Vermilion River Watershed Management Plan

Prepared by the Vermilion River Watershed Management Project Steering Committee
on behalf of the North Saskatchewan Watershed Alliance

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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 comprised of member organizations 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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Introduction

Vision
The Vermilion River Basin is a healthy and sustainable watershed.

Mission
To complete a locally-developed and supported watershed plan that balances social, economic and environmental needs of the watershed community.

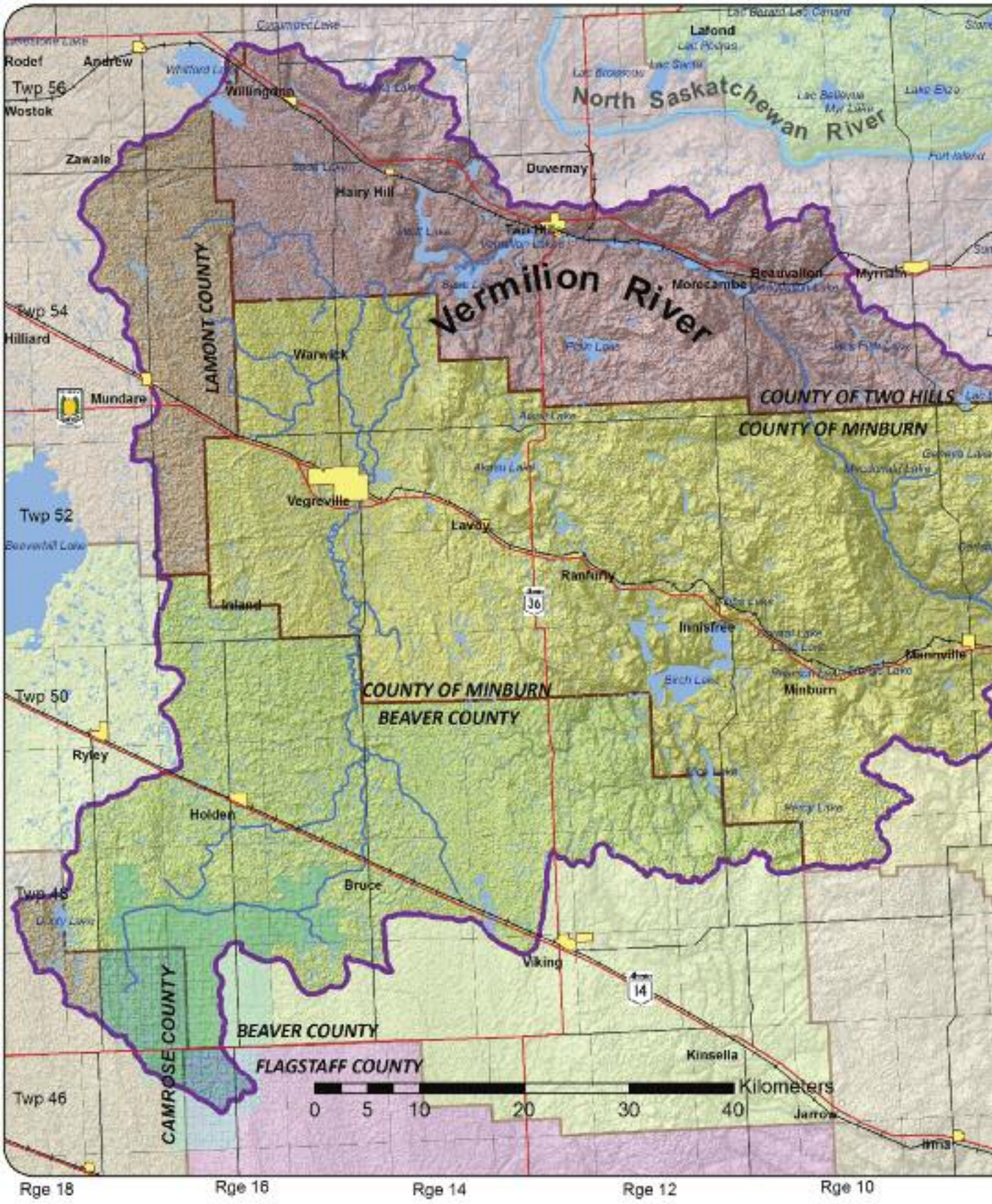
The Vermilion River watershed is located in the Parkland Natural Region of East Central Alberta. It is a rural area dominated by agriculture and is one of 12 sub-watersheds within the larger North Saskatchewan River (NSR) watershed. It covers an area of 7,860 km^2, or 14% of the total NSR basin. It includes all or portions of eight rural municipalities (Beaver, Flagstaff, Lamont and Camrose Counties, and the Counties of Minburn, Two Hills, Vermilion River and St. Paul) plus a total of twelve towns, villages and hamlets. The largest urban municipalities are the Towns of Vegreville and Vermilion. Together, these urban and rural municipalities have a population of 56,977 people (Statistics Canada, 2011).

As a rural agricultural community, we recognize the importance of our land and water. We have benefited for generations from the bounty of our natural resources and we are determined to ensure that our children enjoy the benefits of good, clean water and safe, healthy ecosystems. To do so, we must sustain the environment and ecosystems that have sustained us.

We know that over the past century the Vermilion River watershed has been altered considerably. Extensive wetland drainage has occurred to benefit agriculture, transportation and development. In 1974, the Government of Alberta responded to damaging flooding by channelizing the Vermilion Lakes and the Vermilion River at Vegreville, and by installing a water management structure at Morecambe. The structure was designed to facilitate drainage from the Vermilion Lakes during periods of wet weather and high runoff. These human alterations have affected a number of watershed functions, including the ability of the landscape to store water, recharge groundwater, contribute to stream base flow and lessen the severity of flooding. As a consequence, the State of the North Saskatchewan Watershed Report (2005) gave the Vermilion River watershed a subjective rating of “poor”. We also note that significant data gaps exist in terms of water quality, surface and groundwater hydrology, and overall ecological conditions.

We accept the principles of watershed management, which do not separate land from water or people from their environment. Instead, this integrated approach recognizes complexities and uncertainties. It focuses on the need for us to work together to build our knowledge and capacity so that we can live, work and prosper while maintaining the quality and reliability of our surface and groundwater supplies and the health of our aquatic ecosystems.

Morecambe water management structure, May 2011


Rodel
Andrew
Twp 56
Wostok
Willingdon
Lafond
North Saskatchewan River
Zawale
Duvernay
Hairy Hill
Vermilion River
Beaverhill Lake
Myrnam
Morecambe
Twp 54
Hilliard
LAMONT COUNTY
Warwick
Mundare
COUNTY OF TWO HILLS
COUNTY OF MINBURN
Vegreville
Twp 52
Lavoy
Ranfurly
Ireland
Innisfree
Minburn
COUNTY OF MINBURN
BEAVER COUNTY
Twp 50
Ryley
Holden
Bruce
Viking
Twp 48
CAMROSE COUNTY
BEAVER COUNTY
FLAGSTAFF COUNTY
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0 5 10 20 30 40 Kilometers
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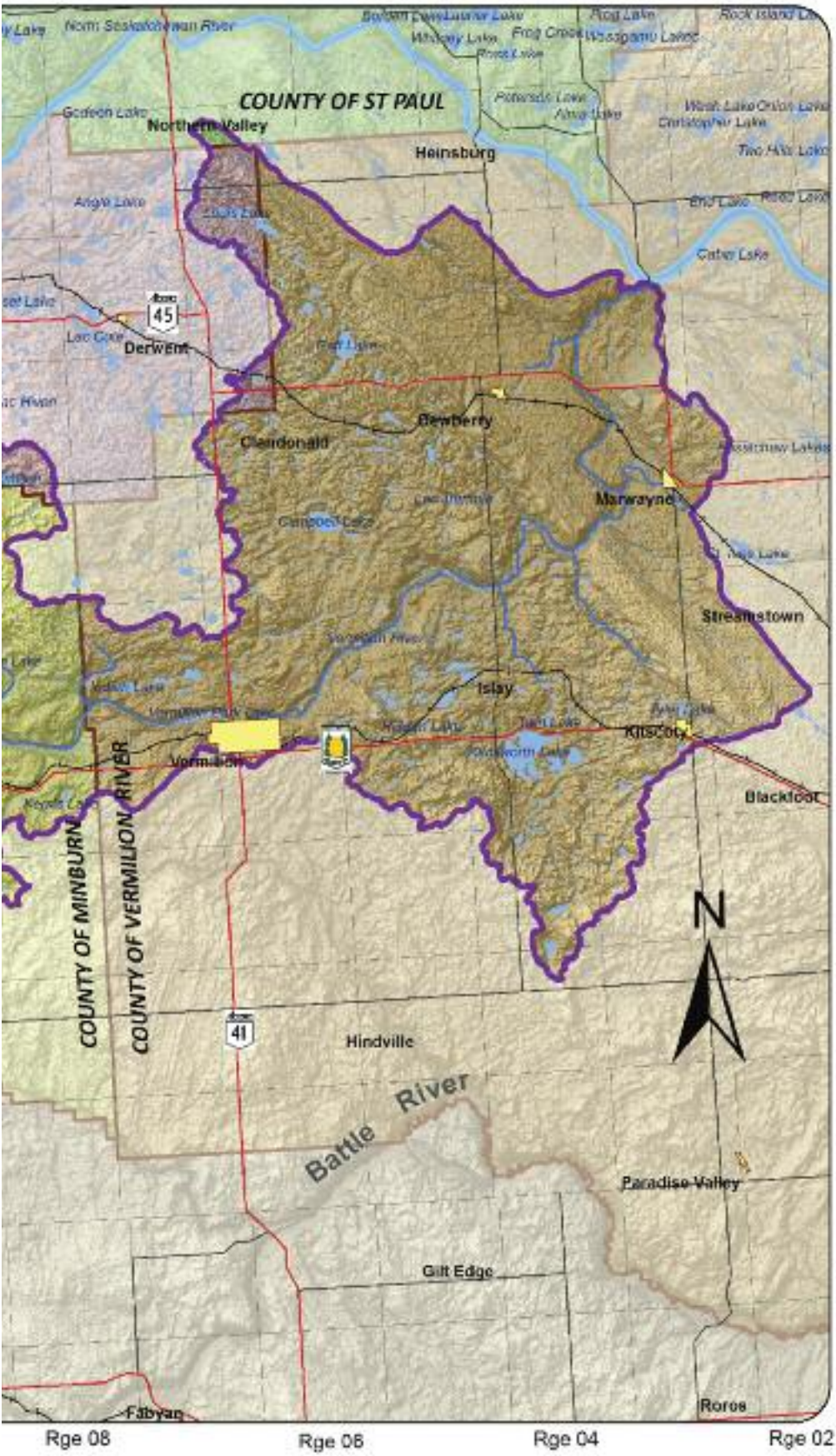
Map of the Vermilion River Watershed



