would affect wildlife in the area, specifically fish that will be unable to spend winter in the deeper main part of the lake.
31) One final concern for the lake would be water levels. As a kid playing on the shores and comparing the levels now I remember the water level receding almost every year. I am unsure if this is simply due to drought or agricultural activity or some other factor.
32) Eutrophication of the shallow eastern basin. Not sure if cattle are still drinking from the lake in the eastern basin, but if they are, their manure and urine will continue to drive it to higher levels of eutrophication.
33) Maintain existing lake quality (or get it back to where it was in 1993!). Maintain reasonable usage ability by lakefront landowners that does not cause significant long term damage. Research for phosphorus removal (maybe nitrogen too).
34) Agriculture: cattle grazing up to and in the lake. Shoreline development: residences are affecting riparian health. Sewage treatment: nutrient inputs.
35) Water Quality/Pollution. Biodiversity – shore birds, fish, amphibians, invertebrates. Sustainable recreational use/land protection.

36) Lake Quality. Managed development. Public access.
37) Agriculture: cattle (using shoreline). Bay (Mayatan) – south/east bay closed up due to cattle crossing. Maintain water quality.
38) No crown land, limited ability to set aside conservation areas or to not develop. Agricultural runoff. Climate change warming the shallow basin and causing blooms without any additional inputs.
39) Runoff from septic systems. Runoff from farming operations. Recreation aftereffects. Over-population of waterfront. Support active organizations.
40) The quality of the water. The ability to sustain waterfowl – Loons! Balancing the ecosystem.
41) Pollution. More protection for wildlife. Less lake development.
42) Uncontrolled development of any kind. I.e. On agricultural land you can remove all your trees & fill in your wetlands, make it into one level piece of land. On agricultural land use of phosphate-based fertilizer. Intrusive agricultural operations – feedlot. Intensive recreational development.
43) Critical development close to lakes; Cattle in the water; unresponsible sewage close to the water
44) Cattle in the watershed (nutrient loading); pressure from development (increased usage); invasive species; lack of control over lake issues (who has authority?)
45) Preserving water quality; how to develop in a way that preserves environmental integrity; preserve Wildlife habitat
46) Water quality (increased algae); lower water levels; inappropriate development that affects lakes water quality and riparian areas, habitats, etc.;
47) Nutrient loading from agriculture; ALUS program helpful; boat speed/ power boats disturb fish, riparian areas (?electric motors only, enforce speed limits; rethink government structures to work together to protect water/ lakes (overall structure to control)
48) Fishery dies out periodically; Fish & Wildlife pumped air in fall but quit
49) Protect and manage lake water quality; decide on watershed land uses; technical point (understand groundwater influence on lake)
50) Quality of fisheries; canary in the lake water quality (relates to fish); quality of riparian habitat
51) Development, Beef---Gas & Oil Recovery – Non-Sustainable
52) Bad Result Lake atrophies & doesn't support fish & wildlife. Casual recreational activities, water use. The area becomes marshland.
53) Lake polluted & can't fix
54) Intensive agricultural operators (feedlot)
55) Importance High/Urgency High – 4 Stars – Once lake turns it is almost impossible to turn it back. Compounding problem. Cycles of phosphorus.

Stakeholder Aspirations:

1) Keep it as a jewel (quiet and protected).
2) Preserve Water Quality in Mayatan Lake
3) Maintain existing lake quality (or get it back to the way it was 20 years ago).
4) Aspiration: A lake with strong fisheries, healthy riparian area, plus good water quality. Fence off riparian area from cattle.
5) I come from flat, dry, barren Saskatchewan. The nearest lake was 200 km away. I value the trees, clear water and quiet.
6) Sustaining the water quality for wildlife.
7) That we learn more about the factors affecting water quality in the lake such as the influence of coal fired power plants to the west, the contribution of ash fallout on mercury levels in the lake water, the sources of nitrogen to the lake and how to mitigate these sorts of negative affects through legislative change at the provincial level.
8) I would like to see Mayatan become an example of a natural healthy Alberta lake. Maybe have educational signage and educate people to respect wildlife and the fragile ecosystem.
9) Use NSRP to help the lake with conservation & setting lake-specific, phosphorus standards. Educate about lake science.
10) Healthy native fish species in Mayatan Lake. This would mean there is good water quality, healthy riparian areas. We have a progressive, smart, science based system for managing near-shore development where municipal & provincial objectives & regulations are harmonized & coordinated – with advice from community. Mayatan maintains high-quality wildlife habitat in its riparian areas.
11) I would like to see Mayatan Lake in as good or better shape than it is today in 30 years
12) If grandkids could enjoy
13) Maintain as low a level of eutrophication as possible
14) Program to fence riparian area from cattle grazing- allowing vegetation growth (cows and fish; ALUS)
15) Preservation of Lake Quality. Use of science in development & planning.
16) Fuller cooperation with Lake People, County, ALMS – so resources are truly “shared” not concentrated to one lake, one issue, etc. funds included. If any “commercial” operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. “County land” all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.

Stakeholder Solutions:

1) No gas/diesel vehicles left on lakes when fishing time is on. They can leak poisonous fluids like antifreeze.
2) No septic fields in effective drainage area.
3) Monitor the garbage left behind during winter use.
4) Importance High/Urgency High – 7 Stars – has the toxic variety increased? Paleo. Mandatory residential fertilizer ban. High nutrient upload!
5) Preservation of Lake Quality. Use of science in development & planning.
6) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
7) Question: Can we help farmers to restrict direct cattle access to lake?
8) Innovative collaborative land use agreements; farmers may want to keep cattle away from lakes, but not have resources to achieve it.
9) Aeration in fall.
10) Fear I would be saddened with Mayatan Lake disappearing: Bring back beavers, Cisterns for any new development, Water & energy conservation, Limit development around the lake, Analyse ground water flow
11) New construction must have cisterns. New development has sewage holding tanks pumped in and out, water and energy conservation measures.
12) Cows to be managed – fencing.
13) Use of science. All aspect of science--flushing, aeration, as well as testing H2O. You have to separate lifestyle out of the equation.
14) Humans should manage natural processes using science. EG. Aeration will help the fish kill. Aeration is a must.
15) There should be more gov assistance for farmers.
16) Restrict gasoline engines from lake.
17) Drainage management by using oil spill retaining fabric.
18) Education of lake Users – a bigger consistency than lake owners – motor boat users, ice fishing litterers/polluters...
19) To approximate the annual phosphorus loading.
20) Limit development of oil & gas, prohibit fracking, responsible ice fishing (pick up garbage)
21) Worse case – no fishing for grandchildren, living with it, look at other wildlife that has adapted to water quality change

22) Install 2 aerator on the lake, limit cottage development, enhance nest sites for all species of birds.
23) Importance High/Urgency High – 6 Stars – Flush lake by using treatment plant on RR627 (TransAlta). Restrict use of large motor boats not to disturb phosphorus on lake! Either minimize lake mixing (boat speed) or else remove phosphorus already in the lake, so phosphorus doesn't increase. How this is solved on an immediate basis is not clear.
24) Importance High/Urgency High – 3 Stars – people in area can purchase snow blowers to clear 1000' X 250' area to have sunlight penetrate to plants below & use up CO2 leaving O2 for the fish.
25) Importance High/Urgency High – 2 Stars – Planning important. Look at all the factors. 2003? Results of aeration.

Other Questions and Comments:

1) I'd like to know: what are the alternatives for influencing patterns of agricultural use (cattle) - what's best?
2) Question: Agricultural cattle grazing, set back – farms? commercial?
3) Where have shell fish gone? Frogs? Bats?
4) Fertilizer use? Wells?
5) What about oxygen levels in the lake?
6) How about the side water bodies; is there a benefit to adding oxygen in the water?
7) Question: Research into recent blooms – is it related to temperature?
8) What's the water quality?
9) How is a spring fed lake recharged from ground water? Is this lake unique? (Depth? Water table?) Can its uniqueness be protected?
10) AB environment used to aerate the lake every fall, why did they stop?
11) Can I stop Phillip from peeing in the lake?
12) Why is [sic] by-law wildlife & fisheries officers not fining more fishermen for leaving ice huts barrels etc. to pollute the lake in thaw season?
13) Where is the phosphorus coming from?
14) Can we aerate the lake? Will that stop fish kill?
15) Do we know what's best for getting rid of sewage?
16) Need information on P&N budgets.
17) The fisheries and agitation= conducted in fall for 15 years; prior to freeze up; mix deeper basin; major fish kill in 2014; who? Fish and Wildlife?
18) Need more info on groundwater/ lake level interaction and trends?
19) Soils (erodibility, slopes/risk, gray luvisols)?
20) Biodiversity
21) Cattle crossing
22) ALUS program
23) Nutrient loading. What is the status of Beaver population?

