



AN INTEGRATED  
WATERSHED MANAGEMENT PLAN

---

SUMMARY OF  
STAKEHOLDER WORKSHOP

# **Summary of Stakeholder Workshop**

## **An Integrated Watershed Management Plan for Lesser Slave Watershed**

Prepared for:

Lesser Slave Watershed Council

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## Document Scope

This summary document has been prepared for the Lesser Slave Watershed Council as an internal document and is not intended for public distribution. It is a brief overview of watershed management planning in Alberta and the workshop held in September of 2013 in High Prairie, AB.

The following document highlights the main themes of what was discussed and what was heard at the workshop. It is not intended to provide an entire project background or provide discussion around the next steps in moving forward through the Watershed Management Planning process.

Detailed information and detailed discussion on topics mentioned in this document will be provided in the forthcoming Terms of Reference document.

## 1 Watershed Management Planning

Alberta Environment and Sustainable Resource Development (ESRD) released the *Framework for Water Management Planning* (Framework) in 2001. The Framework was guided by public consultation and a review of policies and legislation that pertain to water management. The Framework provided an outline of the components required and the process for water management planning. It recognized that no two locations are the same, and that a unique approach will have to be applied to each situation. The Framework applies to all waterbodies including lakes, wetlands, rivers and streams using an Integrated Resource Management (IRM) approach. IRM is an interdisciplinary and comprehensive approach that incorporates decisions, programs, legislation and policies across sectors to achieve the best long-term outcomes.

In 2008, the Government of Alberta reaffirmed their commitment to the wise management of Alberta's water quality and quantity with the release of *Water for Life: Alberta's Strategy for Sustainability*. *Water for Life* has three goals:

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

To achieve these goals, *Water for Life* is based on the collaboration and engagement of government, at all levels, first nations, industry, environmental organizations, the general public and others.

Another planning tool, Alberta's Land-use Framework (LUF) is aimed at managing growth in the province by maintaining a growing economy while also addressing the cumulative pressures and affects that increasing land use has on the environment. The LUF divides the province into seven regions (Figure 1), with each region developing its own regional plan to manage the impacts of development on land, water and air. The LUF contains seven strategies, two of which focus on watershed management. Strategy 3 and 4 under the LUF focuses on the effects of development on watersheds and the environment on both private and public land. The Government of Alberta has indicated that limits may be placed on developments in order to limit pollution of rivers as well as limiting development in ecologically sensitive areas.

The Government of Alberta has also shifted to a cumulative effects management approach (CEM) in the future. CEM has the tools and resources needed to manage all activities affecting the environment, economy and society in an area. Areas are continuously assessed to determine what management actions, if any, are required in a region. Through this system, the government of Alberta hopes to be better equipped to balance and achieve social, economic and environmental goals in an area, for the present and the future. Much of the CEM groundwork is being laid out through regional plans under the LUF initiative and is focused on sustaining the Alberta economy without jeopardizing Alberta's environment. Human activities such as water withdrawal, diversions, urban expansions and developments are all landscape disturbances that can affect watersheds and the quality of water in

them. The health of our water systems is largely dependent on the developments that occur within the boundary of that watershed, making a cumulative effects system an important step in assessing and managing cumulative effects to watersheds. For more information on watershed management planning in Alberta, please see the presentation included in Appendix A.

### 1.1 Watershed Planning Advisory Councils

To address issues on a watershed basis, ESRD has designated independent, non-profit Watershed Planning and Advisory Councils (WPAC's) to determine and assess the condition of their watershed (Figure 2). Each WPAC leads watershed planning within their designated watershed, develops best management practices, reports on the state of the watershed, fosters stewardship activities and educates users. Watershed management plans address issues in the watershed and engage residents and stakeholders to seek solutions to the identified issues.

### 1.2 Lesser Slave Watershed

As one of eleven WPACs designated by ESRD, the Lesser Slave Watershed Council (LSWC) is committed to developing a strategy to improve water quality, quantity and healthy aquatic ecosystems within the Lesser Slave watershed.

The Lesser Slave watershed is comprised of two main watersheds; Lesser Slave Lake and Lesser Slave River Watersheds with a total area of 20,100 km<sup>2</sup> (Figure 3). These two watersheds are further divided onto five subbasins (Table 1) (Jamison 2009).

Table 1. Subbasins of the Lesser Slave Watershed

Subbasin	Area (km <sup>2</sup> )
South Heart River / East and West Prairie Rivers	6,886.75
Driftpile River	1,428.90
Swan River	2,818.31
Lesser Slave Lake North	1,324.11
Lesser Slave River	6,507.03
Lesser Slave Lake	1,138.90
<b>Total Area of the Lesser Slave Watershed</b>	<b>20,100</b>