Legend

- Vermilion Watershed
- Vermilion River
- Urban Municipalities
- Rural Municipalities
- Holden Drainage District
- Townships
- Highway
- Roads
- Rail

Purpose of this Plan

This Vermilion River Watershed Management Plan recommends actions that need to be taken to meet the goals of *Water for Life: Alberta's Strategy for Sustainability* (2003): safe, secure drinking water; healthy aquatic ecosystems; and reliable quality water supplies for a sustainable economy.

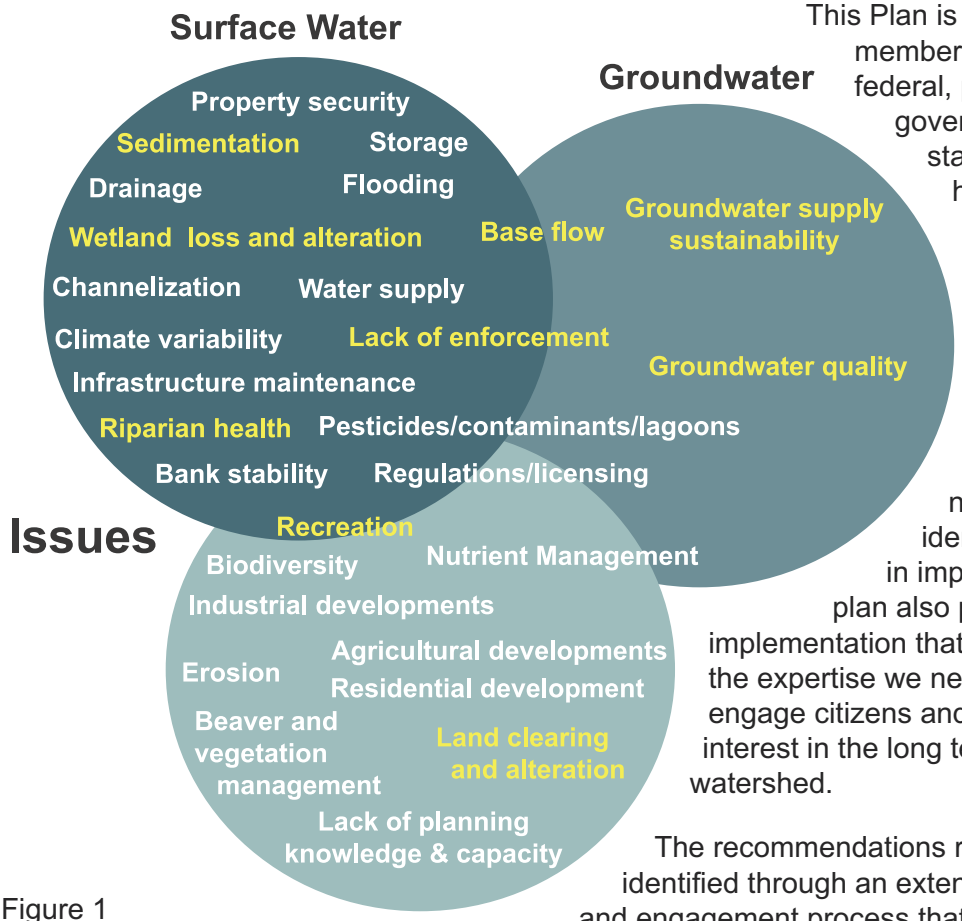


Figure 1
This diagram illustrates watershed issues identified by the steering committee and affirmed through the collaborative planning and engagement process in alignment with the goals of the plan. Issues highlighted in yellow are high priority.

This Plan is presented as advice to all members of our community; to federal, provincial, and municipal governments; and to all watershed stakeholders who live, work, or have an interest in our watershed. It is intended to guide future decisions with respect to the management of our watershed resources.

The recommendations identify specific actions that need to be implemented and identify who should be involved in implementing each action. This plan also presents a strategy to guide implementation that describes how we access the expertise we need and how we actively engage citizens and organizations who have an interest in the long term sustainability of our watershed.

The recommendations respond to the issues identified through an extensive collaborative planning and engagement process that began in 2009. These issues have been organized into categories of surface water (quantity, quality and aquatic ecosystems), groundwater (quality and quantity), and watershed (land use and land management) (see figure 1).

The comprehensive report titled: *Discussion Paper For the Development of a Watershed Management Plan for the Vermilion River Watershed in Alberta* (2011) summarized the planning process and presented the research findings to support these recommendations.

Vermilion Watershed Open House in Beaver County, January 2012

Hayed floodplains of the Vermilion River southeast of Two Hills, Sept 2012

High water during spring thaw (natural irrigation of flood plains), April 1997

From October 2011 to March 2012, extensive public consultations were held throughout the Vermilion River watershed area and at various public events in east-central Alberta. Details of the public consultation process included: targeted electronic and hard copy dissemination of the *Discussion Paper*; formal presentations and briefings to local decision makers; and web-based information and surveys for collection of feedback from the general public. Social media tools were also used, through the North Saskatchewan Watershed Alliance's Facebook and Twitter accounts, to garner feedback on the *Discussion Paper*.

Local libraries, industry contacts, conservation agencies, government offices and member organizations received electronic copies of the *Discussion Paper*. As well, over 800 printed copies were personally distributed by Steering Committee members to local stakeholders. Copies of the *Discussion Paper* were posted to the NSWA's website and feedback surveys were available online to the general public. Formal presentations and requests for feedback were made to six urban and rural municipal councils. Presentations were also made at a number of other events: a County-sponsored open house at Camrose; at two Watershed Planning and Advisory Council conferences (Slave Lake and Lacombe); at a provincial wetland conference at Nisku; and at an inter-provincial watershed conference held in Saskatoon. In addition, four public open houses were held for the Vermilion River Watershed project for local communities; these were hosted by member municipalities at Holden, Clandonald, Vegreville and Mannville.

All feedback received from the survey on the draft Goals, Watershed Management Directions, and Actions presented in the *Discussion Paper* informed the recommendations in this Plan, and helped identify priorities for implementation. The Steering Committee of the Vermilion River Watershed Management Project believes the recommendations in this Plan accurately reflect the interests of all those who actively participated in the planning process, and that this Plan represents their shared values concerning the future management of the Vermilion River watershed.

Background

The Vermilion River Watershed Management Project is a collaborative planning initiative between the North Saskatchewan Watershed Alliance (NSWA), the Alberta North American Waterfowl Management Plan Partners (AB-NAWMP Partners), and the North East Alberta Water Management Coalition (NEAWMC).

Figure 2
VRWMP Steering Committee, June 2012

The NSWA is a multi-stakeholder organization led by an elected, volunteer Board of Directors. AB-NAWMP Partners include two federal ministries (Agriculture and Agri-Food Canada, and Environment Canada); two provincial ministries (Alberta Environment and Sustainable Resource Development, and Alberta Agriculture and Rural Development); and two non-profit organizations (Nature Conservancy of Canada and Ducks Unlimited Canada). The NEAWMC is a coalition of several rural and urban municipalities in the Vermilion River watershed.

In 2009, a Steering Committee (Figure 2) was established to ensure the Vermilion River Watershed Management Plan was prepared in consultation with local and regional stakeholders (see Appendix A for a list of members). The Steering Committee is accountable to the NSWA, and is responsible for guiding the development of this Plan within the context of the NSWA's Integrated Watershed Management Plan (IWMP) for the North Saskatchewan River watershed.

To develop this Plan, the Steering Committee:

- Took a watershed approach that considered both surface and groundwater issues, and the interaction of water, plants, animals and human activities within the watershed.
- Developed a stakeholder engagement process to identify issues in the watershed.
- Examined the legislative, policy and planning context, which revealed the need for voluntary action by stakeholders to effectively use existing policy and regulatory tools available at the provincial and municipal level.
- Examined existing research, conducted a study on water supply and demand in the Vermilion River watershed (Golder Associates, 2009), and surveyed municipalities on their current use of watershed management policy, planning and regulatory tools.
- Conducted hydrologic modeling research to understand how past drainage and future changes to drainage patterns on the landscape could potentially affect hydrologic response (Pomeroy et al., 2012).
- Developed Draft Recommendations for managing the watershed, which align with those made in the document titled: *Discussion Paper for the Development of an Integrated Watershed Management Plan for the North Saskatchewan River Watershed in Alberta* (January, 2011).
- Proposed a watershed monitoring system, and reviewed indicators and data available to measure long-term progress in watershed improvement as a result of implementing Plan recommendations.
- Released the document titled: *Discussion Paper For the Development of a Watershed Management Plan for the Vermilion River Watershed in Alberta*, which summarized the planning process, presented the research findings, proposed the Draft Recommendations, and included a survey to collect feedback on the Draft Recommendations.
- Conducted an extensive public consultation process, vetting information and data from the above with multiple stakeholders and target audiences via public open houses, online surveys, formal presentations and face-to-face briefings.
- Clearly documented the public engagement and consultation process, which also included targeted communication activities, events, multi-media approaches and tools, as well as the process of collection, review and incorporation of all feedback.
- Explored the initial development of an implementation strategy that identified cross-sectoral Working Groups responsible for leading the implementation of each recommended action.

