

7.0 Recommendations

Recommendations for this watershed fall into the following four categories:

1. Planning – This is an ongoing, regulatory approach which will include the watershed management planning process, and the municipal planning process (intermunicipal development plans, bylaws, others).
2. Stewardship – This is ongoing as well, and requires community involvement. Components of this step are education and awareness, use of cottage owner BMPs provided by organizations such as *Living by Water* and ALMS, better animal husbandry and agricultural land use practices, nutrient and manure management and others.
3. Reclamation and restoration – This is the most drastic of all of the steps and would involve activities such as riparian restoration, replanting and restoration of critical lacustrine marsh areas and riparian vegetation and others.
4. Data gaps – Significant data gaps will need to be filled to move forward with an Integrated Watershed Management Plan. These gaps include wetland and biodiversity inventories, initiation of long-term monitoring programs of water quality, particularly for N, P, pesticides, biologicals (bacteria, parasites) and riparian health assessments.

Wetland Loss

There is a provincial wetland inventory under way, led by Alberta Environment. Once this inventory is completed, the information pertaining to wetlands within the Red Deer watershed should be considered during the writing of the IWMP. Individual municipalities within the watershed that are concerned about wetland loss can implement Wetland Policies within their bylaws, which will help protect wetlands and prevent further loss. The provincial *Wetland Policy* (to be released in 2009) will assist watershed groups and municipalities in protecting wetlands as well. At this time, wetlands are protected under the Alberta *Water Act*, and no wetland in the province can be drained or altered without an approval under the *Water Act*. Under the auspice of the wetland mitigation framework (i.e., avoid, minimize or compensate), any unavoidable wetland loss in the Red Deer River watershed should be compensated for to maintain watershed health. Thus, wetlands should be protected with the aim of a no-net-loss of wetlands in the Red Deer River watershed and to maintain or improve watershed health. Moreover, WPACs, under the new provincial *Wetland Policy*, should develop watershed-specific objectives for wetland protection, restoration, etc. The integration of WPACs into the new *Wetland Policy* will be essential to keep the provincial government on track to protect watershed health.

Other municipalities within the Province have utilized economic valuation as a method of determining the dollar value of ecological goods and services provided by wetlands. Once the functionality of the wetland has been assigned a dollar value, it provides municipalities a monetary value with which to provide developers or resource extraction companies in order to make arrangements for preservation, mitigation or compensation in the event of wetland impact. Individual wetlands that are deemed significant in the landscape can be protected using environmental reserve designation, protective notations or other methods through government agencies, such as special areas designation and others.

Compensation packages or tax incentives can be offered to agricultural producers in an attempt to encourage leaving intact wetlands on the landscape.

The importance of wetlands should be incorporated into all school science programs, and public outreach, particularly to realtors, developers and agricultural producers should be implemented immediately regarding the same. This will assist with increasing the public knowledge regarding the functionality of wetlands and will help educate producers and developers about the significance of leaving these features on the landscape. New home buyers will prefer “greener”, i.e., more ecologically sustainable, developments that incorporate wetlands as natural features, rather than having them removed and replaced with stormwater management ponds. Realtors can use the presence of natural wetlands as selling features for home buyers, and education will help them to assign value to properties based on their ecological footprint with relation to wetlands. Educational signage and viewing platforms can be used as valuable tools to incorporate educational opportunities with “ecologically friendly” recreational enjoyment of wetlands.

Riparian Health

Riparian health assessments are spotty throughout the entire watershed, and should be completed on a more thorough basis. Currently, assessments are completed based entirely upon requests made to Cows and Fish; watershed groups or municipalities interested in protecting their riparian areas should develop partnerships with Cows and Fish to complete assessments on waterbodies within their subwatershed. Areas of concern can then be highlighted and restoration efforts and best management practices can be implemented in order to help preserve riparian area functionality.

Municipalities can use *Riparian Policies* in order to protect these areas, similar to the *Wetland Policy* mentioned above. This is especially important given the current lack of riparian policy development at the provincial or federal level. Protective notations or environmental reserve designations can also be placed in riparian zones in order to prevent loss or degradation. Tools have been developed to determine exactly how wide a riparian buffer zone should be based on characteristics such as soil type, slope, vegetation cover and others. These tools can be used on a site-by-site basis to determine the buffer widths required to preserve ecological function and water quality in receiving waterbodies.

Public education and outreach is essential to the preservation of these areas as well. If the public, agricultural producers and developers are made aware of the ecological benefit of intact riparian buffers, there may be more attempts to preserve these areas and leave them as natural features in the landscape. Educational signage can be placed in significant areas, or in restored areas, to raise awareness and encourage preservation.