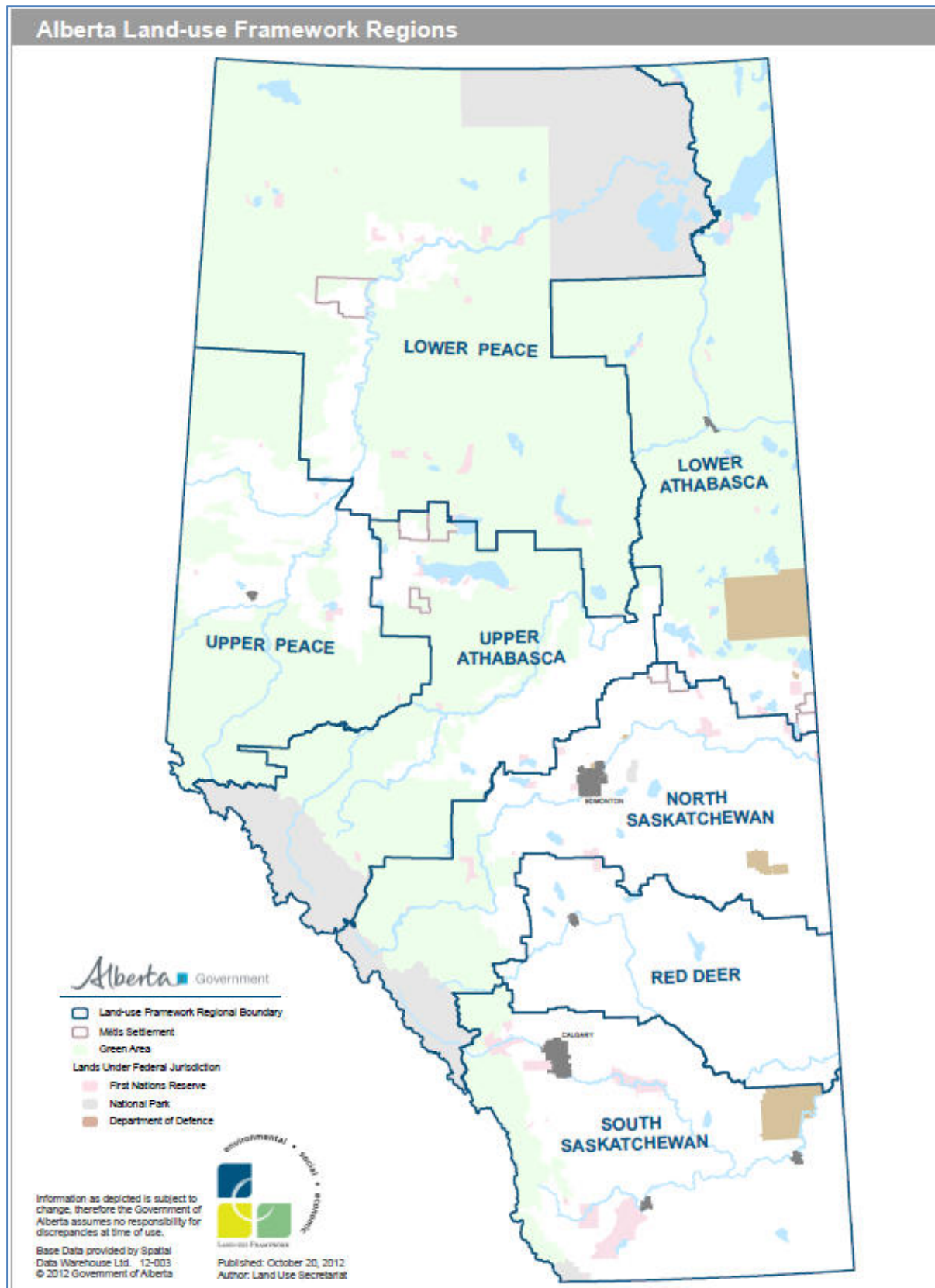


Figure 1. Land Use Framework Regional Boundaries.



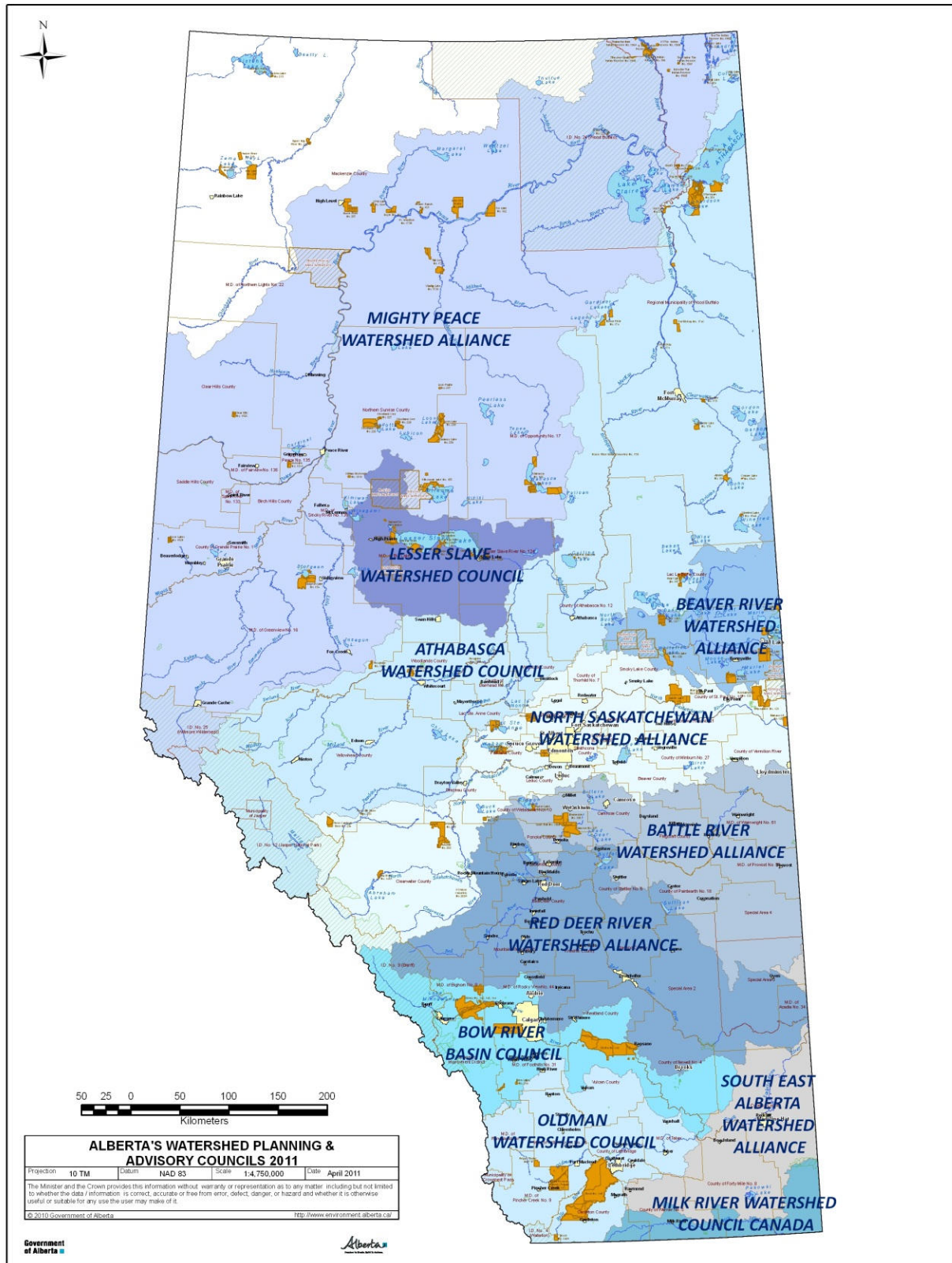


Figure 2. Watershed Planning and Advisory Councils Map.





Figure 3. Lesser Slave Watershed and Subbasins.

## 2 Lesser Slave Integrated Watershed Management Plan

As mandated by ESRD, the LSWC is moving forward with completing an Integrated Watershed Management Plan (IWMP). An IWMP is a combined effort by multiple stakeholders to identify objectives and set goals and evaluation points to address issues and improve the watershed for all stakeholders. To move forward with developing their IWMP, the LSWC is taking a phased approach. The first step in the phased approach is to hold a structured decision making (SDM) workshop. The second step is to develop a draft Terms of Reference (ToR) for the IWMP. A ToR provides specific details of what will be undertaken and identified within the IWMP. The third step is to distribute the draft ToR to all stakeholders so that they can provide comments and inputs on the objectives outlined in the draft ToR. Once all comments are received, the fourth step will be to finalize the ToR and provide it to ESRD for final approval. When the final ToR is approved by ESRD, then the IWMP process can begin.

## 3 Structured Decision Making

Making decisions about environmental management and resources can be challenging. Decisions that are made affect large groups of people and should not be taken lightly. The LSWC has chosen the structured decision making (SDM) approach to making decisions as it focuses on engaging stakeholders, experts and decision makers. The SDM process has shown to be an effective tool for groups that can work together to create solutions that are rigorous, inclusive, defensible and transparent. SDM has a dual focus which is the foundation for defensible decisions; values of affected people and scientific information concerning potential consequences of actions (Gregory *et al.* 2012). The SDM process follows six steps:

**Step 1: Clarify the Decision Context:** defines what question or problem is being addressed and it establishes the scope of the management decisions.