Timelines and Milestones in the Vermilion River Watershed Management Planning Process

Timelines	Milestones
1. Build Partnerships Summer 2009	A. Establish a locally based steering committee to guide the project – completed summer 2009 B. Establish consensus on project goals, scope of work and priority issues – completed summer 2009
2. Characterize Watershed Winter 2009/2010	A. Update current understanding of key watershed attributes • Water supply & demand study completed spring 2009 B. Establish preliminary goals – completed fall 2009 C. Characterize issues & fill data gaps – completed spring 2010 D. Consider potential future conditions affecting goals – spring 2010
3. Goals and Solutions 2010-2011	A. Finalize goals – completed fall 2010 B. Recommend actions to achieve goals & objectives (policies, BMP's, education…) – completed spring 2011 C. Set objectives ("targets") and indicators – completed summer 2011
4. Recommendations for Implementation 2011-2012	A. Develop recommendations to implement plan – summer 2011 B. Draft discussion paper completed – fall 2011 C. Public Engagement & Consultation – completed spring 2012 D. Funding development – initiated spring 2012 E. Partners to commit resources to implementation – fall 2012 F. Assign responsibility for evaluating and revising plan – winter 2012/13

Riding along the banks of the Vermilion River, August 2012.

Glossary of Key Terms

Base flows
The fair-weather or sustained flow of streams, which includes water from springs from groundwater aquifers, but not from direct runoff from precipitation or snowmelt (Alberta Environment, 2008).

Bioremediation
The use of microorganisms to remediate contaminated soil or water. A type of bioremediation for reducing petroleum constituents called “landfarming” uses soil microbial activity, sunlight, tillage, and plant growth (Alberta Environment, 2002).

Dikes and berm
Flood protection/mitigation structures.

Floodplain
An area adjoining a body of water that has been or may be covered by flood water (Alberta Environment, 2008).

Healthy aquatic ecosystem
Provides quality habitat for fish and wildlife while continuing to meet social needs and expectations. It is sustainable and resilient to stress, maintaining ecological structure and function over time similar to the natural (undisturbed) ecosystems of the region, with the ability to recover from disturbance (Alberta Environment, 2005, p.6).

Hydrology
The science dealing with the properties, distribution and flow of water on or in the Earth (Alberta Environment, 2008).

Instream Flow Needs (IFN)
The scientifically determined amount of water, flow rate, or water level that is required in a river or other body of water to sustain a healthy aquatic environment or to meet human needs such as recreation, navigation, waste assimilation, or aesthetics (Alberta Environment, 2008).

Mitigation
The elimination or reduction of the frequency, magnitude, or severity of exposure to risks, or minimization of the potential impact of a threat or warning (BusinessDictionary.com).

Natural water storage
Existing natural or restored wetlands, or other naturally occurring water bodies.

Non-point source pollution
Contaminants that enter a water body from diffuse or undefined sources and are usually carried by runoff from landscapes such as agricultural lands, coal mines, logging areas, urbanized areas, construction sites and roads (Alberta Environment, 2008).

Permanent vegetative cover
Trees, or perennial grasses, legumes, or shrubs with an expected life span of at least 5 years (Womach, 2005). Permanent vegetation reduces runoff, erosion and water quality problems, and provides habitat for many plants and animals.

Point-source pollution
Pollution that originates from one, easily identifiable cause or location, such as a sewage treatment plant or feedlot (Alberta Environment, 2008).

Regional water supply
Water supplied by pipeline for potable, commercial or industrial uses. Water may be diverted from appropriate sources within a river or lake, or from a regional water supply source, such as the EPCOR distribution system from Edmonton.

Riparian areas
The area of water-influenced vegetation and soils beside a stream, river, lake, spring or pond. Riparian areas are critical to reducing the negative effects of various land uses on adjacent waters.

Riparian setback
Setbacks identify the minimum distance required between water bodies and development (Alberta Environment, 2012).

Water Conservation Objective (WCO)
Defined in Alberta's *Water Act* (CW-3, RSA 2000) as the amount and quality of water set by a Director for the protection of a natural water body or its aquatic environment, the protection of human uses of water, or the management of fish or wildlife (Alberta Environment, 2008).

Water Act Approval
Under the *Water Act* (CW-3, RSA 2000), an approval provides authority (to an approval holder) for constructing works or undertaking an activity within a water body. The approval includes conditions under which the activity can take place (Alberta Environment, 2008).

Water Act Licence
Provides the authority for diverting and using surface water or groundwater. The licence identifies the water source, the location of the diversion site, the amount of water to be diverted and used, the priority of the "water right" established by the licence, and the conditions under which the diversion and use must take place (Alberta Environment, 2008).

Water Quality Objective
A numerical concentration or narrative statement that supports and protects a designated water use, or current water quality, at a specific site (NSWA, 2010).

Watershed features
Features of the landscape that include rivers, lakes, wetlands, riparian areas, floodplains, and permanent vegetative cover.

Wetlands
Land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, water-loving (hydrophitic) vegetation and various kinds of biological activity which are adapted to a wet environment (Alberta Environment, 2008).

For sources of definitions
See Appendix B.

Goals, Watershed Management Directions and Actions

What do we, as a *community,* want to achieve?

How are we going to achieve it?

The Vermilion River Watershed Management Project (VRWMP) Steering Committee recommends that we undertake the following work to ensure we have clean, reliable water supplies and healthy aquatic ecosystems now and in the future. The work is described in the form of Goals, Management Directions, and Actions. All Management Directions and Actions are nested within each Goal area, in order to foster potential synergies among efforts over time and efficiently achieve long-term results.

- **Goals**: Five (5) overarching statements representing an overall, long-term result the plan is intended to achieve.

Management Directions: Nineteen (19) statements that are planning objectives on technical and policy themes that quantify efforts toward the achievement of a desired goal.

Actions: Fifty-four (54) specific Actions that describe a specific activity undertaken to implement the watershed Management Direction and contribute to achieving the Goal.

Fall colours of the Vermilion River watershed with Beauvallon Lake in the distance, Sept 2012

The VRWMP Steering Committee offers these recommendations as guidance to everyone working and living in the Vermilion River watershed. They are presented as advice to the Government of Alberta, local municipalities, industry, utilities, non-government organizations (NGOs), producers, and residents, to be considered in all future decisions concerning land and water management.

As stated above, by nesting the Management Directions and Actions within each Goal area, cumulative effects of multiple actions will potentially lead to more efficient use of resources, improved results over a shorter time frame, and have a greater impact on achieving intended outcomes.

Many of the recommendations are interrelated, and need to be implemented in a voluntary, yet coordinated way. Therefore, each Action identifies the key groups or sectors that have the expertise or jurisdiction needed to support implementation.

A watershed management plan is a living document. As we begin working together to achieve our Goals, new Actions will be identified as others are completed, and new Management Directions may be identified as issues emerge.

Town of Vermilion and the Vermilion Dam, July 2010.

Canoeing in the Vermilion River, North of bridge on Twp Rd 532, August 2004

Swathed hay on the floodplains of the Vermilion River, southeast of Two Hills, July 2012

Goal 1:

Develop capacity and knowledge in the Vermilion River watershed.

Town of Vermilion and Vermilion Provincial Park, July 2010

> ***"...we envision a future where people in the Vermilion River watershed have the capacity, knowledge, skills, and resources to effectively work together..."***

As a community, we envision a future where people in the Vermilion River watershed have the capacity, knowledge, skills, and resources to effectively work together to ensure clean, reliable water supplies and healthy aquatic ecosystems. We are concerned about wetland loss and riparian degradation, and we want a capable, effective regulatory 'backstop' to prevent further environmental degradation. But we also need a balanced, practical approach to regulations that recognizes the importance of working with local communities and their local knowledge.

The Steering Committee recognizes that all three levels of government play key roles in addressing watershed issues through their various plans and operations, through clear mandates and policy direction, and supported by adequately enforced regulations.

Therefore, the Committee identified the need to develop capacity and knowledge by: promoting community awareness and understanding of current laws and regulations; encouraging voluntary stewardship through education and incentives; improving cooperation and communication among planning initiative; and developing and implementing monitoring systems to support watershed planning.

Direction 1.1 Improve capacity for watershed management planning and implementation in communities within the Vermilion River watershed.

Action 1.1.1

Establish a VRWMP Implementation Team to:

- Coordinate implementation of the VRWMP among stakeholders.
- Act as a bridge to other sectors and organizations.
- Monitor and report on progress made.
- Review new information.
- Review and update the watershed management plan on a five year basis.

Who's involved: VRWM Project Partners, including the North Saskatchewan Watershed Alliance (NSWA); the Alberta North American Waterfowl Management Plan Partners (NAWMP); counties and towns in the Vermilion River watershed; Alberta Environment and Sustainable Resource Development; Alberta Agriculture and Rural Development; Vermilion River Operations Advisory Committee; North East Alberta Water Management Coalition (NEAWMC); Holden Drainage District; Lakeland College; and Ducks Unlimited Canada.

Action 1.1.2

Develop a long-term funding model to improve capacity for watershed management planning, implementation and monitoring:

- Develop a clear multi-year work plan and business case for partner support.