24) Compare water quality from 30 years ago to now.
25) Algae on lake
26) ALUS
27) Importance High/Urgency Low – 4 Stars – important but only parts of lake affected this year.

2. Lake Water Levels

Stakeholder Concerns:

1) How to keep the channel open?
2) I hope that the lake water levels would increase back to what I remember as a child and hopefully the narrows deepen, allowing for passage between the sections of the lake without trouble.
3) Is there a study on the water level of Mayatan in the future? E.g. will it dry up?
4) Fear I would be saddened with Mayatan Lake disappearing: Bring back beavers, Cisterns for any new development, Water & energy conservation, Limit development around the lake, Analyse ground water flow
5) Lower water levels
6) What would happen if lake dries up. Why did this happen? Beavers, wells, climate. Rehabilitate it. Natural cycle of beaver population increasing flow. Prairie lakes are unique, fragile, and changeable.
7) Fear – lake levels go down. Algae increase. Fish kill. Want lake levels in same or better shape than now.
8) Worst case scenario: lake dries up completely/disappears → what can be done.
9) Fear: Increased water levels.
10) No motor boats in channel.
11) Another concern or comment would be that it appears that the narrows between the two sections of the lake is closing off quite quickly. While the second part used to be easily accessible by boat but now even a kayak now can barely make it through the narrows. Is this natural or due to water loss in the lake or is it related to development? I am concerned if this will affect water quality or water levels as when paddling through these narrows it has seemed to me that the water usually flows from the smaller section into the "main" part of the lake. If this narrows does close off I am unsure how it would affect wildlife in the area, specifically fish that will be unable to spend winter in the deeper main part of the lake.
12) One final concern for the lake would be water levels. As a kid playing on the shores and comparing the levels now I remember the water level receding almost every year. I am unsure if this is simply due to drought or agricultural activity or some other factor.
13) Low water, fish kill, land use – no regulations
14) Dropping water levels. Over-use of Lakes by recreational users. Reduce impact of cattle.

15) Water quality (increased algae); lower water levels; inappropriate development that affects lakes water quality and riparian areas, habitats, etc.;
16) Concerns of Lake Levels
17) Bad Result Lake atrophies & doesn't support fish & wildlife. Casual recreational activities, water use. The area becomes marshland.
18) No water left

Stakeholder Aspirations:

1) Keep water levels up or improved effect of wells on ground water & surface water.
2) Water levels to come up.
3) My Aspiration: Forest and shoreline remain at least as intact as it is now.
4) I would like my children to be able to canoe from one end to the other end, keeping the passages open, opportunity to fish. Consultation with local farmers.
5) Reservoir to recharge water table. Important? Frequent? Unique? Political/bureaucratic interest in lakes? Monitoring. Improved regulations. Coordination. How many lake management initiatives? 1. Vermilion River agricultural base 2. Sturgeon River (Lake Isle, Lac St. Anne, St. Albert, Onoway, Gibbons 3. Headwaters
6) I would like to see Mayatan Lake in as good or better shape than it is today in 30 years
7) I would like water levels to stay "up" in Mayatan Lake

Stakeholder Solutions:

None.

Other Questions and Comments:

1) Question: Can we re – establish natural water flows?
2) Question: Springs and groundwater – lakebed – Where are they? How much water comes into the lake? Recreation, fishing impact – How many fish are taken?
3) Climate change VS Natural cycles??
4) What is effect of climate change ↑ why is water level decreasing?
5) Water wells still appropriate? Lots of people are saying you shouldn't have water wells any more: related to groundwater.
6) How is a spring fed lake recharged from ground water? Is this lake unique? (Depth? Water table?) Can its uniqueness be protected?
7) Do we know what room water birds need for nesting?
8) Alberta geological survey; regional lake level trend? (Jackfish, Mayatan)
9) Importance High/Urgency Low – 4 Stars – is lower a result of used well water and in septic tanks being trucked out of watershed?
10) Wetland loss (just west of end of 522)
11) Lake Level has receded over 1930's.
12) Compare, study beaver populations in the past… rainfall in the past… study effects of humans, (for example, wells, Changing climate.)

13) Used to be open
14) I think I've learned lower water levels are part of a cycle. One agrees.
15) We wish it were higher but it has to be a cycle that we don't see much change via human effort.

3. Impacts of Development

Stakeholder Concerns:

1) Fear I would be saddened with Mayatan Lake disappearing: Bring back beavers, Cisterns for any new development, Water & energy conservation, Limit development around the lake, Analyse ground water flow
2) New subdivisions should have restrictions to keep lake clean. Responsible owners!
3) No septic fields in effective drainage area.
4) Can we ban septic fields?
5) What can we do to support the ALUS program and make farmers aware? What can be done to take the gas motors off the lake? How are these oil/gas wells marked?
6) Issue: need for managed motorized non-motorized recreation trail; Compaction, Trespassing, Erosion, Wildlife, NOICE!!!!
7) Sewage Maintenance
8) Innovative collaborative land use agreements; farmers may want to keep cattle away from lakes, but not have resources to achieve it.
9) Who should be here? Agricultural interests are probably not represented (seasonal work – e.g. seeding)
10) Worse case? – unrestricted development on lake area. All stakeholders who live in this area should be here!
11) Invasive species, plants and animals, over development, destruction of shore line
12) Cattle in the water. ALLUS.
13) Fertiliser runoff
14) An Aspiration I Fear: Turn Mayatan Lake into Sylvan, highrise condos, water skiing with power boats, campgrounds – the lake becomes a slough, but the developers have already gotten their money, and who care about the cottage owners? A good defence: the county officials are all my friends, and they love the tax base, and after all, "it's money, money, money makes the world go round".
15) My Fear – a large golf course development. Lots of land cleared, lots of fertilizer in run off. Argument: AB likes to encourage business development. Jobs. Lots of money for a few people.
16) Fear: development of Intensified Agriculture, such as feedlot, manure and associated nutrient runoff. Manure is spread on adjacent land – straight into water. Argument: economic incentive, lots of profit. ↓ Food cost. Export efficiency.

17) A resolve: inappropriate development that affects lake water quality, riparian areas and habit etc.
18) Priority Issue: management of agriculture use of the lake, (reduce the use by cattle)
19) Runoff from household septic systems.
20) Biggest fear – man-made destruction.
21) Concern for responsible future development: type—density.
22) My main concerns are continued usability and water quality of the lake. Many lakes in the parkland region seem to be suffering from the pollution and development that have occurred around their shores. As a small lake I imagine Mayatan is less tolerant of the added strain put on it by farming and increased usage/development. I have already noticed an increased amount of activity around the lake in recent years and do not want the lake to be negatively affected.
23) As Stony Plain and Spruce Grove increase in size I would want to ensure that Mayatan remains as wild as possible and is not encroached upon by industry or housing.
24) One final concern for the lake would be water levels. As a kid playing on the shores and comparing the levels now I remember the water level receding almost every year. I am unsure if this is simply due to drought or agricultural activity or some other factor.
25) Habitat loss. Loss of trees due to clear cutting of lots prior to construction. My concern has to do with drying of the land in Mayatan Lake Estates, the reduction of habitat for birds, amphibians, and other animals in the development, and the fact development begins on lots prior to the granting of development permits and the opportunity for comment by residents (this has happened at least 3 times).
26) When a home owner cuts down all or most of the trees on their lot, it exposes neighbouring lots to higher rates of windfall from high winds striking the remaining tall trees.
27) Eutrophication of the shallow eastern basin. Not sure if cattle are still drinking from the lake in the eastern basin, but if they are, their manure and urine will continue to drive it to higher levels of eutrophication.
28) New development. The large property to the east of Rge Rd 30 at the entrance to Mayatan Lake Estates is currently being developed with a lot of sculpting of the land, drawing in of gravel, etc. Has this development begun without notice to neighbouring property owners or prior approval from Parkland?
29) Low water, fish kill, land use – no regulations
30) Agriculture: cattle grazing up to and in the lake. Shoreline development: residences are affecting riparian health. Sewage treatment: nutrient inputs.
31) Water Quality/Pollution. Biodiversity – shore birds, fish, amphibians, invertebrates. Sustainable recreational use/land protection.
32) Lake Quality. Managed development. Public access.
33) Agriculture: cattle (using shoreline). Bay (Mayatan) – south/east bay closed up due to cattle crossing. Maintain water quality.