**Step 2: Define Objectives:** defines 'what matters' about the decision.

**Step 3: Develop Alternatives:** develop creative alternatives that are responsive to the defined objectives.

**Step 4: Estimate Consequences:** consequences of the alternatives on the performance measures are estimated.

**Step 5: Evaluate Trade-offs:** the goal is to choose an alternative that achieves an acceptable balance across multiple objectives.

**Step 6: Implement, Monitor, and Learn:** the SDM process should promote learning and build management capacity to make better decisions in the future. This learning may be related to technical understanding, human resources, or institutional capacity.

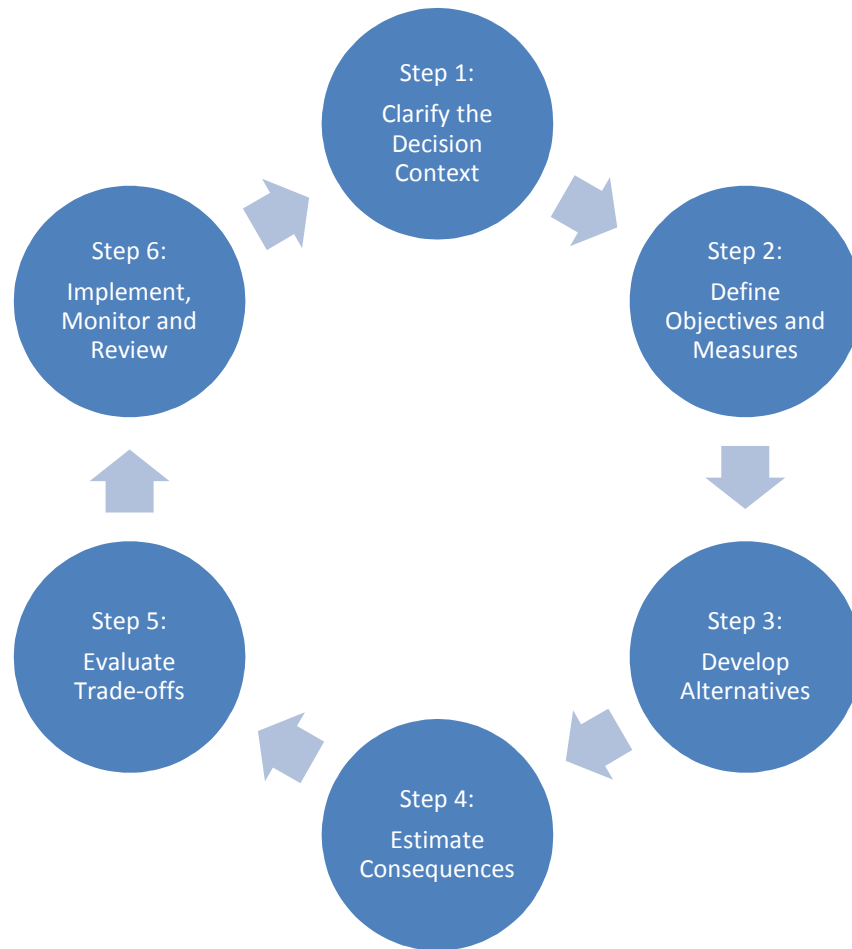


Figure 4. Six steps in Structured Decision Making.

These six core steps (Figure 4) are used to structure and guide the decision making process. For each of the decision steps, different methods are used to collect data and describe information to assist in making comparisons among alternatives. These methods are designed to involve different ways of presenting information, finding links and building common understanding among participants. The LSWC and stakeholders will work through the six steps in the SDM process to deliver an IWMP that is transparent, defensible, rigorous and inclusive.

The SDM process is also being used by other groups in Alberta such as the Wapiti River Steering Committee and the Upper Smoky River Committee on their joint Watershed Management Plan. In addition, the SDM process is endorsed by ESRD as being open and transparent.

In working with the SDM process, the LSWC is currently underway with Step 1 – Clarify the Decision Context. At the end of Step 1, the LSWC should have a clear understanding of the decision context as defined by the stakeholders and have an idea on how to move forward with Step 2, which will result in a draft ToR.

## 4 Abells Henry Public Affairs Report

In 2013, the LSWC contracted Abells Henry Public Affairs to consult with stakeholders and residents about the IWMP (Abells Henry 2013). This was undertaken to gather information and identify what stakeholder issues and priorities were, interests, needs and to better understand perceived risks associated with growth and development in the watershed. In-person interviews, public online surveys, public open houses and meetings with first nations and high school students were conducted. The report states that most of the issues identified from the consultation relate to water quality, water quantity, groundwater, aquatic ecosystem health and watershed planning.



Photo 1. Grade 10 Students Consultation

Photo Source: Abells Henry (2013).



Photo 2. Open House Presentation

## 5 Terms of Reference Workshop

Continuing to move forward with Step 1 of the SDM process, the LSWC and Aquality Environmental Consulting Ltd (Aquality) held a stakeholder workshop on September 19, 2013, in High Prairie, AB. The LSWC personally invited stakeholders from government (municipal, provincial and federal), landowners, business leaders, First Nations, recreational groups, industry representatives from oil and gas, forestry, and CN Rail. A total of twelve stakeholders participated in the workshop. Through multi-stakeholder partnerships, consultation and legislative tools, the Lesser Slave IWMP will succeed.

As discussed in Section 4, the LSWC had previously identified three main areas of concern: water quality, water quantity and healthy aquatic ecosystems (Abells Henry 2013). Based on this information the LSWC focused the workshop on these three areas.

The workshop began with a presentation by Jay White of Aquality on watershed management planning in Alberta and provided context of why the LSWC was hosting the workshop (Appendix A). Each participant was provided a workbook that included background information on the Lesser Slave watershed and watershed management planning in Alberta (Appendix B). Participants were then divided up into three groups. Meghan Payne and Lindsie Fairfield of the LSWC and Amanda Cooper of Aquality took notes for each of the three main themes. Each note taker visited each of the three groups and asked the question “What does (one of the three themes) mean to you?” Participants were encouraged to engage in the discussion and / or provide feedback in their workbook. The notes that were taken and feedback provided in the workbooks have been summarized in the following sections. The comments are listed and are further defined by what general category the comment applies to (Research, Policy and Management, Education, Develop Partnerships). The comments represent what needs to be done or a potential desired outcome that would address a concern.