Who's involved: VRWMP Implementation Team, in collaboration with federal, provincial, and municipal governments, industry, educational institutions, and conservation organizations.

Action 1.1.3

Integrate the recommendations in this VRWMP into all municipal and industrial planning and decision-making processes.

Who's involved: Municipalities and industry.

Direction 1.2 Improve information, knowledge, and understanding of watershed function and stewardship.

Action 1.2.1

Assess the state of information and knowledge to support watershed planning:

- Identify risks associated with information gaps and prioritize areas for research and monitoring.

Who's involved: VRWMP Implementation Team, in collaboration with the Government of Alberta, municipalities, industries, educational institutions, and conservation organizations.

Action 1.2.2

Develop and implement monitoring systems for water quality, water quantity, healthy aquatic ecosystems, groundwater, land use, and land management:

- Fill technical information gaps and increase information available to stakeholders.
- Monitor actions taken related to this plan and behavioural changes related to watershed stewardship.

Who's involved: VRWMP Implementation Team, in collaboration with the Government of Alberta, municipalities, industry and conservation organizations.

Action 1.2.3

Develop and deliver watershed stewardship education and awareness programs for residents and watershed stakeholders in order to foster conservation and the productive use of all water sources in the Vermilion River watershed to reduce water use pressures:

- Coordinate with existing environmental education and extension programs to tailor and deliver information for specific audiences (such as producers, acreage owners, urban residents, young children and students).
- Align education and extension programs with the goals and directions in this plan.

Who's involved: VRWMP Implementation Team, educational institutions, conservation organizations, industry and federal, provincial and municipal governments.

Direction 1.3 Improve regulatory compliance and enforcement.

Action 1.3.1

Improve community knowledge and understanding of laws and regulations used to manage human impacts on land and water in the watershed.

Who's involved: Government of Alberta, NGOs and municipalities.

Action 1.3.2

Assess and address issues around capacity, e ciency, and e ectiveness of regulatory compliance and enforcement:

- Identify opportunities for connecting regulatory officials with watershed planning and implementation activities.

Who's involved: Government of Canada, Government of Alberta, and municipalities within their respective jurisdictions.

Direction 1.4 Improve cooperation and communications among planning initiatives.

Action 1.4.1

Develop intermunicipal planning initiatives to increase consistency of planning and decision-making to address shared watershed issues:

- Coordinate planning, development, and policies related to the riparian and floodplain areas of the Vermilion River.

Who's involved: Municipalities.

Action 1.4.2

Establish an intermunicipal partnership to promote and coordinate watershed stewardship programs and plans among municipalities:

- Explore opportunities for the partnership to act as a wetland mitigation and restoration agency.

Who's involved: Municipalities, in collaboration with the VRWMP Implementation Team.

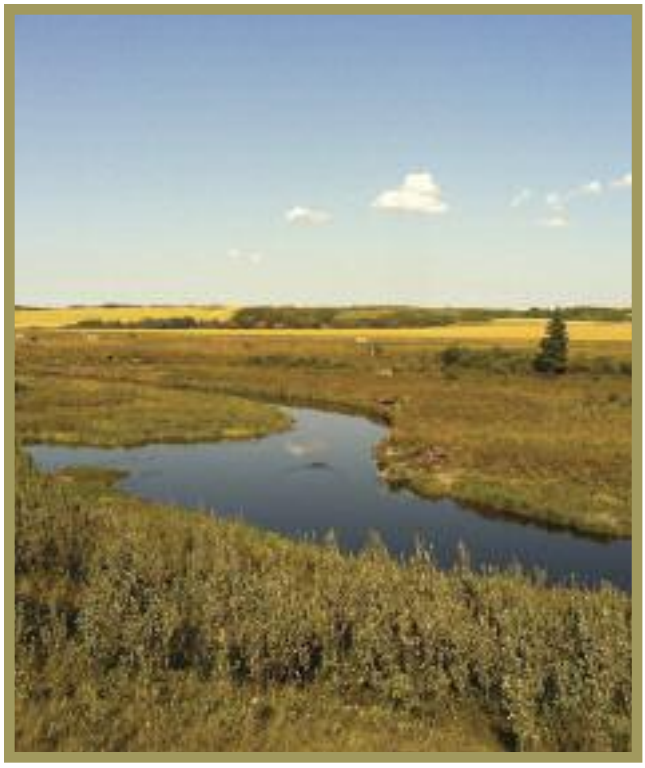
Action 1.4.3

Integrate the VRWMP with other regional-scale planning initiatives, such as the North Saskatchewan River Integrated Watershed Management Plan (IWMP) and the North Saskatchewan Regional Plan (NSRP).

Who's involved: Government of Canada, NSWA, Government of Alberta, and the VRWMP Implementation Team.

Goal 2:

Improve reliability of surface water supply in the Vermilion River watershed.



Vermilion River north of bridge on Twp Rd 532, September 2012

> ***"...we envision a future where careful land management, flood management, and water conservation support increased reliability of surface water supply."***

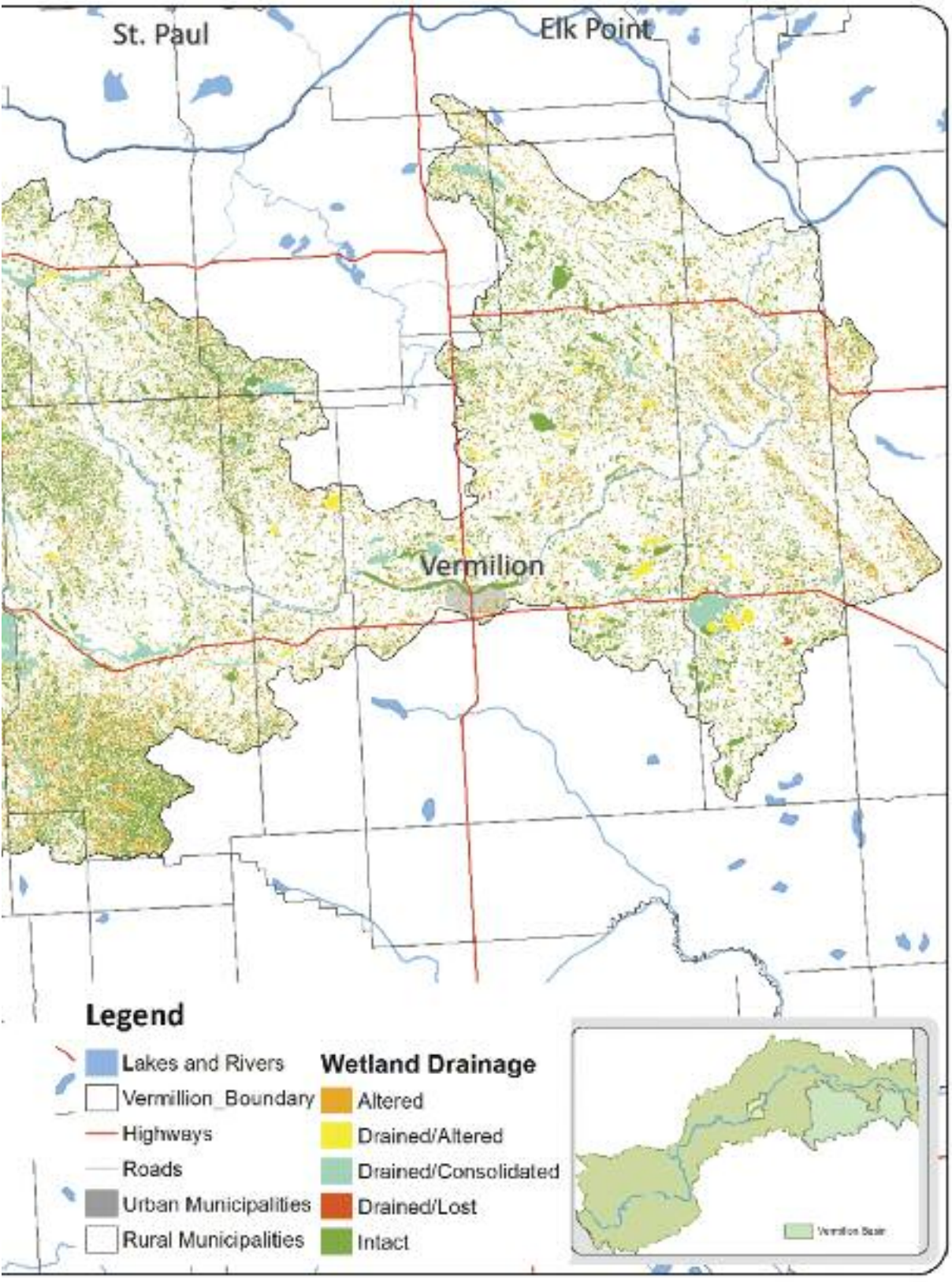
As a community, we envision a future where careful land management, flood management, and water conservation are used to achieve increased reliability of surface water supply. We must also be sensitive to concerns about how our efforts to manage water supply can create problems for our neighbors downstream.

The Steering Committee recognizes that the Vermilion River is naturally highly variable, and that human activities such as wetland drainage, landscape changes, and water use have increased risks to water availability and healthy aquatic ecosystems. Flooding can be both beneficial and harmful, so damage needs to be mitigated in ways that retain the ecological and economic benefits of flooding. Surface and groundwater (hydrological) studies have pointed to the limitations of using isolated wetland restorations or single large engineering projects to address issues of damaging flooding or drought. For example, the operation of the water management structure at Morecambe has increased the risk that areas downstream will have dry channels after dry winters. Planners need to consider multiple, cumulative impacts and benefits across the watershed when planning projects, which requires a high degree of knowledge and understanding of the science of hydrology.

Therefore, the Steering Committee recommends: improving our knowledge and understanding of water supply; developing scientific tools needed to monitor and model water flows; and increasing water storage capacity by protecting and restoring key wetlands or wetland complexes, and by assessing the need for new water management structures.