Watershed groups and municipalities can receive assistance from organizations such as Cows and Fish regarding the restoration of degraded riparian areas. Community based activities, such as willow staking, fencing and other replanting initiatives, build community pride in riparian areas and allow for

economical, large-scale restoration of impacted areas. Cottagers and others living in the proximity to riparian areas can participate in programs, such as *Living by Water*, to obtain information on how to better manage their properties to preserve surface water quality through vegetation management and preservation of riparian areas. Areas with cattle grazing should incorporate fencing in order to prevent vegetation trampling and soil compaction.

Manure Production

Proper manure management is key to preservation of water quality, especially in areas with high livestock density. At a subwatershed or municipality scale, producers should work with their local agricultural fieldmen and other resources in order to complete site specific assessments of soil quality, which would include nitrogen and phosphorus levels, along with runoff potential. Using these data, it can be calculated how much manure can be safely applied to the landscape without causing undue harm to surface waterbodies. Coupled with the riparian restoration and preservation initiatives, appropriate riparian buffers can be implemented to intercept nutrient rich surface flow and keep excess nutrients from entering waterbodies and causing eutrophication. Bacterial contamination would also be greatly reduced.

Other manure BMPs can be encouraged, including storage of manure, composting, aeration of slurry storage tanks and anaerobic digestion.

Urban, Rural, Agricultural and Recreational Developments

As identified in the Data Gaps section of the report, data regarding the extent of recreational use within the watershed is largely unknown over the last few years. Knowing this information would assist with highlighting areas of high recreational activity, which can have potentially detrimental impacts on the environment. Limits could be established regarding the number of users in the area at one time, for example, and trail systems could be built in order to minimize further degradation. Signs can be posted in areas where ATV activity is prohibited, and traffic can be limited in sensitive areas, such as riparian areas or wildlife habitat.

Currently, urban development is occurring at a rapid pace in Alberta. This can result in the use of large areas of land for housing developments, infrastructure and associated development. In order to minimize the effects to the landscape and to preserve natural areas and arable land, municipalities have the ability to limit “outward” growth of a city, or town, and can encourage higher density developments. Permits for development can also be limited to projects that implement low impact development practices, such as permeable pavement, green roofs, bioswales, and others. Canmore has used this approach with great success (Town of Canmore, 2008). Along with urban development goes the Country Residential housing market. Country Residential homes are very low density, with large homes, often with lots 1-2 acres in size or more. This practice uses large amounts of land and rapidly expands the footprint of an urban area. Development approvals on these types of projects can be limited by a municipality in favor of higher density developments. Municipalities can also require environmental

impact assessments and/or biological assessments for all proposed development sites to ensure sensitive areas are preserved and protected.

Residential best management practices are available and need to be communicated to the public. Homeowners can be educated on the proper use of pesticides and fertilizers, as well as the importance of cleaning up pet feces. Recycling and composting programs are becoming more widespread and can be encouraged in the smaller towns and cities, if they do not currently exist.

Rural developments, i.e., farm yards and associated houses and buildings, are typically widespread, but may have a large individual footprint. Best management practices, including minimizing compacted or paved surfaces and avoiding widespread land clearing, can be used in order to minimize the impact of the development. Septage best management practices can be encouraged or even enforced, with fines for leaky septic tanks or land spreading of human wastes.

An over-arching theme in this indicator is education. Developers, buyers and current homeowners need to be aware of why higher density development is preferential, and how large scale land use for low density development is not sustainable in Alberta's current landscape. Urban sprawl is increasing annually and must be kept in check before too much of the natural landscape is lost or impaired. Developers need to be cognizant of low impact development alternatives and they should be incorporated in all development plans. Low impact development needs to become commonplace in project design and during the construction phase.

Linear Developments

Linear developments are of concern in the Red Deer River watershed. This can be managed with best management practices such as limiting construction of and cross-industry sharing of forestry roads and pipeline/well pad access roads, limiting road widths, avoidance of sensitive areas, and many others. With the extensive oil and gas development in Alberta, it will be challenging to minimize seismic activity, pipeline right-of-ways and other such developments, but these features can be managed to minimize wildlife and vegetation impacts on the landscape using best management practices.

Oil and Gas Activity

Oil and gas activity is widespread across Alberta, from natural gas extraction to coal bed methane and conventional hydrocarbons. The impacts to surface water and groundwater from resource extraction can be significant, but the impacts can be lessened with care and attention. Proper, intact well casings and safe handling of drilling fluids and solvents is essential in preventing environmental damage. Drilling staff aim to ensure casings are poured properly and that all waste materials are collected and removed from site instead of being stored in pits. Fractionation is a practice that can lead to the rapid and unpredictable spread of solvents and product through rock and soils, causing contamination of groundwater. Alternatives to this practice need to be explored in order to prevent this contamination and to help preserve the health of those reliant on groundwater for drinking. Spill and blowout

prevention are critical, and regular pipeline maintenance is required to prevent large scale spillage of product on the landscape.