Photo 3. Meghan Payne of LSWC with workshop participants





Photo 4. Amanda Cooper of Aquality with workshop participants



Photo 5. Lindsie Fairfield of LSWC with workshop participants



## 5.1 Healthy Aquatic Ecosystems

### 5.1.1 Overview of Healthy Aquatic Ecosystems as an Area of Concern

Aquatic ecosystems include Alberta's rivers, lakes, streams, wetlands and the groundwater systems that connect them. These ecosystems also encompass all of the plants, animals and biological processes that depend on the water within these systems. The health of these ecosystems is imperative to all forms of life, including humans. If an ecosystem becomes unhealthy, everyone and everything will suffer. Water is necessary for sustaining life, as such; we are dependent upon the health of our aquatic ecosystems to provide safe, secure, clean water.

### 5.1.2 What We Heard

Comment	Category
Reduction and control of sewage entering the watershed and lake	Policy and management, education
Intact and functioning Buffalo Bay marshlands	Policy and management, education
Healthy commercial fishing operation	Policy and management, education, fisheries management
Maintain wetlands on private lands	Policy and management, education
Public understanding of ecosystem interconnectedness	Education
Reduction of chemicals into the aquatic ecosystem such as pesticides, pharmaceuticals and herbicides	Policy and management, education
Develop best management practices for beach grooming	Research, education, policy and management
Monitoring and reporting of biodiversity indicators for watershed	Research, developing partnerships
Compiling known data and identifying gaps	Research, developing partnerships
Educate and simplify knowledge	Education, developing partnerships
Building partnerships	Developing partnerships
Allow for policy adjustments	Policy and management, research
Protecting ecosystems at a regional level	Research, policy and management
Categorize water types into regional plans	Research, policy and management
Ecosystem goods and services	Education, policy and management
Develop an inventory and general land use influence on riparian areas	Research, develop partnerships, policy and management
Utilizing new technologies such as wet areas mapping	Research, policy and management
Creating and maintaining logging buffers	Research, policy and management
Determine the effect of fracking on the lake	Research
Control of Invasive species	Policy and management, education
Obtain consensus from user groups	Developing partnerships
Impact of water levels and flows	Research, policy and management

## 5.2 Water Quality

### 5.2.1 Overview of Water Quality as an Area of Concern

Water quality is important not only to the surrounding environment and ecosystems, but for people as well. In regards to water quality, nitrogen, phosphorus and bacteria are the main parameters of concern. Nitrogen and phosphorus are essential nutrients for most aquatic plants. As a result, excess nutrients can lead to eutrophication, which causes an excessive amount of aquatic plant and phytoplankton growth. Associated with increased plant and phytoplankton growth, oxygen levels may become significantly reduced in the water column, which may negatively impact aquatic organisms, including fish. In addition, excessive phytoplankton growth, particularly of cyanobacteria, can lead to the release of toxins into the water column, which may be harmful to aquatic organisms, waterfowl, livestock and humans. The input of nutrients into aquatic systems can occur naturally, but large amounts of nutrients typically originate from indirect anthropogenic sources; including, improperly treated wastewater, residential and industrial use of fertilizers, industrial activity and agricultural operations.

### 5.2.2 What We Heard

Comment	Category
Risks that sewage lagoons pose	Research, policy and management, education
Increase the standards for existing outhouses	Policy and management, education
Fish management – winter kills, nutrient loading	Fisheries management, research
Sedimentation	Policy and management, education
Need riparian areas intact	Research, policy and management, education
Inaccurate survey of bed and shore	Research
Protection of Lesser Slave Lake north shore	Policy and management, education
Algae growth	Research, policy and management, education
Non-point source run off	Research, policy and management, education
Herbicides and pesticides entering the water	Policy and management, education
Erosion on agricultural lands and clear cutting from road building	Policy and management, education
Impact of industrial development in remote areas	Research
Need groundwater data	Research
New shoreline development	Policy and management
Reduction of buffers	Policy and management, education
What is the effect of Fracking on our water? Need more studies	Research
Invasive species	Research, policy and management, education
Need for cumulative effects monitoring	Research, policy and management
Increased monitoring – what are the impacts of development?	Research, education
Do we have enough data?	Research, education

## 5.3 Water Quantity

### 5.3.1 Overview of Water Quantity as an Area of Concern

Water quantity is simply the amount of water available within a system, such as a river or watershed. The majority of Albertans and industry obtain their water from lakes and rivers. These sources are replenished from snowmelt and rainfall. In some areas of the Province water can become scarce during the summer months due to a limited water quantity in lakes and rivers. During times of scarcity, water conservation becomes extremely important.

### 5.3.2 What We Heard

Comment	Category
Sustainable fish populations	Research, policy and management
Tracking the allocation of water	Policy and management
Education. It won't last forever, need to manage it properly.	Education
Industrial consumption, poor government standards	Policy and management
More reporting and monitoring	Research, policy and management
Ensure function of wetlands and riparian areas	Research, policy and management
Control natural fluctuations so they are not extreme	Research, policy and management
Monitoring lake levels	Research, policy and management
Water quantity model for the watershed	Research, policy and management
Oilfield fracking, surface water completely lost	Research, policy and management
Flood risk mapping	Research, policy and management
Land use practices	Research, policy and management
Shoreline protection	Research, policy and management, developing partnerships
Wildlife use	Research, policy and management
Best management practices	Research, policy and management, education, developing partnerships
Cumulative impacts	Research, policy and management
Conservation	Research, policy and management, education, developing partnerships
Sewage inputs	Research, policy and management, education
Compliance and enforcement	Policy and management
Water management balance	Research, policy and management
Spring runoff management	Research, policy and management, education
Cross boundary partnerships and team work	Developing partnerships
Need participation from all levels of government	Developing partnerships

## 6 Conclusions

There were a few items that were agreed upon across each theme:

- Build Partnerships across all groups affected and involved in management and decisions,
- Increase monitoring, tracking and reporting,
- Educate the users of the watershed about the issues we are facing today and could face tomorrow,
- Need to determine surface and groundwater allocations so that it can be managed effectively
- Improve riparian health,
- Proper management of sewage lagoons and residential septic systems and improve discharge quality,
- Wetland Inventory and increased conservation,
- Need to understand the impacts of fracking on the watershed,
- Seasonal planning but also long term planning is required,
- Continued fisheries management,
- Increase enforcement and compliance on policies and bylaws, and
- Develop a sustainable plan for all types of development pressures within the watershed.

Objectives for the draft Terms of Reference will be driven by the information collected by Abells and Henry, and what was said at the stakeholder workshop. Continuing to move forward with Step 1, Aquality will prepare an initial draft ToR. The planning process will move on to Step 2 of the SDM process and an initial draft will be provided to the stakeholders that attended the workshop to provide comments. Once comments are received, Aquality will finalize a final draft of the ToR which will be released for the public to review and provide comments. Comments and feedback on the final draft will be incorporated into the Final ToR, which will be provided to ESRD for approval. As discussed in Section 2 of this report, once the Final ToR is approved by ESRD, the development of the full Integrated Watershed Management Plan will begin.

As the end of Step one of the SDM process nears and moving forward with Step 2: Define Objectives: defines 'what matters' about the decision, an example of an objective would be establishing a partnership across all groups affected.