Map of Wetland Drainage in Vermilion

As a community, we stress the importance of building understanding of a healthy watershed and the importance of wetlands within the context of climate and landscape. Wetlands provide numerous ecosystem services and are important for natural storage, flood mitigation, groundwater recharge and biodiversity. On the typically arid Canadian prairies, many shallow wetlands are lost to evaporation and drought within and between growing seasons. The vegetation and soils in a watershed act like a massive sponge, and during naturally occurring dry cycles, if the sponge dries up, wetlands are lost. During naturally occurring wet cycles, once winter snows and summer rains return and the sponge fills up, the wetlands do come back. During wet cycles the sponge may become fully saturated, which results in soils being inundated with water. Under such conditions wetlands are at full capacity, cannot store additional water and are no longer able to mitigate flooding. The wetlands then fill and spill, resulting in flooding downstream or onto the rest of the landscape. Depending on the landscape, off-site drainage may be adequate, as in undulating or gently rolling landscapes. But on level plains or in hummocky, prairie pot-hole landscapes off-site drainage may be limited and during very wet conditions, soils become inundated, water ponds on the surface, and in extreme cases flooding results. Effective watershed management attempts to build an understanding of the multiple factors associated with landscape, hydrologic processes and human uses, all within the context of climate change.


St. Paul
Elk Point
Vermilion
Legend
Lakes and Rivers
Vermillion_Boundary
Highways
Roads
Urban Municipalities
Rural Municipalities
Wetland Drainage
Altered
Drained/Altered
Drained/Consolidated
Drained/Lost
Intact

Direction 2.1 Improve knowledge and understanding of surface water supply, trends and variability.

Action 2.1.1

Develop and refine hydrologic models to support better management decisions for Licences and Approvals under the *Water Act*, and to manage water management structures.

Who's involved: Government of Alberta, in collaboration with NSWA, the VRWMP Implementation Team, and other watershed stakeholders.

Action 2.1.2

Evaluate and report risks to water supply (water quantity) in the Vermilion River resulting from climate change, human uses, landscape-scale alterations (from wetland loss and land clearing), and from current approaches to surface and groundwater management.

Who's involved: Government of Alberta, in collaboration with NSWA, the VRWMP Implementation Team, and other watershed stakeholders.

Action 2.1.3

Evaluate the ability of natural, and constructed or restored water bodies and wetlands to provide water storage and environmental benefits, both locally and downstream, to meet current and future needs.

Who's involved: VRWMP Implementation Team, in collaboration with Government of Alberta and conservation organizations.

Action 2.1.4

Estimate seasonal withdrawals, return flows, and consumptive use (water consumed and not returned) based on reports from major licence and approval holders under the Water Act to reduce uncertainties regarding water use.

Who's involved: Government of Alberta and major licence and approval holders.

Horses on pasture in the Vermilion River watershed, August 2012

Combining barley in the Vermilion River watershed, September 2012

Direction 2.2 Assess flow requirements for the Vermilion River to inform water management decisions.

Action 2.2.1

Identify appropriate, cost-effective methodologies to evaluate Instream Flow Needs and Water Conservation Objectives for the Vermilion River that account for natural variability in flows. Assess flow requirements for aquatic ecosystem, habitat and human uses.

Who's involved: NSWA and Government of Alberta, in collaboration with VRWMP Implementation Team and other watershed stakeholders.

Action 2.2.2

Evaluate need and scope of a Water Management Plan for the Vermilion River that recommends Water Conservation Objectives:

- Evaluate need and rationale for emergency, seasonal, or longer-term limits on water allocations.

Who's involved: Government of Alberta, with NSWA and Vermilion River watershed stakeholders.

Direction 2.3 Manage water quantity to support flow requirements in the Vermilion River.

Action 2.3.1

Monitor, evaluate and report on meeting flow requirements or any alterations to flow regimes that could affect human uses or aquatic ecosystems.

Who's involved: Government of Alberta and VRWMP Implementation Team.

Action 2.3.2

Establish drought and flood management strategies that identify land and water management responses during periods of extreme low or high flows.

Who's involved: VRWMP Implementation Team, Government of Alberta, and municipalities.

Action 2.3.3

Manage the water allocation licensing and approval process to support flow requirements, or Water Conservation Objectives, if established in a Water Management Plan.

Who's involved: Government of Alberta.

Action 2.3.4

Promote utilization of a regional water supply system to improve water supply reliability.

Who's involved: VRWMP Implementation Team.

Direction 2.4 Increase natural and constructed water storage capacity to mitigate damage from flooding and increase base flows.

Action 2.4.1

Develop wetland protection and restoration plans, practices and policies to conserve existing wetlands, restore drained or degraded wetlands, or create new (ecologically functional) wetlands where storage is needed but restoration is not feasible:

- Prioritize wetlands/wetland complexes for conservation and restoration based on hydrology (properties, distribution and flow of surface and groundwater), water quality, and biodiversity significance.
- Develop and implement policies that mitigate wetland loss, prevent unlicenced (illegal) drainage, and balance ecological needs with drainage requirements by increasing wetland area where beneficial and acceptable.

Who's involved: VRWMP Implementation Team in cooperation with municipalities, Government of Alberta, and other watershed stakeholders.

Action 2.4.2

Use a variety of tools (regulations, bylaws, incentive programs and market-based instruments) to encourage beneficial management practices and alternative use and management of land that support wetland restoration and development of water storage areas in floodplains:

- Coordinate and focus use of existing and new tools through VRWMP project partners.

Who's involved: Municipalities, in collaboration with VRWMP Implementation Team.

Action 2.4.3

Investigate use of a variety of flood and erosion protection measures in urban areas. These could include restricting development in floodplains or constructing flood protection structures such as dikes or berms to divert water, where appropriate.

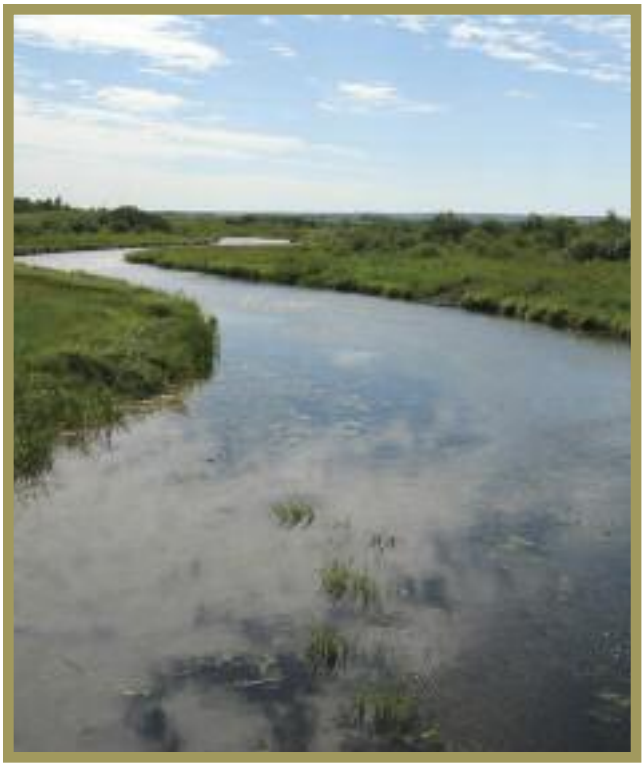
Who's involved: A ected municipalities, working with Government of Alberta.

Winter moon over a frozen Vermilion River, February 2005

View of Beauvallon Lake in the Vermilion River watershed, September 2012

Goal 3:

Maintain or improve surface water quality in the Vermilion River watershed.



Vermilion River south of bridge on Twp Rd 532, August 2012

As a community, we envision a future where water quality in the Vermilion River watershed supports both human uses and healthy aquatic ecosystems, and where there is no further human-caused degradation of water quality. We understand the importance of good water quality and are motivated to adopt stewardship and beneficial management practices to ensure we enjoy the benefits of good water quality now and in the future.

The Steering Committee recognizes that to make informed decisions about water quality we must fill information gaps by developing a long-term monitoring system that provides up-to-date information.

Therefore, the Committee recommends: improving our knowledge about water quality conditions in the watershed; developing Water Quality Objectives; and reducing pollution risk by adopting beneficial management practices.

> ***"...we envision a future where water quality in the Vermilion River watershed supports both human uses and healthy aquatic ecosystems, and where there is no further human-caused degradation of water quality."***

Direction 3.1 Improve knowledge of surface water quality in the Vermilion River watershed.

Action 3.1.1

Evaluate existing water quality data and water quality monitoring needs, and develop a monitoring plan for the Vermilion River watershed plus a strategy for monitoring point and non-point sources of pollution.

Who's involved: Government of Alberta, in collaboration with NSWA and the VRWMP Implementation Team.

Action 3.1.2

Fund and implement long term water quality monitoring sites at the confluence of the Vermilion River with the North Saskatchewan River and at key locations along the Vermilion River.

Who's involved: Government of Alberta.

Action 3.1.3

Fund and implement a medium-term, water quality monitoring network for the Vermilion River to establish current conditions and detect changes from previously measured water quality.

Who's involved: Government of Alberta, VRWMP Implementation Team, and municipalities.

Solar powered remote watering system for livestock, August 2002

Direction 3.2 Develop and implement Water Quality Objectives for long term monitoring sites on the Vermilion River.

Action 3.2.1

Develop and implement site-specific Water Quality Objectives for the Vermilion River that align with and support those developed for the North Saskatchewan River:

- Adopt the policy guidance of "no further degradation" and "continual improvement," as defined in the NSWA's *Proposed Site-Specific Water Quality Objectives* (February 2010).
- Determine technical procedures required to develop Water Quality Objectives for sites on the Vermilion River.