Current provincial and federal regulations limit development on highly sensitive areas (i.e., near surficial groundwater, surface waterbodies, wildlife areas and SARA areas); however, such regulations should be reviewed to determine their effectiveness and further development should be prevented, if possible. All approvals should require a full biological assessment and EIA for all proposed sites in order to identify areas of concern, along with a commitment for long-term monitoring of the site and any nearby surface waterbodies that may be affected by exploration activity. Sensitive areas that are unavoidably impacted can be subject to compensation similar to the Alberta Conservation Association land swap program, in which oil and gas companies are encouraged to purchase tracts of natural land for conservation in order to make up for the land that has been impacted.

Water Quality

Protection of surface water quality involves a multi-pronged approach, including regular, long-term water quality monitoring, restoration and preservation of riparian areas and wetlands, minimization of stormwater and effluent loading and urban and agricultural best management practices. Long term monitoring programs should be implemented immediately on all moderately to highly impacted agricultural streams in the watershed. These data can then be used to identify problem areas, and they can also be shared with watershed groups who are looking to complete watershed management plans for their area.

Excess nutrient levels, as seen in many of the waterbodies in the Red Deer watershed, can come from a number of sources, including stormwater runoff, fertilizer application and livestock manure. These all contain high amounts of nitrogen and phosphorus, which, when added to the already naturally nutrient rich surface water, can lead to problems such as excessive algal growth. Excess nutrients can be controlled through treatment or infiltration of urban stormwater, biological nutrient reduction processes in wastewater treatment plants, prevention of over application of fertilizers by homeowners and agricultural producers, as well as manure management practices (see “Manure” section above). Preservation of intact riparian areas and wetlands will greatly assist in the reduction of nutrient rich overland flow before it reaches lakes and rivers within the watershed.

Bacteria and parasites, particularly *E. coli*, *Cryptosporidium* and *Giardia*, can cause serious health impacts to human populations. Their sources are the gastrointestinal tracts of mammals, including beavers, waterfowl, ungulates, livestock and humans. If these organisms are found in water samples, it is a definite indicator of fecal contamination; however, the exact source of the fecal matter is not readily apparent. In areas demonstrating high coliform and/or parasite levels, microbial source tracking can be completed to determine the exact species of mammal responsible for the contamination. This will identify what exactly within the watershed needs to be addressed, e.g., septage management or manure management, or whether it is simply a matter of high wildlife usage. Detection of these organisms in

waterbodies used for drinking water will be cause for concern for water treatment plants, which may subsequently require upgraded treatment for protection of public health.

Pesticides are also commonly detected in most surface water in Alberta. There are a number of compounds and their metabolites that may be detected but the testing is very expensive and so often is not completed in water quality analyses. Also of concern is the lack of Canadian and/or Alberta water quality guidelines for the majority of these compounds. It is hoped that more research will be done on these compounds to assist with the development of guidelines. In the meantime, annual monitoring of pesticides should be completed in all monitored waterbodies in the summer after a rainfall event; this will provide the best conditions for capturing pesticide runoff. Concentrations and number of detections can therefore be monitored closely and best management practices can be developed according to the types of compounds detected.

Water Quantity

This category is largely a data gap at this time. Some flow data is available for the mainstem but is largely missing for tributaries of the Red Deer River. Lake volume is also lacking across the watershed. A benchmark for flow rates and volumes must be determined in order to properly manage waterbodies and ensure that allocations do not exceed the minimum amounts required to preserve ecological integrity. This is highly specialized work that must be carried out by trained hydrologists or biologists. Assistance may be possible from Alberta Environment in this endeavor.

Wildlife Diversity

Wildlife populations are monitored to some extent, but indices of diversity have not been calculated on a subwatershed basis. Changes in land use over time can result in loss of wildlife biodiversity, which has many repercussions. Loss of biodiversity results in a loss of genetic diversity within populations and can mean that an ecosystem is less resilient to change. More biodiverse habitats generally indicate healthy and properly-functioning ecosystems. Given the lack of data in this area, more surveys and monitoring should be completed by federal and provincial governments, watershed groups or ENGOs, such as the ACA.

Land Cover

Native vegetation cover is important in preserving ecosystem health as well. In order to monitor the loss of natural vegetative cover, the AVI/NVI should be completed on a more regular basis (e.g., every 5 years) and watershed groups should lobby for the ABMI to return to the watershed on an annual basis. Sensitive areas with rare plants, SARA species or sensitive ecosystem conditions should be protected using Protective Notations or Parks status. Subwatersheds with good levels of natural cover should strive to preserve the remaining areas and those with highly impacted vegetation can look towards restoring some of the native plant populations through replanting efforts and removal of invasive species. Cleared land should be avoided due to the high risk of erosion from wind and water. Moreover, it has been shown that native/perennial plant cover provides buffer zones for aquatic

habitats in the landscape. Perennial cover is not only important to maintain biodiversity, but it can also improve water quality (DUC, 2004).