## 7 References

Abells Henry, 2013. Issues and Priorities in the Lesser Slave Watershed. 2012 – 2013 IWMP Project. Final Report. Prepared for: Lesser Slave Watershed Council. Prepared by: Abells and Henry Public Affairs. March 15, 2013. 53pp.



Gregory, R., Failing, L., Harstone, M., Long, G., McDaniels, T., Ohlson, D., 2012. Structured Decision Making. A Practical Guide to Environmental Management Choices. 299pp.

Jamison, T. 2009. State of the Lesser Slave Watershed 2009. Carson Forestry Services Inc. Prepared for Lesser Slave Watershed Council. High Prairie, AB. 116 pp.

## **Appendix A**



### **Presentation**





# Watershed Management Planning and Workshop


Jay S. White, M.Sc., P.Biol. and Amanda Cooper, B.Sc.  
Aquality Environmental Consulting Ltd.  
September 19, 2013




## Overview of the Day

- Watershed Management Planning Presentation
- 10:15 – 10:30 Break / Networking
- 10:30 – 12:00 Divide into 2 groups
- 12:00 – 1:00 Lunch
- 1:00 – 3:00 Back into groups
- 3:00 - 3:30 Break / Networking
- 3:30 – 4:30 Review and Closing Remarks







## Overview of Presentation




- Watershed Management Planning Overview
- SDM Process
- Step 1 – Define the Context
- Step 2 – Define the Objective
- Water Quality
- Water Quantity
- Healthy Aquatic Ecosystems



## Water for Life



- In 2003 the Government of Alberta released *Water for Life: Alberta's Strategy for Sustainability*
- Strategy for **actively managing** Alberta's water resources







## Water for Life Goals




1. Safe secure drinking water supply
2. Healthy aquatic ecosystems
3. Reliable, quality water supplies for a sustainable economy

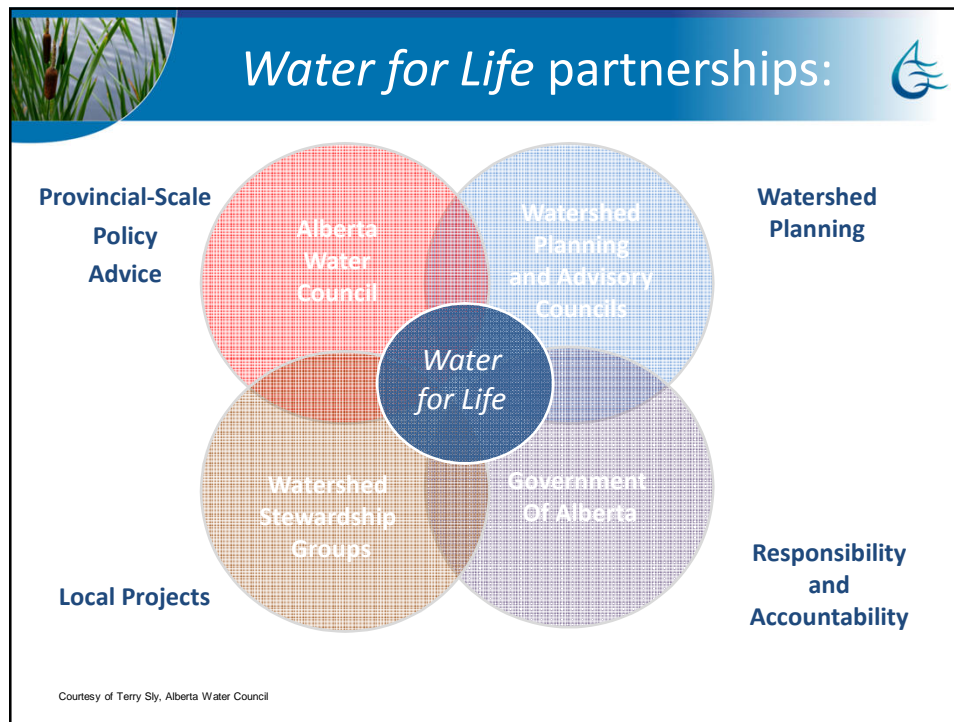


## Intent of the WFL Framework



- Formalizes water management planning in Alberta
- Outlines process and required components
- Provides general guidance
- Applies to all types of water bodies







## AESRD Responsibilities

- AESRD has the role of approval and adoption of WMPs and decisions under the *Water Act*.
- Plays a lead role by creating, coordinating, authorizing and approving water management plans
- For water management plans developed by non-government organizations or stakeholder groups, AESRD:
  - Approves Terms of Reference
  - Ensures public consultation
  - Approves water management plans (as specified under the Water Act)

The image shows the cover of the 'Framework for Water Management Planning' document, published by Alberta. The cover is blue with a water droplet graphic and the word 'Alberta' at the bottom.

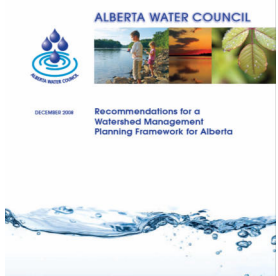


## Recommendations for a Watershed Management Planning Framework for Alberta (2008)



Framework is the Water Act and *Framework for Water Management Planning* (2001)

- Integrates shared governance and a watershed approach to planning
- Discusses integration with other land planning initiatives
- Watershed management planning should involve WPACs and WSGs and align with larger basin scale plans
- All plans must be in alignment with *Water for Life* and applicable legislation





## Shared Governance




- Refers to a governance structure where both government and other stakeholders share responsibility for the development and delivery of policy, planning, and programs or services
- The government retains legislative accountability
- Collaborative goal-setting and problem-solving process
- Includes Alberta Water Council, WPACs, WSG's, NGO's, government agencies







## Watershed Planning and Advisory Council

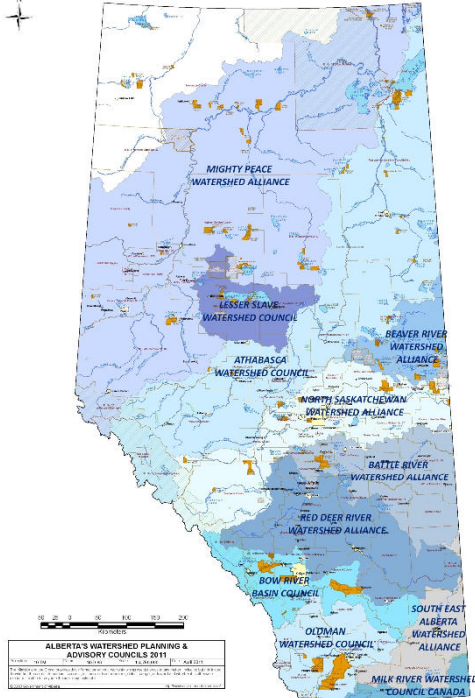


- Are multi-stakeholder councils established to oversee the implementation of *Water for Life*
- Non-profit organizations that investigate and report the conditions of their watershed and develop plans and activities to address watershed issues
- Do not report to the AWC
- Lead watershed planning, develop BMP's, report on the state of the watershed, foster stewardship activities and educate users.