Who's involved: NSWA, VRWMP Implementation Team, and Government of Alberta.

Direction 3.3 Manage total contaminant loads entering the Vermilion River from all point sources to support Water Quality Objectives.

Action 3.3.1

Characterize and quantify point-source loads for pollutants entering the Vermilion River from industrial and municipal wastewater discharges, storm sewers and combined sewer outfalls and for which Water Quality Objectives have been established.

Who's involved: Municipalities and point-source approval holders.

Action 3.3.2

Set load targets and negotiate load allocations for each pollutant to support the achievement of Water Quality Objectives.

Who's involved: Government of Alberta in collaboration with point source approval holders.

Action 3.3.3

Update and improve wastewater, stormwater, and other point-source treatment infrastructure and management protocols to support the achievement of Water Quality Objectives:

- Investigate water quality issues related to the volume, timing, and release pattern of wastewater treatment lagoons.
- Explore alternative uses and treatment options for wastewaters (including irrigation, surface application and constructed wetlands) to mitigate impacts of municipal release of effluent to surface water bodies.

Who's involved: Government of Alberta, in collaboration with municipalities and other point-source approval holders.

Direction 3.4 Identify and reduce non-point source pollution by implementing beneficial management practices in the Vermilion River watershed.

Action 3.4.1

Identify sources and quantify loads for non-point source pollution for which Water Quality Objectives have been established.

Who's involved: Government of Alberta, in collaboration with NSWA, VRWMP Implementation Team.

Action 3.4.2

Reduce non-point source pollution through strategies that:

- Identify and analyze sources of sediment, nutrients and other contaminants.
- Develop plans for monitoring nutrient, sediment and other contaminant sources.
- Utilize incentive programs and educational/training programs to increase the voluntary adoption of beneficial management practices.
- Ensure risks of land and water contamination from oil and gas production, including landfarming, are minimized or avoided.

Who's involved: VRWMP Implementation Team, NSWA, industry sector organizations and NGOs.

Off-stream, solar powered, livestock waterer in winter, November 2005

Goal 4:

Maintain or improve aquatic ecosystem health in the Vermilion River watershed.

Vermilion River floodplain southeast of Two Hills, September 2012

> ***"...we envision a future where aquatic ecosystems thrive and play a key role in the sustainable development of our region."***

The fish in our rivers and streams, and the waterfowl nesting in our wetlands and riparian areas (river banks and shore lands), are part of what sustains us in the Vermilion River watershed. Our watershed lies within the Parkland Natural Region and contains many Environmentally Significant Areas. As a community, we envision a future where aquatic ecosystems thrive and play a key role in the sustainable development of our region. Careful planning and management is key to good decision making, but we are concerned that we do not have the information we need to ensure the sustainability of the Vermilion River watershed. Some of us still remember when there was an abundance of fish and other species, and now we are concerned about lower populations and biodiversity. We can see opportunities to develop a thriving tourism industry that recognizes the significance of our watershed, but we need to act now if we are to achieve our goals.

The Steering Committee recognizes that our community needs to work together to improve aquatic ecosystem health, using education, training and extension programs, and incentives. These are needed to prevent further degradation of aquatic ecosystems in order to turn the community's vision for a sustainable future into reality.

Therefore, the Committee recommends: improving our knowledge and understanding of aquatic ecosystem health; developing Aquatic Ecosystem Health Objectives; and developing and implementing incentives to encourage the adoption of beneficial management practices.

Direction 4.1 Improve knowledge of aquatic ecosystem health in the Vermilion River watershed.

Action 4.1.1

Assess, monitor changes, and report on the current state of aquatic ecosystem health of key water bodies and fish populations within the Vermilion River watershed:

- Utilize cost effective indicators, rapid assessment methods and indices, where appropriate.

Who's involved: Government of Alberta, in collaboration with NSWA, the VRWMP Implementation Team, and watershed stakeholders.

Action 4.1.2

Assess, monitor changes, and report on wetlands, riparian areas, and floodplain conditions throughout the Vermilion River watershed:

- Identify ecological requirements of floodplains for frequency and duration of floods.
- Delineate floodplain and riparian zones throughout the watershed at a coarse scale using remote sensing.
- Update wetland inventory, as required.
- Complete wetland assessments on major wetlands in the watershed.

Who's involved: VRWMP Implementation Team, Government of Alberta, NSWA, and conservation organizations.

Action 4.1.3

Assess, monitor changes, and report on the condition of permanent vegetative cover (vegetation with a lifespan of over five years) throughout the Vermilion River watershed to support surface water quality modeling and inform landscape and agricultural beneficial management practices.

Who's involved: The VRWMP Implementation Team, municipalities, and remote sensing specialists.

Action 4.1.4

Develop, fund and implement long-term monitoring of aquatic ecosystem health on priority water bodies and watershed features, including rivers, lakes, wetlands, riparian areas, floodplains and permanent vegetative cover.

Who's involved: Government of Alberta in collaboration with NSWA, the VRWMP Implementation Team, and other watershed stakeholders.

Direction 4.2 Develop and adopt Aquatic Ecosystem Health Objectives for the Vermilion River watershed.

Action 4.2.1

Develop Aquatic Ecosystem Health Objectives for key water bodies and features in the Vermilion River watershed, including wetlands, floodplains and riparian areas. Objectives should balance ecological requirements with human needs.

Who's involved: Government of Alberta in collaboration with NSWA, the VRWMP Implementation Team, and watershed stakeholders.

Action 4.2.2

Develop and implement Fish Management Objectives for the Vermilion River mainstem, tributaries, wetlands and lakes to protect significant fish habitat and populations. Identify fish habitat that has been lost or degraded.

Who's involved: Government of Alberta, in collaboration with Fisheries and Oceans Canada, and other stakeholders.

Direction 4.3 Integrate Aquatic Ecosystem Health Objectives into planning and decision making so that decisions affecting the watershed are based on appropriate science.

Action 4.3.1

Recommend Aquatic Ecosystem Health Objectives for inclusion in relevant formal plans (such as Government of Alberta Water Management Plans, Approved Water Management Plans, North Saskatchewan Regional Plan, and municipal development plans) for priority water bodies in the Vermilion River watershed.

Who's involved: Government of Alberta and municipalities in collaboration with the NSWA and the VRWMP Implementation Team.

Action 4.3.2

Develop and incorporate riparian setback and management guidelines into municipal planning, regulations and bylaws, following the Government of Alberta's *Stepping Back from the Water: A Beneficial Management Practices Guide for New Development near Water Bodies in Alberta's Settled Region* (2012).

Who's involved: Municipalities.

Action 4.3.3

Identify existing and potential Environmentally Significant Areas (ESAs) and prioritize sites for conservation and protection.

Who's involved: Municipalities, conservation agencies and organizations, and Government of Alberta.

Direction 4.4 Develop and implement incentive policies and programs to support the adoption of beneficial management and other stewardship practices to improve aquatic ecosystem health.

Action 4.4.1

Identify and implement beneficial management practices, incentive policies and programs in order to:

- Minimize flood damage and guide future development in floodplains.
- Restore wetlands and riparian areas to support biodiversity and ecosystem services.
- Maintain permanent vegetative cover, limiting its conversion to other uses and maintaining or improving its function.

Who's involved: Government of Alberta, municipalities, conservation organizations, and other watershed stakeholders (producers, businesses and industry).

Action 4.4.2

Fund the restoration of significant fish habitat that has been lost or damaged.

Who's involved: Government of Alberta, Fisheries and Oceans Canada and other stakeholders.

Direction 4.5 Encourage responsible tourism and recreation use emphasizing agricultural, ecological, historical and archeological attributes.

Action 4.5.1

Establish a network of interpretive sites at key Environmentally Significant Areas (lakes, wetlands, and floodplain sites in or near towns) so people can learn about the natural and cultural history, and attributes, of the Vermilion River watershed.

Who's involved: VRWMP Implementation Team and municipalities.

Canoeing on the Vermilion River, August 1994

Action 4.5.2

Identify economic development opportunities associated with natural, historical and agricultural features in the watershed.

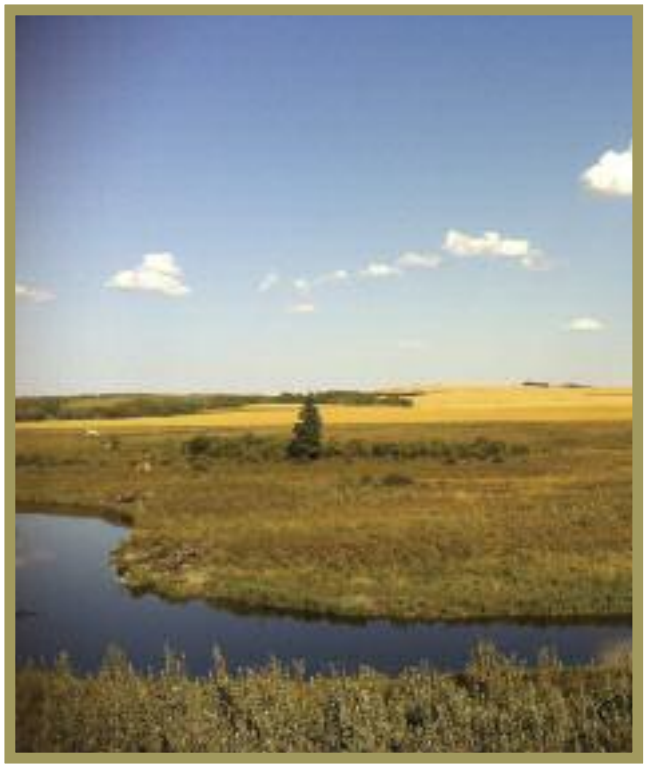
Who's involved: Municipalities.