7.1 Stewardship Opportunities

This report should be used by landowners, stakeholders, municipalities and governments as a basis for future watershed management planning and for the implementation of BMPs. All regulatory agencies have a role to play in watershed management planning, and the Red Deer River Watershed Alliance must work closely with Alberta Environment to ensure success. Financial and technical support will be required from project partners. Local support and behavioural changes that are needed to improve water quality will come through communicating with and educating local residents and producers. The surrounding Counties and municipalities must be made aware of the importance of preserving watershed health, either through public consultation or advisement from the RDRWA. Important points to make would include the extensive costs associated with infrastructure and/or restoration to improve water quality, the loss of tax revenues from individuals no longer interested in living next to a “polluted” waterbody, the public health risks associated with toxic algal blooms and the subsequent loss of recreational value of the waterbody, among others. These effects would be extremely detrimental to the local economy due to the popularity of the waterbody.

Municipalities have a significant role to play in the protection and preservation of watershed health in many ways, including:

- Enforcement of Land Use Bylaws and increased bylaw presence;
- Creation of environmentally conscious Area Structure Plans and Municipal Development Plans;
- Harmonizing development bylaws with other municipalities and ensuring the highest standards are used;
- Regular and scheduled review and revision of bylaws as required;
- Support for watershed management planning activities, including staffing resources, establishing/maintaining ratepayer buy-in, continuation of education and awareness programs, newsletters and newspaper articles and establishment of a progressive approach with developers and realtors;
- Consider wider environmental reserves, municipal reserves, and minimum setbacks from waterbodies where possible;
- Stormwater management and low impact development initiatives for new developments, retrofitting options for older developments;
- Control/prohibit development in sloped areas due to the potential for stormwater runoff;
- Encouraging the use of Environmental Farm Plans and Homesite Assessments; and
- Begin private sewage inspections.

Cottage owners have many options available to them for helping to restore the health of the lake and watershed. Groups such as *Living by Water* and ALMS (among others) have many programs available to assist cottage owners with improving their land use practices, from how to better manage vegetation to fertilizing practices and water management. A list of stewardship groups can be found on the Alberta Stewardship Network website (<http://www.ab.stewardshipcanada.ca>).

On a community basis, initiatives such as shoreline clean-up days should be initiated by the Counties or by the RDRWA, and participation in programs like Alberta Water Quality Awareness Day and Farm WaterWatch should be promoted. Partnerships can be formed with the Alberta Fish and Game Association, Water's Edge Resource Group, the West Central Conservation Group, Alberta Riparian Habitat Management Society, Ducks Unlimited Canada, the Alberta Conservation Association and the *Living By Water* Project to host open houses, lake awareness days, riparian and wetland restoration sites and other opportunities to increase the level of education and awareness in the Red Deer River watershed. Associated with water quality improvement would be restoration and protection of wetlands and riparian areas, sewage and stormwater best management practices, nutrient management in residential areas, changes to the land use bylaws and IDP to further protect sensitive areas and limit development and public education and outreach regarding watershed health and beneficial land use practices. A recommendation for future management initiatives would be to implement a long-term annual sampling program for the Red Deer River and its major tributaries to monitor water quality and as a performance measure for watershed restoration programs. Sources of fecal contamination should be identified and quantified with appropriate methods, such as microbial source tracking.

A generic land use bylaw has been drafted by the Bow River Basin Council (BTBC) and is freely available for municipalities to review. It can be downloaded from the BRBC website (<http://www.brbc.ab.ca>).

7.2 Future Strategies

In the near future, the RDRWA should continue on the watershed management planning process to address some of the issues faced in the Red Deer River watershed. To proceed effectively, a watershed advisory committee (WAC) should be formed, followed by technical advisory committees (TACs) as required. The WAC, once formed, will need to formalize their mandate, include all involved municipalities and stakeholders, and identify grants and other funding and in-kind assistance sources to complete the watershed management plan and associated implementation activities.

Planning initiatives among Counties should be undertaken to harmonize legislation to protect watershed health. Outreach and education programs should focus on nutrient management best management practices for the agricultural and recreational cottage communities. Several data gaps should be filled, as listed above. Environmental Farm Planning should be undertaken on a large scale, which will likely involve a significant commitment from county agricultural fieldmen. The integrated watershed management plan for the Red Deer River should be linked with the larger planning initiatives in the South Saskatchewan River basin to ensure consistency and harmony among plans.