Eleven watersheds have organizations recognized as WPACs:

- Athabasca Watershed Council
- Battle River Watershed Alliance
- Beaver River Watershed Alliance
- Bow River Basin Council
- Lesser Slave Watershed Council
- Mighty Peace River Watershed Alliance
- Milk River Watershed Council Canada
- North Saskatchewan Watershed Alliance
- Oldman Watershed Council
- Red Deer River Watershed Alliance
- South East Alberta Watershed Alliance

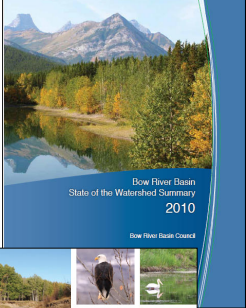
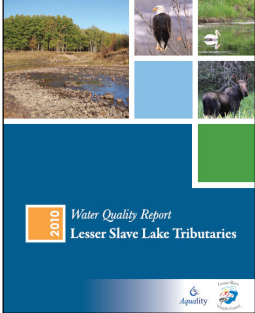




## What WPACS Do






- Planning
- Smaller “nugget” projects and side ventures
- Influence local government
- Headwaters protection
- Raising awareness/ education/ outreach



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## Lesser Slave Watershed Council

**Vision:**

"The Lesser Slave Watershed, including its lake and rivers, is a bond that brings communities together, is a part of each citizen's life, is a prime asset and renewable resource, and is a generator of economic development"



## Why you are Here



- A successful Watershed Management Plan is all about collaboration
- We want your feed back and insight to help develop the best possible Watershed Management Plan



## WMP and LSWC



The LSWC is taking a phased approach to developing a watershed management plan

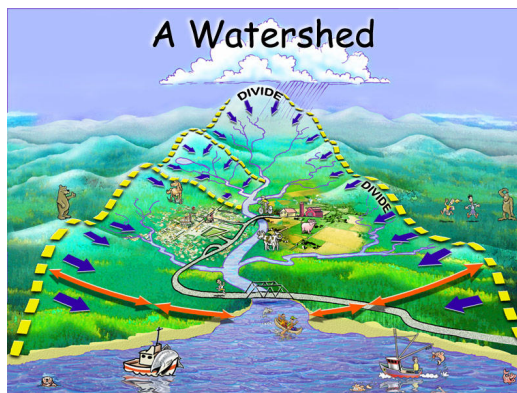
- Phase 1 - Workshop and Terms of Reference
- Phase 2 – Watershed Management Plan
- Phase 3 – Stakeholder and Public Consultation
- Phase 4 – Plan Implementation

## What is a Watershed?




The area of land that catches precipitation and drains into a larger body of water such as a marsh, river, or lake

A watershed is often made up of a number of sub-watersheds that contribute to overall drainage




### LESSER SLAVE WATERSHED AND SUBBASINS








## What is a Watershed Management Plan?



- A tool used to ensure the long term sustainability and health of aquatic ecosystems within a watershed
- Describes the goals for the watershed and defines specific actions to achieve these goals
- Determines reporting and monitoring requirements to measure the success and progress of the plan





## WMP Planning




### Step 1 - Setting the Stage

- Plan goals, objectives, scope and deliverables are identified
- Organizational structure and managerial aspects of plan development are defined
- General information required to support the technical assessment anticipated is outlined
- Plan development is characterized
- Implementation strategy is set out
- Terms of Reference (ToR) is created







## WMP Planning




### Step 2 - Plan Preparation

- Data and information collection and evaluation
- Preparation of educational material
- Modeling to study alternative water management scenarios
- Evaluating alternatives
- Formation of recommendations




## WMP Planning




### Step 3 - Plan Formulation

- Develop basin water management goals and objectives
- Identify and evaluate solutions/alternatives
- Draft the watershed management plan
- Public review of the draft watershed management plan







## WMP Planning




### Step 4 - Plan Implementation, Evaluation and Monitoring


- Identifying roles, responsibilities, budget, funding, long-term monitoring needs and priorities
- Plan content will need to be evaluated and monitored for its success, performance and compliance with existing legislation, policy and standards
- Performance monitoring
- Schedule for review and amendment



## Structured Decision Making Process



- SDM is an organized approach to **identifying** and **evaluating** creative options and making choices in **complex decision situations**
- Helps reach decisions that are defensible, transparent and efficient





## SDM Process – Step 1



### Clarify the Problem

- What problem is being addressed and why
- Identify who needs to be involved and how
- Establish the scope for the decision
- Clarifying the roles of the decision making team




## SDM Process – Step 2




### Define the Objectives

- What are the things that matter?
- What are the objectives?
- Which of these objectives are most and least important?







## Report: Issues and Priorities in the Lesser Slave Watershed



- LSWC contracted Abells Henry Public Affairs to consult with residents and stakeholders about the development and implementation of their IWMP
- Input from people living and working in the watershed to identify their interests, needs, issues and priorities
- Wanted to better understand perceived risks associated with managing growth and development in the watershed



## Report: Issues and Priorities in the Lesser Slave Watershed




**Issues identified included:**

- Algal blooms
- Agricultural Impacts – cows, fertilizers, pesticides
- Land Clearing – loss of wetlands and riparian areas
- Health of the fishery
- Industrial activity – oil and gas and forestry
- Development pressure
- Sewage treatment and pollution
- Surface and ground water levels
- Need for watershed planning and education




## Water Quality

- Water quality is important not only to the surrounding environment and ecosystems, but for people as well
- In regards to water quality, **nitrogen**, **phosphorus** and **bacteria** are the main parameters of concern




## Nitrogen and Phosphorus



- Essential nutrients for most aquatic plants
- Excess nutrients can lead to eutrophication
- Eutrophication can lead to reduced oxygen levels, which can negatively impact aquatic organisms, including fish
- Excessive growth of cyanobacteria (Blue green algae) can lead to the release of toxins into the water column, which are harmful to humans and other organisms




## Nutrient Input




- Can occur naturally, but typically originate from indirect anthropogenic sources, including:
  - Improperly treated wastewater,
  - Residential and industrial use of fertilizers,
  - Industrial activity, and
  - Agricultural operations.




## Bacteria





- Bacteria comes from a wide variety of sources in the aquatic environment:
  - Soil
  - decomposing plants
  - animal waste
  - Anthropogenic (human) sources such as raw sewage, manure runoff, and pet waste
- Many types of bacteria found in the aquatic environment are harmless, but some can be pathogenic and cause human health issues




## Why do we Monitor Water Quality?



- Changes in water quality indicate a deterioration or improvement in the condition of the watershed
- Results from changes in land use or land management practices, landscape disturbance and natural events




## Major Anthropogenic Impacts



**The major anthropogenic impacts on water quality result from:**

- Natural resource extraction and processing,
- Industrial and municipal wastes,
- Commercial, municipal, and household use of
- Wetland drainage,
- Dredging,
- Dam construction,
- Agricultural runoff,
- fertilizers,
- Land erosion,
- Road construction, and
- Land development.