Paleontological exploration on banks of Vermilion River, February 2012

Quick dip in the Vermilion River, July 2012

Goal 5:

Protect and sustain groundwater quality and supply in the Vermilion River watershed.



Vermilion River north of bridge on Twp Rd 532, September 2012

> ***"...we envision a future where we use groundwater resources sustainably and where we protect this vital resource from contamination from human activities."***

As a community, we envision a future where we use groundwater resources sustainably and where we protect this vital resource from contamination from human activities. Most of our rural landowners and communities rely on groundwater and are not connected to regional water supply systems. We are worried about risks to groundwater quality due to contamination from surface and subsurface resource and water management activities. We know how important groundwater is, but we also know that we need more information about our groundwater resources and better understanding of how to protect our groundwater quality and sustain our water supply.

The Steering Committee recognizes that the community needs reliable information about current groundwater levels and quality. This information is needed in order to make good decisions about groundwater use, and to appropriately manage surface and subsurface activities to protect groundwater quality and recharge areas.

Therefore, the Committee recommends that we improve our knowledge and understanding of groundwater in the watershed, and develop and implement strategies to protect it.

Direction 5.1 Improve knowledge and understanding of groundwater quality and quantity in the Vermilion River watershed.

Action 5.1.1

Assess and address gaps in knowledge about groundwater that may affect groundwater sustainability by assembling and summarizing current scientific knowledge in published sources and available databases:

- Identify priority aquifers, recharge areas, and groundwater-dependent ecosystems (discharge areas such as springs).
- Improve accuracy of spatial definition of aquifers using available geophysical logs.

Who's involved: Government of Alberta.

Action 5.1.2

Develop a monitoring system to compile and share well-testing data from private, municipal, and industrial sources and report changes in supply and quality to all stakeholders:

- Maintain and/or establish long-term observation wells for key aquifers in the Vermilion River watershed.
- Encourage voluntary monitoring and reporting of groundwater levels and use.
- Evaluate and follow through on groundwater monitoring recommendations made in Regional Groundwater Assessments (Hydrogeological Consultants Ltd., 1999-2001).
- Develop better understanding of groundwater/surface water interactions.

Who's involved: Government of Alberta, in collaboration with municipalities and other watershed stakeholders.

Action 5.1.3

Assess and monitor impacts and risks to groundwater quality and quantity from resource extraction, industrial, municipal, and agricultural developments and activities over aquifers connected to the Vermilion River watershed.

Who's involved: Government of Alberta, municipalities, and VRWMP Implementation Team with support from qualified hydrogeologists.

Direction 5.2 Develop and implement management strategies and plans to protect groundwater quality and quantity.

Action 5.2.1

Develop aquifer management plans for areas where risk assessment indicates current or future threats to groundwater resources. Management plans will:

- Determine sustainable pumping rates.
- Identify strategies for drought management.
- Respond to cumulative effects of water withdrawal.
- Identify and use codes of practice, incentives for best management practices, and other tools to protect groundwater resources at risk from proposed developments or activities.

Who's involved: Government of Alberta to work with municipalities, industry and other stakeholders.

Action 5.2.2

Advance public understanding of groundwater by increasing and sustaining water well and groundwater extension programs and educational activities for municipalities, landowners and other stakeholders.

Who's involved: Government of Alberta, municipalities and agricultural organizations.

Action 5.2.3

Promote the use of regional water supply systems to decrease pressure on priority aquifers and increase water available for base flows of streams.

Who's involved: VRWMP Implementation Team.

Action 5.2.4

Promote water conservation and productivity to decrease pressure on priority aquifers and increase water available for base flows of streams.

Who's involved: VRWMP Implementation Team.

Implementation

The implementation of the Vermilion River Watershed Management Plan (VRWMP) requires that we, as a community, commit to work together to achieve our goals. There are no laws requiring us to implement this Plan; we have only our determination to protect our natural resources and environment so that our children and grandchildren will benefit from good clean water and healthy aquatic ecosystems.

The organizations that form the VRWMP Steering Committee will take the first action and establish the VRWMP Implementation Team (Action 1.1.1). This Team represents the VRWMP Project Partners and their commitment to coordinate implementation of this Plan and to act as the bridge between all levels of government, industry sectors, organizations and individuals living and working in the Vermilion River watershed. The Team will work together to develop a long-term funding model and a multi-year work plan (Action 1.1.2), apply technical knowledge (including hydrologic modeling results) and will promote the VRWMP to every municipality in the watershed, encouraging them to integrate its recommendations into their planning and decision-making processes (Action 1.1.3).

Research findings from the hydrologic modeling stress the importance of protecting existing wetlands in the first place, rather than attempting to restore them after the fact. These results will aid subsequent prioritization of management directions and actions (4.3.3. and 4.4.1).

Off-stream livestock watering to protect riparian area, August 2005

Cows & Fish riparian management field day, August 2004

The VRWMP Implementation Team will be committed to putting the recommendations in this Plan into action based on the best available information, which requires ongoing monitoring, evaluation and reporting on conditions in our watershed. This Team will work closely with the NSWA's Expert Working Groups, which are being established to implement the North Saskatchewan River Integrated Watershed Management Plan (NSWA, 2012b), in order to identify knowledge gaps and research needs, review and advise on legislation and policy, and identify beneficial management practices. The Team may also develop locally based working groups to access valuable knowledge needed to implement the Plan (see Figure 3).

This approach will provide us with both the local knowledge and professional expertise we need to support the actions we each may voluntarily take if we are to implement this Plan and achieve our goals. The implementation strategy is a draft framework at this point in time (Figure 4), and will require future dialogue and collaboration among interested stakeholders to fully develop a workable implementation strategy.

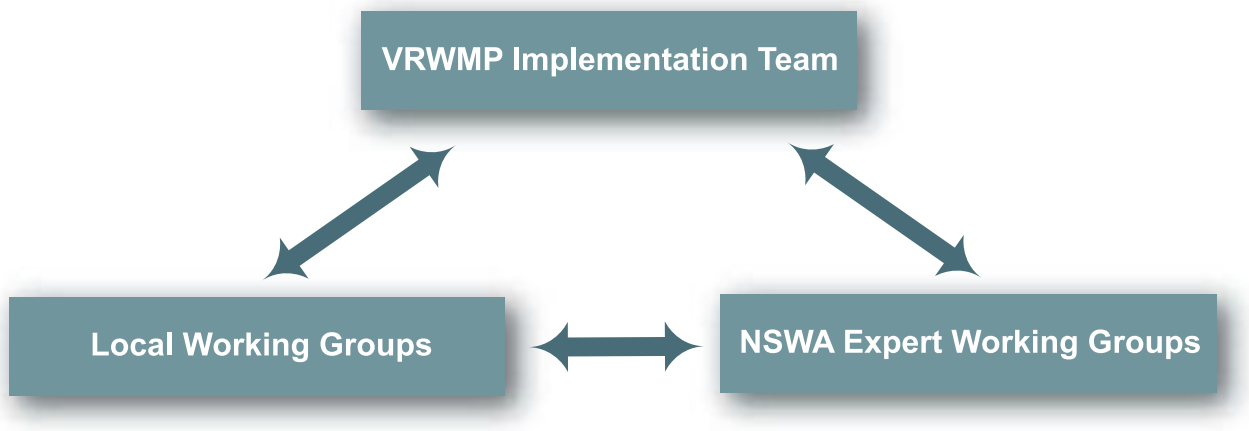


Figure 3
Diagram indicating the flow of work and information between the various groups involved in the implementation of the VRWMP.