34) No crown land, limited ability to set aside conservation areas or to not develop. Agricultural runoff. Climate change warming the shallow basin and causing blooms without any additional inputs.
35) Runoff from septic systems. Runoff from farming operations. Recreation aftereffects. Over-population of waterfront. Support active organizations.
36) Pollution. More protection for wildlife. Less lake development.
37) Uncontrolled development of any kind. i.e. On agricultural land you can remove all your trees & fill in your wetlands, make it into one level piece of land. On agricultural land use of phosphate-based fertilizer. Intrusive agricultural operations – feedlot. Intensive recreational development.
38) One owner/operator is policing the activities.
39) Critical development close to lakes; Cattle in the water; unresponsible sewage close to the water
40) Cattle in the watershed (nutrient loading); pressure from development (increased usage); invasive species; lack of control over lake issues (who has authority?)
41) Preserving water quality; how to develop in a way that preserves environmental integrity; preserve Wildlife habitat
42) Water quality (increased algae); lower water levels; inappropriate development that affects lakes water quality and riparian areas, habitats, etc.;
43) Nutrient loading from agriculture; ALUS program helpful; boat speed/ power boats disturb fish, riparian areas (?electric motors only, enforce speed limits; rethink government structures to work together to protect water/ lakes (overall structure to control)
44) Lots too small- too many people for a development
45) Climate Trends; Climate Change; Recreation pressures (Land Development); Long term Land Management; Controlled Development
46) Protect and manage lake water quality; decide on watershed land uses; technical point (understand groundwater influence on lake)
47) Development pressure
48) Development, Beef---Gas & Oil Recovery – Non-Sustainable
49) I would like to see the people of Mayatan internalize a sense of stewardship; have a conservation ethic or a land ethic. Education that is meaningful and involved. Co-management by all levels of government. *Regulations in place to allow developers to make proper cost/benefit analysis (i.e. Is it worth it to build “green” or not build at all. It should never be an option to build “cheaply” from an environmental perspective. (Fear – development is okay but we need to know what our carrying capacities are and stick within them.)
50) Unresponsible development
51) Over development, noise day and night
52) Uncontrolled development of any kind
53) Intensive recreational development

Stakeholder Aspirations:

1) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
2) Responsible development and usage by the lake.
3) A lake that is preserved ecologically (increase water quality & habitats.)
4) Keep it as a jewel (quiet and protected).
5) What I hope for: I think it's about balance—balance for all. It will still be a fun place to live and play. No power boats. Battery powered electric motors. Control use of treble hooks, get rid of stainless steel hooks. I see Mayatan Lake as it is today with healthy Riparian area. Many visitors enjoying habitat, the birds, the fishing, the quiet. I see educated visitors, managed.
6) New development should not adversely affect existing development.
7) My Aspiration: Forest and shoreline remain at least as intact as it is now.
8) Aspiration: A lake with strong fisheries, healthy riparian area, plus good water quality. Fence off riparian area from cattle.
9) I come from flat, dry, barren Saskatchewan. The nearest lake was 200 km away. I value the trees, clear water and quiet.
10) The importance of silence, quiet and solitude.
11) There is an older couple that owns property on the western side of the lake who expressed to me their hope that their land would not be developed. If it could be purchased by the Edmonton Area Land Trust or the Nature Conservancy that would prevent the development of a significant piece of shoreline.
12) Long term I would like Mayatan to remain a quiet and small lake with good fishing and extremely limited development.
13) As cities draw nearer to it I would hope that it is preserved and held as an example of sustainable lake development which I recognize involves finding a balance between conservation and development.
14) Maintain existing lake quality (or get it back to where it was in 1993!). Maintain reasonable usage ability by lakefront landowners that does not cause significant long term damage. Research for phosphorus removal (maybe nitrogen too).
15) I would like the forest and shoreline around Mayatan to remain at least as intact as it is now.

16) Better education on whatever the primary sources of P&N 80 WMP can be strategic. Mayatan Lake stay quiet & good fishing & extremely low development. Responsible stewardship by landowners.
17) Growing consciousness of family-centered camping. Renters, leasees, regular visitors might have more vested interest in the lake, a sense of ownership.
18) Healthy native fish species in Mayatan Lake. This would mean there is good water quality, healthy riparian areas. We have a progressive, smart, science based system for managing near-shore development where municipal & provincial objectives & regulations are harmonized & coordinated – with advice from community. Mayatan maintains high-quality wildlife habitat in its riparian areas.
19) Natural environment on & around the lake.
20) I would like to see Mayatan Lake in as good or better shape than it is today in 30 years
21) No intense development

Stakeholder Solutions

1) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
2) Managed development.
3) Mowing better corridor access for recreation.
4) I wish that someone could buy this surrounding land and establish a "camp" for kids and families to experience this "great outdoors"!
5) New construction must have cisterns. New development has sewage holding tanks pumped in and out, water and energy conservation measures.
6) Compare, study beaver populations in the past… rainfall in the past… study effects of humans, (for example, wells, Changing climate.)
7) Cows to be managed – fencing.
8) Maintain habitat for all recreators, limit further cottage development, fish kill is a concern.
9) You do smart development. You work with developers.
10) There should be more gov assistance for farmers.
11) ALUS helps but more money is needed; fencing is expensive, use solar energy for watering livestock
12) Landowners can use/clear 10 ft per lot or 20% whatever is less e.g. access view sightline.
13) Limit development of oil & gas, prohibit fracking, responsible ice fishing (pick up garbage)

14) Install 2 aerator on the lake, limit cottage development, enhance nest sites for all species of birds.
15) Easy to implement, high value; buffers would not be significant impact to agricultural users. Needs enforcement with by-laws etc. _____ (one word unintelligible)
16) Control development to protect riparian zone. Capacity of lake for development. Define "good" development. Setbacks for riparian areas. Protect wildlife areas.
17) Fear I would be saddened with Mayatan Lake disappearing: Bring back beavers, Cisterns for any new development, Water & energy conservation, Limit development around the lake, Analyse ground water flow
18) New subdivisions should have restrictions to keep lake clean. Responsible owners!
19) No septic fields in effective drainage area.

Other Questions and Comments:

1) I'd like to know: what are the alternatives for influencing patterns of agricultural use (cattle) - what's best?
2) Question: Agricultural cattle grazing, set back – farms? commercial?
3) Question: Can we help farmers to restrict direct cattle access to lake?
4) How to assess user density?
5) Mayatan is designated as Environmentally Sensitive Area. What does this mean in terms of development of land around the lake?
6) Nutrient loading. What is the status of Beaver population?
7) Fertilizer use? Wells?
8) Do we know what's best for getting rid of sewage?
9) What would Mayatan Lake look like without development? (still means management?)
10) Forest/re-forestation; climate trend (risk?)
11) Environmental management - precipitation/ temperature averages and extremes?
12) Importance High/Urgency Low – 4 Stars – is lower a result of used well water and in septic tanks being trucked out of watershed?
13) Biodiversity
14) Power line right of way maintenance.
15) Elk sighting
16) Cattle crossing
17) Recreational development
18) Balance – compromise, flexibility,
19) Identify, recognize & respect different interests
20) Balance between rules & flexibility.
21) Wetland loss (just west of end of 522)
22) ALUS program
23) Wildlife: moose, deer, loons, coyote.
24) Wildlife Corridor

25) ALUS

4. Fish and Fishing

Stakeholder Concerns:

1) Let's look at the why of a fish kill before madly trying to replace or support a 'wanted' or 'desired' fish population. This appears to be a natural cycle. Natural effect. Fish are there only because we put them there.
2) Just see if pike population will recover first before doing any restoration.
3) Why did we have such a large fish kill this year?
4) Does anyone keep an eye on the lake during ice fishing season? Making sure they remove their garbage?
5) Can we aerate the lake? Will that stop fish kill?
6) Fear – lake levels go down. Algae increase. Fish kill. Want lake levels in same or better shape than now.
7) Maintain habitat for all recreators, limit further cottage development, fish kill is a concern.
8) Our dying plants absorb all the O2 through the winter.
9) Worse case – no aquatic insects & fish, stagnant water.
10) Worse case – no fishing for grandchildren, living with it, look at other wildlife that has adapted to water quality change
11) Quality of fisheries - the canary? Relates to water quality & riparian vegetation.
12) Another concern or comment would be that it appears that the narrows between the two sections of the lake is closing off quite quickly. While the second part used to be easily accessible by boat but now even a kayak now can barely make it through the narrows. Is this natural or due to water loss in the lake or is it related to development? I am concerned if this will affect water quality or water levels as when paddling through these narrows it has seemed to me that the water usually flows from the smaller section into the "main" part of the lake. If this narrows does close off I am unsure how it would affect wildlife in the area, specifically fish that will be unable to spend winter in the deeper main part of the lake.
13) One final concern for the lake would be water levels. As a kid playing on the shores and comparing the levels now I remember the water level receding almost every year. I am unsure if this is simply due to drought or agricultural activity or some other factor.
14) Fish winter-kill. The loons, herons, etc. depend on having fish in the lake, and fishing is a popular recreational use of the lake. It appears that the aeration program may have been ended. Should or could this be reinstated, if it was a successful program in the past.
15) Low water, fish kill, land use – no regulations
16) Nutrient loading from agriculture; ALUS program helpful; boat speed/ power boats disturb fish, riparian areas (?electric motors only, enforce speed limits; rethink government structures to work together to protect water/ lakes (overall structure to control)

17) Fishery dies out periodically; Fish & Wildlife pumped air in fall but quit
18) Quality of fisheries; canary in the lake water quality (relates to fish); quality of riparian habitat
19) Bad Result Lake atrophies & doesn't support fish & wildlife. Casual recreational activities, water use. The area becomes marshland.
20) No fishing
21) High indicates state of the lake long term

Stakeholder Aspirations:

1) What I hope for: I think it's about balance—balance for all. It will still be a fun place to live and play. No power boats. Battery powered electric motors. Control use of treble hooks, get rid of stainless steel hooks. I see Mayatan Lake as it is today with healthy Riparian area. Many visitors enjoying habitat, the birds, the fishing, the quiet. I see educated visitors, managed.
2) Aspiration: A lake with strong fisheries, healthy riparian area, plus good water quality. Fence off riparian area from cattle.
3) Long term I would like Mayatan to remain a quiet and small lake with good fishing and extremely limited development.
4) Healthy native fish species in Mayatan Lake. This would mean there is good water quality, healthy riparian areas. We have a progressive, smart, science based system for managing near-shore development where municipal & provincial objectives & regulations are harmonized & coordinated – with advice from community. Mayatan maintains high-quality wildlife habitat in its riparian areas.
5) I would like my children to be able to canoe from one end to the other end, keeping the passages open, opportunity to fish. Consultation with local farmers.
6) Maintain a strong fishery

Stakeholder Solutions:

1. Humans should manage natural processes using science. EG. Aeration will help the fish kill. Aeration is a must.
2. Get rid of treble hooks.
3. Biodiversity: stock in large fish.
4. Install 2 aerator on the lake, limit cottage development, enhance nest sites for all species of birds.
5. Appropriate controls on recreational use will promote intelligent use at all lake-based resources. Keep on tab at all times. !!!!! Put a sign at boat launch! (and explain that speeding = fish kill)
6. People in area can purchase snow blowers to clear 1000' X 250' area to have sunlight penetrate to plants below & use up CO2 leaving O2 for the fish.
7. Planning important. Look at all the factors. 2003? Results of aeration.

8. Let's look at the why of a fish kill before madly trying to replace or support a 'wanted' or 'desired' fish population. This appears to be a natural cycle. Natural effect. Fish are there only because we put them there.
9. Just see if pike population will recover first before doing any restoration.

Other Questions and Comments:

1) What are wildlife populations doing?
2) Question: Springs and groundwater – lakebed – Where are they? How much water comes into the lake? Recreation, fishing impact – How many fish are taken?
3) Carrying capacity for boating on Mayatan Lake – what is it?
4) Where have shell fish gone? Frogs? Bats?
5) How does Mayatan Lake compare to other lakes for fish kill??
6) What's the current quality of the fishery? Reproduction? Age classes of fish? State of Watershed Report?
7) Why is [sic] by-law wildlife & fisheries officers not fining more fishermen for leaving ice huts barrels etc. to pollute the lake in thaw season?
8) The fisheries and agitation= conducted in fall for 15 years; prior to freeze up; mix deeper basin; major fish kill in 2014; who? Fish and Wildlife?
9) Fish health
10) Can do this next year.

5. Lake Management System

Stakeholder Concerns:

1) New subdivisions should have restrictions to keep lake clean. Responsible owners!
2) Runoff from septic systems. Runoff from farming operations. Recreation aftereffects. Over-population of waterfront. Support active organizations.
3) Can we ban septic fields?
4) Fear Protect the lake now not in 20 years – too late!
5) Issue: need for managed motorized non-motorized recreation trail; Compaction, Trespassing, Erosion, Wildlife, NOICE!!!!
6) Sewage Maintenance
7) Innovative collaborative land use agreements; farmers may want to keep cattle away from lakes, but not have resources to achieve it.
8) Noise pollution. Boat speed and power boats on lake
9) ALUS helps but more money is needed; fencing is expensive, use solar energy for watering livestock
10) Enforcement is an issue. It often only applies to small segment of society. There are different agencies for enforcement with often confusing results (Jackfish Lake). Which agency is doing enforcement? Enforcement agencies should have claws
11) Concern for responsible future development: type—density.

12) Habitat loss. Loss of trees due to clear cutting of lots prior to construction. My concern has to do with drying of the land in Mayatan Lake Estates, the reduction of habitat for birds, amphibians, and other animals in the development, and the fact development begins on lots prior to the granting of development permits and the opportunity for comment by residents (this has happened at least 3 times).
13) When a home owner cuts down all or most of the trees on their lot, it exposes neighbouring lots to higher rates of windfall from high winds striking the remaining tall trees.
14) Boats on the lake. One resident has a power boat that gets used occasionally at high speeds creating washes that I am concerned will jeopardize the 2 or 3 pairs of loons currently inhabiting the lake year to year.
15) New development. The large property to the east of Rge Rd 30 at the entrance to Mayatan Lake Estates is currently being developed with a lot of sculpting of the land, drawing in of gravel, etc. Has this development begun without notice to neighbouring property owners or prior approval from Parkland?
16) Low water, fish kill, land use – no regulations
17) No crown land, limited ability to set aside conservation areas or to not develop. Agricultural runoff. Climate change warming the shallow basin and causing blooms without any additional inputs.
18) One owner/operator is policing the activities.
19) Cattle in the watershed (nutrient loading); pressure from development (increased usage); invasive species; lack of control over lake issues (who has authority?)
20) Preserving water quality; how to develop in a way that preserves environmental integrity; preserve Wildlife habitat
21) Climate Trends; Climate Change; Recreation pressures (Land Development); Long term Land Management; Controlled Development
22) Protect and manage lake water quality; decide on watershed land uses; technical point (understand groundwater influence on lake)
23) Appropriate, supportive regulations from all levels of government (municipal, provincial, federal) to support sustainability of use and environment. There's a gap in environmental management & responsibility, accountability at this [provincial] level
24) Unresponsible development
25) Over development, noise day and night
26) Is it being made clear to people what the rules are? Development in Mayatan lake estates has improperly cleared land.
27) The quality of the water. The ability to sustain waterfowl – Loons! Balancing the ecosystem.

Stakeholder Aspirations:

1) Preservation of Lake Quality. Use of science in development & planning.

2) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
3) Sustainable human access to the Mayatan Lake Watershed meaning that habitat & wildlife remains, and humans can enjoy it for a long time. Enforcement to ensure human activities are appropriate around the lakes. Using the ecosystem services appropriately for all – based on science.
4) I want this area to be here healthy long after I'm gone!
5) I want to be able to share this beautiful area -- and educate people -- as to how to share "responsibility" to be "good stewarts [sic]!"
6) Want grandkids to enjoy getting out "into the bush", learn about wildlife, encourage kids to enjoy nature.
7) A lake that is preserved ecologically (increase water quality & habitats.)
8) Keep it as a jewel (quiet and protected).
9) Fear – lake levels go down. Algae increase. Fish kill. Want lake levels in same or better shape than now.
10) My kids can swim in lake.
11) What I hope for: I think it's about balance—balance for all. It will still be a fun place to live and play. No power boats. Battery powered electric motors. Control use of treble hooks, get rid of stainless steel hooks. I see Mayatan Lake as it is today with healthy Riparian area. Many visitors enjoying habitat, the birds, the fishing, the quiet. I see educated visitors, managed.
12) Maintain reasonable use ability by lake from owners, that does not cause significant long term damage.
13) Can use the lake reasonable expectations with no long term adverse effect e.g. Not sandy beach, washed gravel on landscaping cloth in limited area.
14) Aspirations: Comprehensive set of regulations for lake development and protection that are enforced.
15) Save the sounds of wildlife: muskrats, chipmunks, squirrels, beavers, ravens, bats, blue jays, songbirds, crows, blue herons, coyotes, pelicans, loons.
16) I come from flat, dry, barren Saskatchewan. The nearest lake was 200 km away. I value the trees, clear water and quiet.
17) Wildlife protection for land and marine life.
18) I wish my grandkids lakes that have a healthy wildlife balance and swimming spot.
19) Mayatan is a jewel. Enjoy the peace and tranquillity of the lake.

20) I hope my grandkids enjoy a healthy lake and be able to watch in the peace and quiet that is there now.
21) Save for our grandkids! Where else can you hear the loons, watch the beavers and listen to all the different birds?
22) There is an older couple that owns property on the western side of the lake who expressed to me their hope that their land would not be developed. If it could be purchased by the Edmonton Area Land Trust or the Nature Conservancy that would prevent the development of a significant piece of shoreline.
23) That we learn more about the factors affecting water quality in the lake such as the influence of coal fired power plants to the west, the contribution of ash fallout on mercury levels in the lake water, the sources of nitrogen to the lake and how to mitigate these sorts of negative affects through legislative change at the provincial level.
24) That there might be a program of education through newspaper articles, blogs, flyers, or other means to publicize various environmental interest stories along the lines of "how cool is that?" content that would encourage people to notice and care for the environment and linked to issues that require action to mitigate environmental degradation.
25) As cities draw nearer to it I would hope that it is preserved and held as an example of sustainable lake development which I recognize involves finding a balance between conservation and development.
26) Maintain existing lake quality (or get it back to where it was in 1993!). Maintain reasonable usage ability by lakefront landowners that does not cause significant long term damage. Research for phosphorus removal (maybe nitrogen too).
27) Opportunity for local communities to have a choice in the future of their natural resources = innovation. Public Access. Acknowledgement of stewardship responsibility.
28) I would like to see Mayatan become an example of a natural healthy Alberta lake. Maybe have educational signage and educate people to respect wildlife and the fragile ecosystem.
29) I would like the forest and shoreline around Mayatan to remain at least as intact as it is now.
30) Better education on whatever the primary sources of P&N 80 WMP can be strategic. Mayatan Lake stay quiet & good fishing & extremely low development. Responsible stewardship by landowners.
31) Use NSRP to help the lake with conservation & setting lake-specific, phosphorus standards. Educate about lake science.
32) I would like to see the people of Mayatan internalize a sense of stewardship; have a conservation ethic or a land ethic. Education that is meaningful and involved. Co-management by all levels of government. *Regulations in place to allow developers to make proper cost/benefit analysis (i.e. Is it worth it to build “green” or not build at all. It should never be an option to build “cheaply” from an environmental perspective. (Fear –

development is okay but we need to know what our carrying capacities are and stick within them.)

33) Healthy native fish species in Mayatan Lake. This would mean there is good water quality, healthy riparian areas. We have a progressive, smart, science based system for managing near-shore development where municipal & provincial objectives & regulations are harmonized & coordinated – with advice from community. Mayatan maintains high-quality wildlife habitat in its riparian areas.
34) I would like my children to be able to canoe from one end to the other end, keeping the passages open, opportunity to fish. Consultation with local farmers.
35) Natural environment on & around the lake.
36) Responsible use & sustainable, managed within tolerances.
37) A regional approach to lake management.
38) I would like to see Mayatan Lake in as good or better shape than it is today in 30 years
39) I would like to see wildlife around and in the lake;
40) I would like to see increased education/knowledge about lakes/ lake management
41) If grandkids could enjoy

Stakeholder Solutions:

1) Preservation of Lake Quality. Use of science in development & planning.
2) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
3) Sustainable human access to the Mayatan Lake Watershed meaning that habitat & wildlife remains, and humans can enjoy it for a long time. Enforcement to ensure human activities are appropriate around the lakes. Using the ecosystem services appropriately for all – based on science.
4) Cooperation of all county council people, better communication! If money available to county let's use it further than one lake study.
5) Using science
6) Identify, recognize & respect different interests
7) Educate about stewardship – conservations -- respect.
8) Get more people interested in the wellbeing of the lake
9) No power boats, Proper Land Planning, prov. and county coordination, water for life
10) Signage, inspection, education, cleaning & dry.

11) Adopt a similar situation as in Ontario, with conservation authorities who bring together various levels of government NGOs etc. Rethink structure.
12) New construction must have cisterns. New development has sewage holding tanks pumped in and out, water and energy conservation measures.
13) Learn from history. Learn about other places are solving problems & do it!
14) Use of science. All aspect of science--flushing, aeration, as well as testing H2O. You have to separate lifestyle out of the equation.
15) You do smart development. You work with developers.
16) Educate farming community and general public.
17) There should be more gov assistance for farmers.
18) Education of lake Users – a bigger consistency than lake owners – motor boat users, ice fishing litterers/polluters...
19) Enforce the boat speed or no gas motors (because you apparently can't enforce speed limit…) It won't change the phosphorus content of lake, but it will reduce the phosphorus mixing and the algae blooms.
20) Landowners can use/clear 10 ft. per lot or 20% whatever is less e.g. access view sightline.
21) Better general education -- users, public, developers.
22) Consider Mayatan in the regional context with other water bodies and providing opportunities consistent with its unique characteristics and regional uses.
23) To get county to allow volunteers to get permission to enforce regulations on properties.
24) No septic fields in effective drainage area.
25) Monitor the garbage left behind during winter use.
26) Water Quality/Pollution. Biodiversity – shore birds, fish, amphibians, invertebrates. Sustainable recreational use/land protection.
27) Nutrient loading from agriculture; ALUS program helpful; boat speed/ power boats disturb fish, riparian areas (?electric motors only, enforce speed limits; rethink government structures to work together to protect water/ lakes (overall structure to control)
28) Easy to implement, high value; buffers would not be significant impact to agricultural users. Needs enforcement with by-laws etc. _____ (one word unintelligible)
29) This is not something that can be solved immediately. Each community should have a liaison or spokesperson to observe most guidelines around lake are followed
30) There should be some lake access to allow access to lake front owners – suggest lesser of 25' or 20% of lakefront with e.g. 50' lot = 10' & 300' lot = 25'
31) Stop all removal of bull rushes on lake shores. There should be real immediate enforcement of this. If laws or regulations are not in place in Alberta they should be. Easy implement, highly effective. Also enhances wildlife diversity. Do not remove it all!
32) Sign for boat launch re invasive species, immediately. Sign for boat speeds or electric motor only.

33) Control development to protect riparian zone. Capacity of lake for development. Define "good" development. Setbacks for riparian areas. Protect wildlife areas.
34) Planning important. Look at all the factors. 2003? Results of aeration.
35) Conservation, mapping, identifying, regulating
36) Better signage at entrance to recreation area close to water edge. Restrict gasoline/fuel motors – electric motors only.
37) Need buy-in by everybody. Need surveillance & regulatory backstop.