## Message




We need a balance between socioeconomic growth and the sustainable management of aquatic ecosystems to ensure long-term health and enjoyment by future generations







## Water Quantity



- Water quantity is the **amount of water available within a system**, such as a river or watershed
- Sources are replenished from snowmelt and rainfall
- In some areas water can become scarce during the summer months due to a limited water quantity in lakes and rivers
- During times of scarcity, water conservation is extremely important










## Why is Water Quantity Important?


- Water quantity is vital for the maintenance of aquatic habitat, it
- Has functions related to water quality and it is essential for the production of drinking water



## Why is Water Quantity Important?


- Irrigation, industry and livestock production are highly dependent on a minimum amount of available water
- In recent years many cottagers and recreational lake users have voiced concerns about the decreasing volumes of water seen across the province





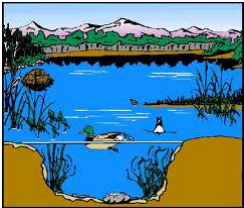
## Why is Water Quantity Important?

- Human activities frequently reduce available water quantities required to maintain healthy aquatic ecosystems
- As a result we need to think about water conservation strategies
- It is important to balance socioeconomic growth and the sustainable management





## Healthy Aquatic Ecosystems


- Aquatic ecosystems include our rivers, lakes, streams, wetlands and the groundwater systems that connect them
- These ecosystems also encompass all of the plants, animals and biological processes that depend on the water within these systems



## Why are Healthy Aquatic Ecosystems Important?



- The health of these ecosystems is imperative to all forms of life, including humans
  - We need water to live!
- Water is necessary for sustaining life
- We are dependent upon the health of our aquatic ecosystems to provide safe, secure, clean water



## Healthy Aquatic Ecosystems



- Human caused disturbances have not inhibited the **natural function** of the ecosystem
- By maintaining a healthy aquatic ecosystem, the health of other surrounding ecosystems is also persevered
- The majority of the world's organisms **directly depend** on an aquatic ecosystem at some point in their lifecycle



## What is a definition?



The Alberta Water Council defines a healthy ecosystem as:

“An aquatic environment that sustains its ecological structure, processes, functions, and resilience within its range of natural variability.”




## Review




- Water for Life establishes the framework for watershed management planning
- Creating a IWMP is a collaborative innovative
- The plan is a tool to guide future management actions and determine long term sustainability








## Review




- The watershed management plan will be developed in phases
  1. Workshop and Terms of Reference
  2. Watershed Management Plan
  3. Stakeholder review and feedback
  4. Implementation



## Review



- The three main areas of focus for the watershed management plan include:
  - Water Quality
  - Water Quantity
  - Healthy Aquatic Ecosystems





**Thank you for coming and participating!**  
**Questions?**





## **Appendix B**

### **Workshop Workbook**



# AN INTEGRATED WATERSHED MANAGEMENT PLAN

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# WORK BOOK

# 1 Water for Life

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In the past, Alberta has been able to manage the water supply while maintaining healthy aquatic ecosystems due to the relative abundance of water to the demand. However, as populations and industries continue to grow and the water supply becomes more unpredictable, the need to actively manage the provinces water is apparent.

In 2003, in an effort to define its commitment to wise water management, the Government of Alberta released *Water for Life: Alberta's Strategy for Sustainability*. *Water for Life* has three primary goals:

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

In order to fulfill the goals of the strategy and meet specific targets, the actions outlined in *Water for Life* revolve around three key areas, knowledge and research, partnerships, and water conservation. All Albertans use and affect water resources within their watershed. As a result, all citizens, industry, and government share the responsibility in developing and participating in provincial *Water for Life* strategy.

While the government oversees the Water for life strategy there are three key partnerships that are imperative to the sustainability and stewardship of our water resources.

These groups include the Provincial Water Advisory Council, watershed stewardship groups, and Watershed Planning and Advisory Councils (WPACs) like the Lesser Slave Watershed Council.





# Water for Life

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## 2 Watershed Management Planning

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Watershed management planning is an important tool used to ensure the long term sustainability and health of aquatic ecosystems within a watershed. This is a unique opportunity to develop a plan that describes the goals for the watershed and defines specific actions to achieve these goals. In addition, the plan determines reporting and monitoring requirements to measure the success and progress of the plan. Watershed management plans are developed in a collaborative manner with the participation of all stakeholders within the watershed. These stakeholders have an interest in the long-term sustainability of the watershed and include all levels of government, stewardship groups, general public, industry, agriculture, First Nations and non-government environmental organizations. Watershed management plans are designed to be adaptive and flexible to address new challenges or goals within the watershed over time. The watershed management plan will encompass the entire watershed from major rivers, lakes, wetlands, groundwater and land use impacts that affect the aquatic ecosystem. Three key topics will be addressed within the watershed management plan: Water Quality, Water Quantity and Healthy Aquatic Ecosystems.