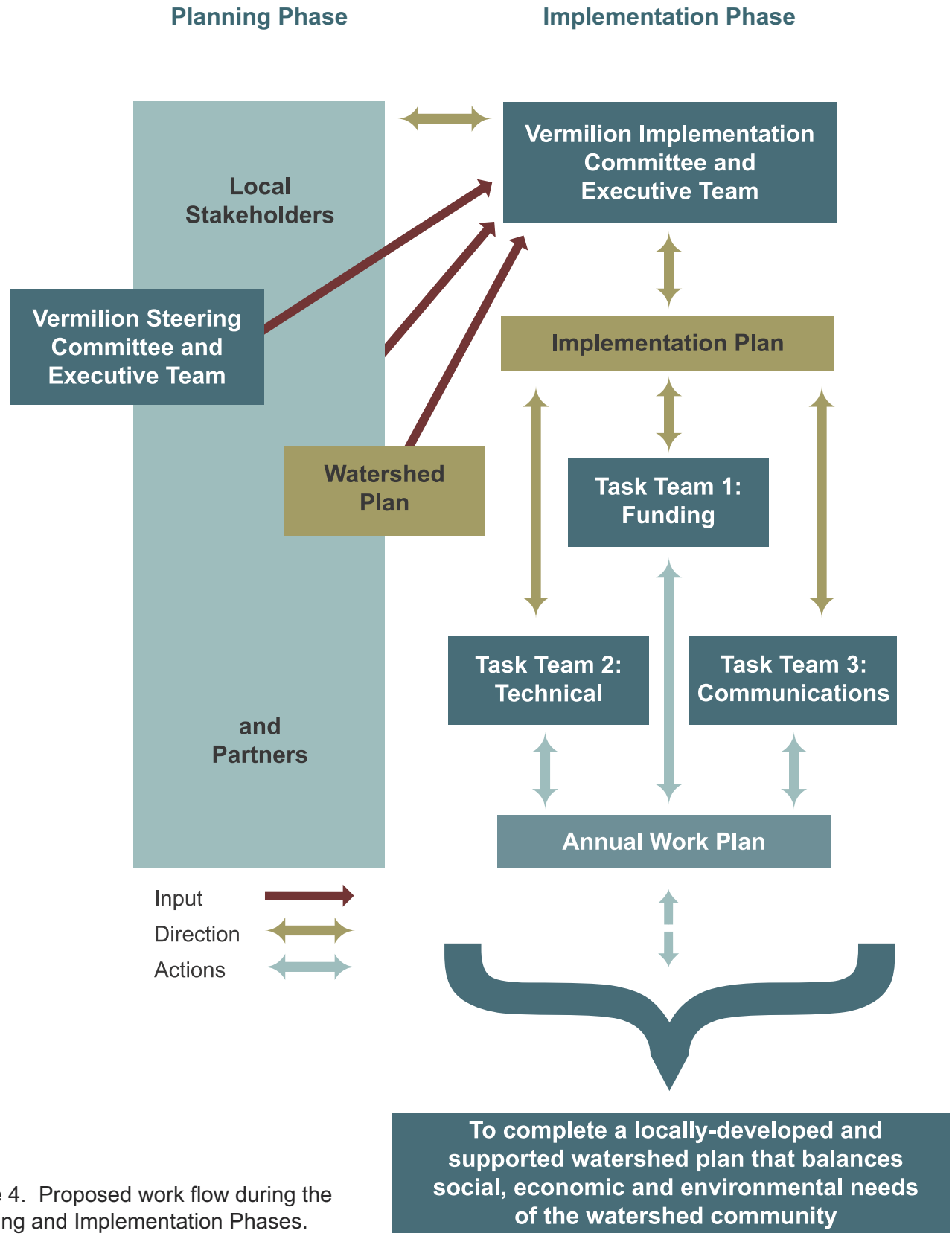


Figure 4. Proposed work flow during the Planning and Implementation Phases.

Appendix A - VRWM Project Steering Committee

Representing	Member	Sector
Beaver County	Ron Yarham (2010-present) Vern Hafso (2009-10) Bob Young (2009-present)	Municipality
County of Minburn	Rick Wagner (2010-present) Roger Konieczny (2010-present) Albert Melnyk (2009-10) Carl Ogrodnick (2009-10)	Municipality
Town of Vegreville	Greg Kurulok (2009-present)	Municipality
Town of Vermilion	Richard Yaceyko (2009-present)	Municipality
County of Two Hills	Patrick Gordeyko (2009-present)	Municipality
County of Vermilion River	Ed Parke (2011- present) Dave Gamracy (2009- 2011)	Municipality
AB Env and Sust Res Dev	Dave Mussell (2012 –present) Rick Friedl (2009- 2012)	Government of Alberta
Agriculture and Agri-Food Canada	Candace Vanin, P.Ag. (2009-present)	Government of Canada
North Saskatchewan Watershed Alliance (NSWA)	Candace Vanin, P.Ag.	Watershed Planning and Advisory Council
Vermilion River Operations Advisory Committee (VROAC)	Barry Kutryk (2009-present)	Water management
Holden Drainage District	Jim Charpentier (2009-present) Milt MacGregor (2009-present)	Water management
Lakeland College	Michael Crowe (2009-present)	Academia
Alberta – North America Waterfowl Management Plan (AB-NAWMP)	Michael Barr (2009-present)	Government/ Conservation Partnership

Ron Yarham (2010-present)
Deputy Reeve, Beaver County - Municipality

Ron is Councillor for Division 3 (Ryley/Holden areas) and his community activities include: Vice-Chair of the Beaver County Seed Cleaning Co-op, and Director with Ankerton Gas Co-op. Ron is a Master Electrician and is married with four children and five grandchildren.

Greg Kurulok (2009-present)
Councillor, Town of Vegreville - Municipality

Greg is serving his second term on Town Council, and besides being a member of the Vermilion River Watershed Steering Committee, he is currently Deputy Mayor of Vegreville and Chairman of the M.D. of Minburn Foundation (Homestead Lodge). His community activities also include: Vegreville Regional Museum Board, the Vegreville Land Use Committee, the Intermunicipal Development Plan Committee and the Vegreville Regional Solid Waste Management Committee. Greg and wife Chris (of 41 years) have two children and three grandchildren. Greg is a retired educator and a small business owner.

Roger Konieczny (2010-present)
Councillor, County of Minburn - Municipality

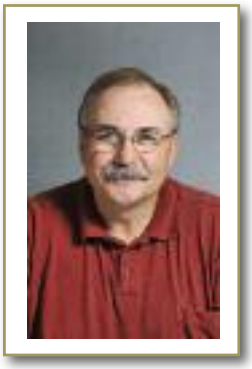
Roger is Councillor for Division 3 (north of Mannville, Minburn, & Innisfree) and his community activities include: Director of the Manville Agricultural Society and Director of the Mannville Minburn Innisfree Family and Community Support Services Society [FCSSS]. Roger is a journeyman carpenter and grain farms with his wife and three children.

Richard Yaceyko (2009-present)
Councillor, Town of Vermilion - Municipality

Richard is serving his third term on Town Council. His community activities include: Town of Vermilion Airport, Lloydminster & District Health Advisory Council, Transportation & Utilities Committee, and Emergency Training Centre Community Advisory Committee. Richard was born and raised on a farm near Derwent, Alberta and has lived in the Town of Vermilion since 1984. Richard is a cement finisher and journeyman carpenter. He and his wife have four daughters.

Ed Parke (2011- present)
Councillor, Country of Vermilion River - Municipality

Ed is Councillor for Division 6 and his county activities include: Lea Park Joint Interest Committee, North Saskatchewan Watershed Alliance, Vermilion River Regional Alliance, Marwayne and District Recreation Board, Marwayne Seed Cleaners Association, and the Lloydminster & District Health Advisory Board. Ed and his wife Mary (of 35 years) ranch with their family, 3 grown children; two married with two grandchildren and another coming in November 2012. Community activities include the Tulliby Lake Agricultural Society and the Lea Park Bethel Church.



Patrick Gordeyko (2009-present)
Councillor, County of Two Hills - Municipality

Patrick has been Chairperson of the Vermilion River Watershed Management Project since 2009, and a Director with the North Saskatchewan Watershed Alliance since 2005. Patrick has been involved in municipal politics since 1998, Patrick is currently Division 3 Councillor for the County of Two Hills, a position he has held since 2005, previously serving as Deputy Reeve/Councillor in 2003-2004, and Reeve/Councillor from 1998-2002. He is also Chairman of Agricultural Service Boards Provincial Committee, a member of the Federation of Gas Utilities Strategic Task Force Committee, and past President of the Two Hills Agricultural Society, an organization he has belonged to since 1998.

James Charpentier (2009-present)
Chairman, Holden Drainage District Water Management

James has served as Director and Chairman of the Holden Drainage Board for 21 years. He is also a Director of the provincial Drainage Council, Director on the Vermilion River Watershed Management Project, and Chairman of the Ankerton Gas Co-op. As a young man he was a truck driver, and then a heavy duty equipment operator. Currently, he farms with his wife, Marilyn (of 48 years) and they have three children and four granddaughters.

Barry Kutryk (2009-present)
Vermilion River Operations Advisory Council (VROAC) - representative of County of Two Hills

Following a career in law enforcement, Barry settled on his third generation family farm near Beauvallon; where together with wife Kathryn and their four children they raised beef cattle. Since 1999 he has represented Two Hills County on the Vermilion River Review Stakeholder Committee, the Vermilion River Operations Advisory Committee (three years as chairperson) and the Vermilion River Watershed Management Project Steering Committee.

Michael Crowe (2009-present)
Director, Academic Services

Mike has worked with Lakeland College since 2003. The majority of his time at the college has been spent in the department of Environmental Sciences where he instructed courses in ecology and field biology, forest ecology, statistics and data management, and restoration ecology. He also served five years as Program Head of the Conservation and Restoration Ecology program. Mike has been seconded from his instructional duties for two years to help with some administrative roles at the college.

Candace Vanin, P.Ag. (2009-present)
Land Use Specialist, Agriculture & Agri-food Canada

Candace is a professional agrologist with over 25 years experience in land & water conservation planning, geo-spatial analysis, agricultural extension, program development and delivery at the provincial and federal government levels. Candace has served as a director on the North Saskatchewan Watershed Alliance since 2004, and on the Partners FOR the Saskatchewan River Basin since 2009.

Michael Barr (2009-present)
Coordinator, Alberta - North Americal Waterfowl Management Plan (AB-NAWMP)

Michael Barr is Coordinator of a wetland conservation partnership among federal and provincial government departments and non-government agencies in Alberta. This international partnership, called the North American Waterfowl Management Plan (NAWMP), supports initiatives that contribute to healthy prairie, parkland and boreal landscapes that sustain bird populations and provide ecological and economic benefits to society. Michael and his family live in Camrose, AB.

Dave Mussell (2012 –present)
Environmental Planning & Partnership Coordinator, Alberta Environment and Sustainable Resource Development

Dave is an environmental planner, with degrees in biology and education. He has extensive experience in environmental research and environmental education. Dave enjoys outdoor pursuits, volunteering, and is director with several local and national charitable organizations. He currently lives in Drayton Valley and is married with three grown children.

Graham Watt
Basin Planner, North Saskatchewan Watershed Alliance

Graham is a geographer and environmental planner who has lived his life by the ocean, on the prairies, and now in the dry plateau country of BC's southern interior. Graham studied ecological restoration and landscape change in the Rocky Mountains before joining NSWA, where he was Basin Planner from 2007-2011. Graham is now working on a watershed plan for the Kettle River with the Regional District of Kootenay Boundary.

Sunset over the Vermilion River, August 2005

Vermilion River downstream of the Morecambe structure, May 2011

Solar-powered, off-stream livestock waterer, August 1997

Writer: Susan Abells, Abells Henry Public Affairs
Layout: Gwen Edge, Just Me Graphic Design

Appendix B
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