Other Questions and Comments:

1) Chance for stewardship within each of us (i.e. not leave it up to others or government)
1) Biodiversity
2) By-Law re: say commercial use are good – but enforce them!!!
3) Balance between rules & flexibility.
4) The lake is the thing not the people living around the lake.
5) Understanding the ability of the lake to resist change--Water levels, Nutrient loading, Development, Tree clearing
6) When we moved out to this area we weren't aware of the impact on lakes. Now as we become more involved we are more aware.
7) WATERSHED MANAGEMENT: Will it make a difference?
8) As long as jurisdiction is unclear, environmental degradation will continue.
9) Work on it, not only debate it. Look ahead to future.
10) Society, Education. Getting it to people so they understand it.
11) A definite must!
12) Mayatan is designated as Environmentally Sensitive Area. What does this mean in terms of development of land around the lake?
13) Who protects Lake Mayatan?
14) What needs to be put in place to make smart decisions about development and usage?
15) How to engage people? Social media, surveys or other?
16) Water wells still appropriate? Lots of people are saying you shouldn't have water wells any more: related to groundwater.
17) What is the cost to remove phosphorus? Are there matching grants available if $ is raised to improve H2O quality? (Could it be a charitable donation?)
18) Who can facilitate a lakeshore management policy process?
19) How can economics be used to drive change in behaviour? i.e. 20 dollars per dump.
20) What's the current quality of the fishery? Reproduction? Age classes of fish? State of Watershed Report?
21) Can we have lake watch to enforce proper activity?
22) Is there a template for lake watershed management?
23) Why is [sic] by-law wildlife & fisheries officers not fining more fishermen for leaving ice huts barrels etc. to pollute the lake in thaw season?

24) What can we do to support the ALUS program and make farmers aware? What can be done to take the gas motors off the lake? How are these oil/gas wells marked?
25) Fish winter-kill. The loons, herons, etc. depend on having fish in the lake, and fishing is a popular recreational use of the lake. It appears that the aeration program may have been ended. Should or could this be reinstated, if it was a successful program in the past.
26) How much riparian do we need? Is it a guess? Or is there science?
27) Does GREEN have a real meaning? Who decides if something is green?
28) Template for lake/watershed management process – does it exist?
29) What influence/authority does the provincial government have? If we provide advice can it be ignored? Over-ruled?
30) What would Mayatan Lake look like without development? (still means management?)
31) Soils (erodibility, slopes/risk, gray luvisols)?
32) Environmental management - precipitation/ temperature averages and extremes?

6. Groundwater Quality and Quantity

Stakeholder Concerns:

1) Old vehicles in back yards pose danger to ground water once brake fluids leak.
2) Water wells still appropriate? Lots of people are saying you shouldn't have water wells any more: related to groundwater.

Stakeholder Aspirations:

1) Keep water levels up or improved effect of wells on ground water & surface water.
2) Reservoir to recharge water table. Important? Frequent? Unique? Political/bureaucratic interest in lakes? Monitoring. Improved regulations. Coordination. How many lake management initiatives? 1. Vermilion River agricultural base 2. Sturgeon River (Lake Isle, Lac St. Anne, St. Albert, Onoway, Gibbons 3. Headwaters

Stakeholder Solutions:

1) New construction must have cisterns. New development has sewage holding tanks pumped in and out, water and energy conservation measures.
2) Limit development of oil & gas, prohibit fracking, responsible ice fishing (pick up garbage)
3) No septic fields in effective drainage area.
4) Need to study effects of ground water use.
5) Fear I would be saddened with Mayatan Lake disappearing: Bring back beavers, Cisterns for any new development, Water & energy conservation, Limit development around the lake, Analyse ground water flow

Other Questions and Comments:

1) Question: Springs and groundwater – lakebed – Where are they? How much water comes into the lake? Recreation, fishing impact – How many fish are taken?

2) Fertilizer use? Wells?
3) What would happen if lake dries up. Why did this happen? Beavers, wells, climate. Rehabilitate it. Natural cycle of beaver population increasing flow. Prairie lakes are unique, fragile, and changeable.
4) How much ground water does Genesee/Sundance use for power generation? Are they depleting the water table?
5) Is there any fracking in our watershed?
6) How is a spring fed lake recharged from ground water? Is this lake unique? (Depth? Water table?) Can its uniqueness be protected?
7) Protect and manage lake water quality; decide on watershed land uses; technical point (understand groundwater influence on lake)
8) Where does ground water come from? Can we use it up?
9) Groundwater (domestic wells?); Argon? Cistern or wells in subdivisions - how many? (How merchandized)? boats restricted?
10) Need more info on groundwater/ lake level interaction and trends?
11) Alberta geological survey; regional lake level trend? (Jackfish, Mayatan)
12) Know more about fracking effects on water.
13) Compare, study beaver populations in the past… rainfall in the past… study effects of humans, (for example, wells, Changing climate.)
14) Especially the role of oil & gas on underground water. How much do oil & gas use up?
15) Let's work on what we can see. One agreed.
16) Not urgent because not knowing has not killed the lake yet but need to know soon.

7. Recreational Activities

Stakeholder Concerns:

1) What can we do to support the ALUS program and make farmers aware? What can be done to take the gas motors off the lake? How are these oil/gas wells marked?
2) Monitor the garbage left behind during winter use.
3) Enforce the boat speed or no gas motors (because you apparently can't enforce speed limit…) It won't change the phosphorus content of lake, but it will reduce the phosphorus mixing and the algae blooms.
4) Stop inconsiderate day use visitors--Ice fishing debris, Boaters, Party goers, ATVs
5) Boating pressure.
6) Unrestricted boat launch, speed monitoring, 10 k too fast
7) Issue: need for managed motorized non-motorized recreation trail; Compaction, Trespassing, Erosion, Wildlife, NOICE!!!!
8) Noise pollution. Boat speed and power boats on lake
9) Does anyone keep an eye on the lake during ice fishing season? Making sure they remove their garbage?

10) Boats on the lake. One resident has a power boat that gets used occasionally at high speeds creating washes that I am concerned will jeopardize the 2 or 3 pairs of loons currently inhabiting the lake year to year.
11) Fish winter-kill. The loons, herons, etc. depend on having fish in the lake, and fishing is a popular recreational use of the lake. It appears that the aeration program may have been ended. Should or could this be reinstated, if it was a successful program in the past.
12) Water Quality/Pollution. Biodiversity – shore birds, fish, amphibians, invertebrates. Sustainable recreational use/land protection.
13) Lake Quality. Managed development. Public access.
14) Dropping water levels. Over-use of Lakes by recreational users. Reduce impact of cattle.
15) Runoff from septic systems. Runoff from farming operations. Recreation aftereffects. Over-population of waterfront. Support active organizations.
16) Uncontrolled development of any kind. i.e. On agricultural land you can remove all your trees & fill in your wetlands, make it into one level piece of land. On agricultural land use of phosphate-based fertilizer. Intrusive agricultural operations – feedlot. Intensive recreational development.
17) Nutrient loading from agriculture; ALUS program helpful; boat speed/ power boats disturb fish, riparian areas (?electric motors only, enforce speed limits; rethink government structures to work together to protect water/ lakes (overall structure to control)
18) Weekend traffic; the potential spill from Jackfish Lake; add leeches; recreation boaters (totally inappropriate to scales of AB Lakes—18 foot plus ski boats and pontoon boats)
19) Climate Trends; Climate Change; Recreation pressures (Land Development); Long term Land Management; Controlled Development
20) Bad Result Lake atrophies & doesn't support fish & wildlife. Casual recreational activities, water use. The area becomes marshland.
21) No fishing
22) Intensive recreational development
23) Ignoring the 12 km/hr boat speed has driven the loons to not have young ones or they would away altogether.

Stakeholder Aspirations:

1) Responsible development and usage by the lake.
2) Want grandkids to enjoy getting out "into the bush", learn about wildlife, encourage kids to enjoy nature.
3) My kids can swim in lake.
4) What I hope for: I think it's about balance—balance for all. It will still be a fun place to live and play. No power boats. Battery powered electric motors. Control use of treble hooks, get rid of stainless steel hooks. I see Mayatan Lake as it is today with healthy

Riparian area. Many visitors enjoying habitat, the birds, the fishing, the quiet. I see educated visitors, managed.