# Planning



### 3 Map of the Lesser Slave Watershed

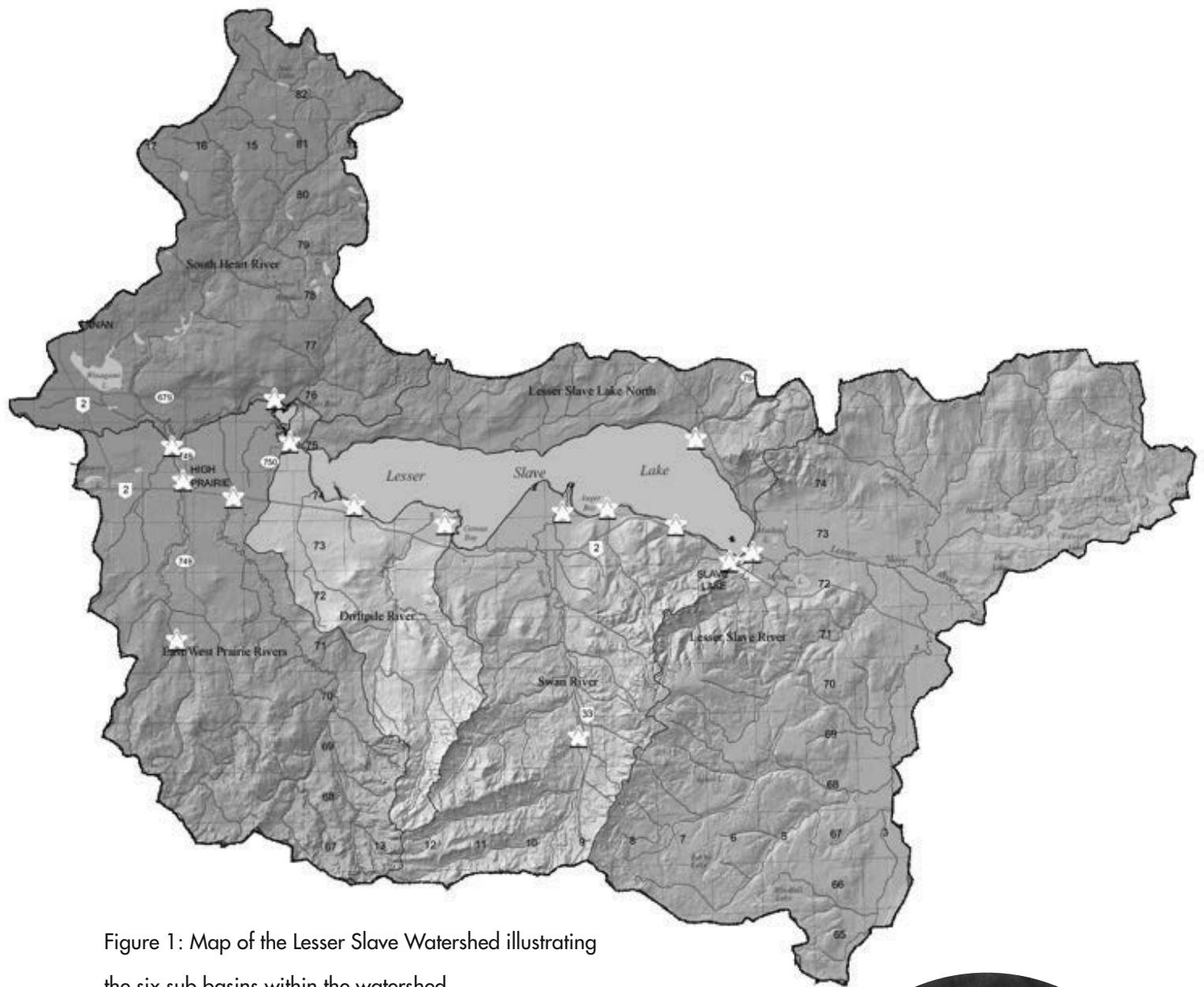
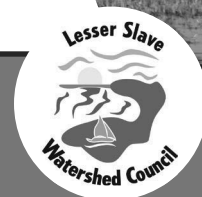


Figure 1: Map of the Lesser Slave Watershed illustrating the six sub basins within the watershed.





# Map

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## 4 Water Quality

Water quality is important not only to the surrounding environment and ecosystems, but for people as well. In regards to water quality, nitrogen, phosphorus and bacteria are the main parameters of concern. Nitrogen and phosphorus are essential nutrients for most aquatic plants. As a result, excess nutrients can lead to eutrophication, which causes an excessive amount of aquatic plant and phytoplankton growth. Associated with increased plant and phytoplankton growth, oxygen levels may become significantly reduced in the water column, which may negatively impact aquatic organisms, including fish. In addition, excessive phytoplankton growth, particularly of cyanobacteria, can lead to the release of toxins into the water column, which may be harmful to aquatic organisms, waterfowl, livestock and humans. The input of nutrients into aquatic systems can occur naturally, but large amounts of nutrients typically originate from indirect anthropogenic sources; including, improperly treated wastewater, residential and industrial use of fertilizers, industrial activity and agricultural operations.

Bacteria can come from a wide variety of sources in the aquatic environment, including natural sources such as soil, decomposing plants, and animal waste, and from anthropogenic (human) sources such as raw sewage, manure runoff, and pet waste. Many types of bacteria found in the aquatic environment are harmless, but some can be pathogenic and cause human health issues.

Changes in water quality indicate either a deterioration or improvement in the condition of the watershed and demonstrate specific areas that require further attention or protection. Changes in water quality result from changes in land use or land management practices, landscape disturbance and natural events. The major anthropogenic impacts on water quality result from natural resource extraction and processing, wetland drainage, dredging, dam construction, agricultural runoff, industrial wastes, municipal wastes, land erosion, road construction and land development. While human activities in a region can have negative impacts on aquatic ecosystems, it is important to strive for a balance between socioeconomic growth and the sustainable management of these aquatic ecosystems to ensure their long-term health and enjoyment by future generations.





# Water Quality

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## 5 Water Quantity

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Water quantity is simply the amount of water available within a system, such as a river or watershed. The majority of Albertans and industry obtain their water from lakes and rivers. Each year these sources are replenished from snowmelt and rainfall. In some areas of the Province water can become scarce during the summer months due to a limited water quantity in lakes and rivers. During times of scarcity, water conservation becomes extremely important.

Water quantity is vital for the maintenance of aquatic habitat, it has functions related to water quality and it is essential for the production of drinking water to meet demands. Irrigation, industry and livestock production are highly dependent on a minimum amount of available water. Sufficient water quantity is necessary for many recreational activities, and in recent years many cottagers and recreational lake users across Alberta have voiced concerns about the decreasing volumes of water seen across the province.

Water discharge rates, allocations and minimum flow rates to maintain ecological integrity can reflect socioeconomic growth in a region. Human activities in a region frequently reduce available water quantities required to maintain healthy aquatic ecosystems. It is important to balance socioeconomic growth and the sustainable management of these aquatic ecosystems to ensure their long-term health and enjoyment by future generations.





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# Water Quantity



## 6 Healthy Aquatic Ecosystems

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Aquatic ecosystems include our rivers, lakes, streams, wetlands and the groundwater systems that connect them. These ecosystems also encompass all of the plants, animals and biological processes that depend on the water within these systems. The health of these ecosystems is imperative to all forms of life, including humans. If an ecosystem becomes unhealthy, everyone and everything will suffer. Water is necessary for sustaining life, as such; we are dependent upon the health of our aquatic ecosystems to provide safe, secure, clean water.

The Alberta Water Council defines a healthy ecosystem as “An aquatic environment that sustains its ecological structure, processes, functions, and resilience within its range of natural variability.” As a result, anthropogenic (human caused) disturbances in these ecosystems have not inhibited the natural function of the system. By maintaining a healthy aquatic ecosystem, the health of other surrounding ecosystems is also persevered. The majority of the world’s organisms directly depend on an aquatic ecosystem at some point in their lifecycle.





# Ecosystems

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# 7 Appendix

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## Structured Decision Making

To move forward with developing their Integrated Watershed Management Plan (IWMP) for the Lesser Slave Watershed, LSWC has decided to take a phased approach. The first step in the phased approach is to hold a Structured Decision Making (SDM) workshop. SDM is an approach to making decisions that focuses on engaging stakeholders, experts and decision makers. Participants are invited to analyze and discuss proactively to identify and evaluate alternatives. SDM follows six steps: clarify the decision context, define objectives, develop alternatives, estimate consequences, evaluate trade-offs and then implement. A few benefits of following the SDM approach include transparency and accountability. It provides a road map to show where we are going and how we got there. It allows for stakeholders to make decisions upfront resulting in a streamlined implementation and support down the road. This will ultimately assist in meeting the objectives set out in the IWMP.

For more information on the SDM approach, please visit their website at [www.structureddecisionmaking.org](http://www.structureddecisionmaking.org)





# Notes