5) Can use the lake reasonable expectations with no long term adverse effect e.g. Not sandy beach, washed gravel on landscaping cloth in limited area.
6) Maintain recreation, safe swimming
7) "Grandchildren. A place to still your mind."
8) I wish my grandkids lakes that have a healthy wildlife balance and swimming spot.
9) The importance of silence, quiet and solitude.
10) I hope my grandkids enjoy a healthy lake and be able to watch in the peace and quiet that is there now.
11) Save for our grandkids! Where else can you hear the loons, watch the beavers and listen to all the different birds?
12) Long term I would like Mayatan to remain a quiet and small lake with good fishing and extremely limited development.
13) Opportunity for local communities to have a choice in the future of their natural resources = innovation. Public Access. Acknowledgement of stewardship responsibility.
14) Better education on whatever the primary sources of P&N 80 WMP can be strategic. Mayatan Lake stay quiet & good fishing & extremely low development. Responsible stewardship by landowners.
15) Growing consciousness of family-centered camping. Renters, leasees, regular visitors might have more vested interest in the lake, a sense of ownership.
16) I would like my children to be able to canoe from one end to the other end, keeping the passages open, opportunity to fish. Consultation with local farmers.
17) If grandkids could enjoy
18) Maintain a strong fishery
19) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
20) Sustainable human access to the Mayatan Lake Watershed meaning that habitat & wildlife remains, and humans can enjoy it for a long time. Enforcement to ensure human activities are appropriate around the lakes. Using the ecosystem services appropriately for all – based on science.

Stakeholder Solutions:

1) Paddle only. Or electric for handicap, gas off.

2) Mowing better corridor access for recreation.
3) I wish that someone could buy this surrounding land and establish a "camp" for kids and families to experience this "great outdoors"!
4) Get a ban on power boats like at Hubbles Lake
5) No power boats
6) No power boats, Proper Land Planning, prov. and county coordination, water for life
7) Signage, inspection, education, cleaning & dry.
8) Maintain habitat for all recreators, limit further cottage development, fish kill is a concern.
9) Restrict gasoline engines from lake.
10) Parking lot dripping oil and antifreeze.
11) Drainage management by using oil spill retaining fabric.
12) Education of lake Users – a bigger consistency than lake owners – motor boat users, ice fishing litterers/polluters...
13) Prohibit gas motors, electric okay.
14) Limit development of oil & gas, prohibit fracking, responsible ice fishing (pick up garbage)
15) No gas boats on these small lakes – way too risky.
16) Flush lake by using treatment plant on RR627 (TransAlta). Restrict use of large motor boats not to disturb phosphorus on lake! Either minimize lake mixing (boat speed) or else remove phosphorus already in the lake, so phosphorus doesn't increase. How this is solved on an immediate basis is not clear.
17) Appropriate controls on recreational use will promote intelligent use at all lake-based resources. Keep on tab at all times. !!!!! Put a sign at boat launch! (and explain that speeding = fish kill)
18) Sign for boat launch re invasive species, immediately. Sign for boat speeds or electric motor only.
19) Less speed, less noise; better for wildlife. Ban motor boats. Attract scuba divers since very deep. Many other things that boats do that affect water.
20) Better signage at entrance to recreation area close to water edge. Restrict gasoline/fuel motors – electric motors only.
21) Fuller cooperation with Lake People, County, ALMS – so resources are truly "shared" not concentrated to one lake, one issue, etc. funds included. If any "commercial" operation is considered – It must be monitored regularly, enforced – shutdown if necessary with fine! Communication – not enough to assume if a decision is made – e.g. "County land" all will know it is heard – so 4 all can digest, get some input – consult Wabamun. Control over-flow parking for lake access. How many boats – size-speed-type. Cattle – drainage / water /contamination. Where farm land holdings go to water edge. Appreciate the clean/clear water and keep it so. Use funds to promote same for all Albertans.
22) Sustainable human access to the Mayatan Lake Watershed meaning that habitat & wildlife remains, and humans can enjoy it for a long time. Enforcement to ensure human

activities are appropriate around the lakes. Using the ecosystem services appropriately for all – based on science.

Other Questions and Comments:

1) Question: Springs and groundwater – lakebed – Where are they? How much water comes into the lake? Recreation, fishing impact – How many fish are taken?
2) Carrying capacity for boating on Mayatan Lake – what is it?
3) How to assess user density?
4) Can we close the boat launch?
5) Why is [sic] by-law wildlife & fisheries officers not fining more fishermen for leaving ice huts barrels etc. to pollute the lake in thaw season?
6) Pesticide? What's it doing? Can we make no power boats? How do we test the water?
7) Groundwater (domestic wells?); Argon? Cistern or wells in subdivisions - how many? (How merchandized)? boats restricted?
8) Recreational development
9) What can we do to support the ALUS program and make farmers aware? What can be done to take the gas motors off the lake? How are these oil/gas wells marked?

8. Disturbance of Wetlands and Riparian Areas

Stakeholder Concerns:

1) Wetland loss (just west of end of 522)
2) Invasive species, plants and animals, over development, destruction of shore line
3) Quality of fisheries - the canary? Relates to water quality & riparian vegetation.
4) A resolve: inappropriate development that affects lake water quality, riparian areas and habit etc.
5) Biggest fear – man-made destruction.
6) Habitat loss. Loss of trees due to clear cutting of lots prior to construction. My concern has to do with drying of the land in Mayatan Lake Estates, the reduction of habitat for birds, amphibians, and other animals in the development, and the fact development begins on lots prior to the granting of development permits and the opportunity for comment by residents (this has happened at least 3 times).
7) Boats on the lake. One resident has a power boat that gets used occasionally at high speeds creating washes that I am concerned will jeopardize the 2 or 3 pairs of loons currently inhabiting the lake year to year.
8) Agriculture: cattle grazing up to and in the lake. Shoreline development: residences are affecting riparian health. Sewage treatment: nutrient inputs.
9) The quality of the water. The ability to sustain waterfowl – Loons! Balancing the ecosystem.
10) Water quality (increased algae); lower water levels; inappropriate development that affects lakes water quality and riparian areas, habitats, etc.;

11) Quality of fisheries; canary in the lake water quality (relates to fish); quality of riparian habitat
12) Development pressure

Stakeholder Aspirations:

1) A lake that is preserved ecologically (increase water quality & habitats.)
2) Keep it as a jewel (quiet and protected).
3) What I hope for: I think it's about balance—balance for all. It will still be a fun place to live and play. No power boats. Battery powered electric motors. Control use of treble hooks, get rid of stainless steel hooks. I see Mayatan Lake as it is today with healthy Riparian area. Many visitors enjoying habitat, the birds, the fishing, the quiet. I see educated visitors, managed.
4) My Aspiration: Forest and shoreline remain at least as intact as it is now.
5) Aspiration: A lake with strong fisheries, healthy riparian area, plus good water quality. Fence off riparian area from cattle.
6) Save the sounds of wildlife: muskrats, chipmunks, squirrels, beavers, ravens, bats, blue jays, songbirds, crows, blue herons, coyotes, pelicans, loons.
7) I come from flat, dry, barren Saskatchewan. The nearest lake was 200 km away. I value the trees, clear water and quiet.
8) I would like the forest and shoreline around Mayatan to remain at least as intact as it is now.
9) Healthy native fish species in Mayatan Lake. This would mean there is good water quality, healthy riparian areas. We have a progressive, smart, science based system for managing near-shore development where municipal & provincial objectives & regulations are harmonized & coordinated – with advice from community. Mayatan maintains high-quality wildlife habitat in its riparian areas.
10) Natural environment on & around the lake.
11) I would like to see Mayatan Lake in as good or better shape than it is today in 30 years
12) Program to fence riparian area from cattle grazing- allowing vegetation growth (cows and fish; ALUS)

Stakeholder Solutions:

1) Maintain habitat for all recreators, limit further cottage development, fish kill is a concern.
2) Landowners can use/clear 10 ft. per lot or 20% whatever is less e.g. access view sightline.
3) Can use the lake reasonable expectations with no long term adverse effect e.g. Not sandy beach, washed gravel on landscaping cloth in limited area.
4) Install 2 aerator on the lake, limit cottage development, enhance nest sites for all species of birds.
5) Easy to implement, high value; buffers would not be significant impact to agricultural users. Needs enforcement with by-laws etc. _____ (one word unintelligible)

6) There should be some lake access to allow access to lake front owners – suggest lesser of 25' or 20% of lakefront with e.g. 50' lot = 10' & 300' lot = 25'
7) Stop all removal of bull rushes on lake shores. There should be real immediate enforcement of this. If laws or regulations are not in place in Alberta they should be. Easy implement, highly effective. Also enhances wildlife diversity. Do not remove it all!
8) Conservation, mapping, identifying, regulating

Other Questions and Comments:

1) Do we know what room water birds need for nesting?
2) How much riparian do we need? Is it a guess? Or is there science?
3) Biodiversity
4) Power line right of way maintenance.
5) Quality of riparian habitat

9. Invasive Species

Stakeholder Concerns:

1) Invasive species, plants and animals, over development, destruction of shore line
2) Control invasive species
3) Cattle in the watershed (nutrient loading); pressure from development (increased usage); invasive species; lack of control over lake issues (who has authority?)

Stakeholder Aspirations:

Stakeholder Solutions:

1) Signage, inspection, education, cleaning & dry.

Other Questions and Comments:

10. Wildlife Impact

Stakeholder Concerns:

1) A lake that is preserved ecologically (increase water quality & habitats.)
2) Issue: need for managed motorized non-motorized recreation trail; Compaction, Trespassing, Erosion, Wildlife, NOICE!!!!
3) Invasive species, plants and animals, over development, destruction of shore line
4) Fewer frogs, bats, etc. Is this an alarm? Pay attention to wildlife signs.
5) What would happen if lake dries up. Why did this happen? Beavers, wells, climate. Rehabilitate it. Natural cycle of beaver population increasing flow. Prairie lakes are unique, fragile, and changeable.
6) Worse case – no aquatic insects & fish, stagnant water.
7) A resolve: inappropriate development that affects lake water quality, riparian areas and habit etc.

8) Biggest fear – man-made destruction.
9) Habitat loss. Loss of trees due to clear cutting of lots prior to construction. My concern has to do with drying of the land in Mayatan Lake Estates, the reduction of habitat for birds, amphibians, and other animals in the development, and the fact development begins on lots prior to the granting of development permits and the opportunity for comment by residents (this has happened at least 3 times).
10) Boats on the lake. One resident has a power boat that gets used occasionally at high speeds creating washes that I am concerned will jeopardize the 2 or 3 pairs of loons currently inhabiting the lake year to year.
11) Fish winter-kill. The loons, herons, etc. depend on having fish in the lake, and fishing is a popular recreational use of the lake. It appears that the aeration program may have been ended. Should or could this be reinstated, if it was a successful program in the past.
12) Water Quality/Pollution. Biodiversity – shore birds, fish, amphibians, invertebrates. Sustainable recreational use/land protection.
13) The quality of the water. The ability to sustain waterfowl – Loons! Balancing the ecosystem.
14) Pollution. More protection for wildlife. Less lake development.
15) Preserving water quality; how to develop in a way that preserves environmental integrity; preserve Wildlife habitat
16) Quality of fisheries; canary in the lake water quality (relates to fish); quality of riparian habitat
17) Wildlife are there, because the lake habitat is healthy – let's attend to this connection very carefully. True measurement of the health of our lake ecosystem.
18) Ignoring the 12 km/hr boat speed has driven the loons to not have young ones or they would away altogether.

Stakeholder Aspirations:

1) Want grandkids to enjoy getting out "into the bush", learn about wildlife, encourage kids to enjoy nature.
2) What I hope for: I think it's about balance—balance for all. It will still be a fun place to live and play. No power boats. Battery powered electric motors. Control use of treble hooks, get rid of stainless steel hooks. I see Mayatan Lake as it is today with healthy Riparian area. Many visitors enjoying habitat, the birds, the fishing, the quiet. I see educated visitors, managed.
3) Save the sounds of wildlife: muskrats, chipmunks, squirrels, beavers, ravens, bats, blue jays, songbirds, crows, blue herons, coyotes, pelicans, loons.
4) Wildlife protection for land and marine life.
5) I wish my grandkids lakes that have a healthy wildlife balance and swimming spot.
6) Sustaining the water quality for wildlife.

7) Save for our grandkids! Where else can you hear the loons, watch the beavers and listen to all the different birds?
8) I would like to see Mayatan become an example of a natural healthy Alberta lake. Maybe have educational signage and educate people to respect wildlife and the fragile ecosystem.
9) Healthy native fish species in Mayatan Lake. This would mean there is good water quality, healthy riparian areas. We have a progressive, smart, science based system for managing near-shore development where municipal & provincial objectives & regulations are harmonized & coordinated – with advice from community. Mayatan maintains high-quality wildlife habitat in its riparian areas.
10) I would like to see wildlife around and in the lake;
11) If grandkids could enjoy
12) Sustainable human access to the Mayatan Lake Watershed meaning that habitat & wildlife remains, and humans can enjoy it for a long time. Enforcement to ensure human activities are appropriate around the lakes. Using the ecosystem services appropriately for all – based on science.

Stakeholder Solutions:

1) Sustainable human access to the Mayatan Lake Watershed meaning that habitat & wildlife remains, and humans can enjoy it for a long time. Enforcement to ensure human activities are appropriate around the lakes. Using the ecosystem services appropriately for all – based on science.
2) Add leeches
3) Fear I would be saddened with Mayatan Lake disappearing: Bring back beavers, Cisterns for any new development, Water & energy conservation, Limit development around the lake, Analyse ground water flow
4) Compare, study beaver populations in the past… rainfall in the past… study effects of humans, (for example, wells, Changing climate.)
5) Maintain habitat for all recreators, limit further cottage development, fish kill is a concern.
6) Worse case – no fishing for grandchildren, living with it, look at other wildlife that has adapted to water quality change
7) Install 2 aerator on the lake, limit cottage development, enhance nest sites for all species of birds.
8) Easy to implement, high value; buffers would not be significant impact to agricultural users. Needs enforcement with by-laws etc. _____ (one word unintelligible)
9) Stop all removal of bull rushes on lake shores. There should be real immediate enforcement of this. If laws or regulations are not in place in Alberta they should be. Easy implement, highly effective. Also enhances wildlife diversity. Do not remove it all!

10) Less speed, less noise; better for wildlife. Ban motor boats. Attract scuba divers since very deep. Many other things that boats do that affect water.
11) Control development to protect riparian zone. Capacity of lake for development. Define "good" development. Setbacks for riparian areas. Protect wildlife areas.

Other Questions and Comments:

1) What are wildlife populations doing?
2) Where have shell fish gone? Frogs? Bats?
3) Nutrient loading. What is the status of Beaver population?
4) Do we know what room water birds need for nesting?
5) Biodiversity
6) Elk sighting
7) Coyote control
8) The herons nest near the channel. Amazing to watch.
9) Wildlife: moose, deer, loons, coyote.
10) Wildlife Corridor

11. Climate Change

Stakeholder Concerns:

1) Climate change -- no increase in lake warming
2) No crown land, limited ability to set aside conservation areas or to not develop. Agricultural runoff. Climate change warming the shallow basin and causing blooms without any additional inputs.
3) Climate Trends; Climate Change; Recreation pressures (Land Development); Long term Land Management; Controlled Development
4) If we do not start to control we will be like _____ ? (unintelligible)

Stakeholder Aspirations:

Stakeholder Solutions:

1) Compare, study beaver populations in the past… rainfall in the past… study effects of humans, (for example, wells, Changing climate.)

Other Questions and Comments:

1) Compare, study beaver populations in the past… rainfall in the past… study effects of humans, (for example, wells, Changing climate.)
2) Climate change VS Natural cycles??
3) What is effect of climate change ↑ why is water level decreasing?
4) Question: Research into recent blooms – is it related to temperature?

5) Take this into account when planning. Look at question immediately, but ? Importance to watershed?
6) Snails growth?