

## Lower Qu'Appelle Watershed – Quality and Quantity Review March 17, 2018

We have an obligation and responsibility to actively restore and protect our watersheds both in quality and quantity.

We don't own the water in our local environments, the water comes in from our neighbours and we pass it along to our downstream neighbours. So we have the responsibility for our own well-being, our neighbours and the next generations to act more responsibly and to act together.

Referring to the Government of Alberta's surface water quality program;

- Water is not just a resource it is a life source.
- They have developed a strategy "Water For Life" in 2003 after experiencing a multi-year drought.
- 3 main goals
  - Safe and secure drinking water – funding
  - Healthy aquatic ecosystems – essential to sustain sources of water for future generations.
  - Reliable, quality water supplies for a sustainable economy – water is finite resource, need to be more efficient in managing sources and supplies than ever before.
    - Examples – California US, Cape Town South Africa

Restoring and protecting our watersheds needs to be looked at in a number of ways:

- Flooding
- Droughts
- Nutrient Enrichment
- Invasive species
- Extreme weather events – higher severity and frequency

The above impacts to water quality and quantity affect different aspects of our environment and economy:

- Damage to infrastructure – roads, bridges, structures
- Strain service delivery – road closures
- Impact property values
- Interrupt supply chains
- Affect commodity prices

It is evident that restoring, protecting and managing our water is and will be challenging. The economy and the environment are very much intertwined which makes protecting our water sources of utmost importance. That is why we need to bring together our resources such as our universities, polytechnic institutions, all levels of government, First Nations and industries to:

- Establish funding for research and implementation
- Provide education and support
- Build policy
- And to adapt together

The state of the economy may not favour funding and support of restoring our watersheds but once the damage is done, it takes much longer to correct the damage or it is irreversible. This isn't something we can put on the back burner.

### **Current state of water quality as outlined by Lower Qu'Appelle Watershed Stewards (LQWS):**

On July 20, 2017, WSA and Saskatchewan Ministry of Health issued an advisory indicating that people should avoid contact with algae blooms. Algae blooms occur during calm, hot weather in lakes with shallow, slow moving or still water that have the required high level of nutrients to promote this bloom.

Direct consumption of algae could result in red skin, sore throat, cramps, nausea, vomiting and diarrhea. Caution is also recommended with consuming fish and shellfish in these areas. The algae can also be harmful to pets and livestock.

It is well known that these lakes are very nutrient enriched lakes, which has increased over time. The effects of the increasing enrichment was described in the 1960s and 1970s by federal government scientists. The results were used by the Qu'Appelle Basin Study Board in a 1972 report, which recommended waste management improvements.

Since then, research by U of R and other universities, have demonstrated the effects of urban and other waste sources on these lakes. The lakes receive waste and nutrient contributions from all types of sources:

- Crop and livestock production
- Waste from waterfront property
- Waste from upstream communities – City of Regina, Moose Jaw, Lumsden, Lipton

Effective ranking of all these nutrient contributors to the lakes for targeted management is critical.

The top priority of the LQWS Qu'Appelle River Basin Research & Monitoring Committee is determining what nutrient sources must be managed more effectively in order to better protect water quality. Their opinion is that management of these sources will more likely be done through education and financial incentives instead of through government regulation. Therefore, buy in from stakeholders, i.e land owners, will be critical to achieving the timeliest results.

### **LQWS Research and Monitoring Plan Projects:**

- Monitoring of nutrients on the major tributaries into the River to determine significant nutrient contributions from the overall basin. (Currently underway by Water Security Agency).
- Sampling along the Qu'Appelle River and its tributaries from the outlet of Buffalo Pound Lake to the outlet of Katepwa Lake. The primary purpose of this sampling effort is to quantify reductions in nutrient loading expected after upgrades to Regina's wastewater treatment plant.
- A report was completed on Municipal Waste Water – an inventory of sewage nutrient contributions from 53 communities other than the City of Regina was completed in March of 2017.
- Ministry of Agriculture partnered project – review nutrient contributions from agriculture operations and wetland drainage. It is believed that most of the nutrients are coming from Agriculture operations, in our watershed along with Upper Qu'Appelle and Moose Jaw.

The Lower Qu'Appelle Watershed Plan is one of the first watershed plans to set water quality targets for the lakes within the Qu'Appelle Basin. It is evident that they are working towards finding out where to target the restoration efforts.

But there is more that can be done and there are more water quality and quantity issues to deal with than just the high nutrient enrichment.

Sources of impact to our lower Qu'Appelle watershed:

- Quill Lake
  - Concern that with the potential impacts to water quality are not fully known and not enough is being done to investigate all options
  - Impact to bird sanctuary, fish and wildlife populations, Portage la Prairie gardens (supply Campbells soup) at their maximum allowable salt concentration for irrigation
  - Lack of transparency in the approval process
  - Lack of public and First Nations consultation
- Upstream community wastewater
  - Regina, Moose Jaw, Lumsden, Lebret and other municipal wastewater
  - City of Regina - Existing infrastructure capacity limitations addressed?
- E.coli contamination and beach closures
  - For long term recovery of the river and lakes, sewage bypassing is not acceptable.
- Proposed Potash Mines
- Illegal Drainage
- Shoreline Properties
  - Removal or disturbance to riparian areas
    - The zone between aquatic and terrestrial areas of a landscape.
    - Erosion protection
    - Traps sediment and nutrients from surface runoff – improves water quality for downstream lakes and rivers
    - Source of food for fish habitat
    - Helps to regulate water temperature
  - Septic infrastructure
    - Aging and leaking septic tanks
    - Lack of policy to regulate and enforce

With all the sources impacting water quality and quantity, it is evident that better management is required. Better management through:

- Research – short and long term solutions
- Policy
- Enforcement for non-compliance
- Education
- Economy vs environment

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**Solutions – short and long term**

Long Term:

- Research and funding
  - Water management - a process should be established to investigate options for reducing future flood risk, while preventing over-use during drought conditions.
  - LQWS projects.
  - Quill Lake hydrological modelling for the prairie landscape. University of Saskatchewan, John Pomeroy is the only model that can model this landscape.

Example. – Lake Winnipeg Basin Program – funding for freshwater management with focus on:

- Reducing nutrient pollution;
- Enhancing collaboration to protect freshwater quality through the basin; and
- Strengthening collaborative-governance opportunities and supporting enhanced engagement of Indigenous peoples in addressing freshwater issues.

Short Term:

- Illegal drainage
  - Enforcement when education is not resulting in timely action for restoration
- Innovative technology
  - Three Mile Lake, Ontario – Ultrasonics to control Blue-Green Algae Trial
- Riparian areas
  - Education & funding
- Septic Infrastructure
  - Education, funding & enforcement
- Cottage Country
  - Education
    - Phosphate free shampoos
    - Reduce gas spillage into lakes
    - Low flush toilets
    - Katepwa Poplar or other riparian trees- play an important environmental role on the farm in curbing wind erosion, reducing greenhouse gases, providing wildlife habitat, and protecting riparian zones

## **Quill Lake**

In regards to the recently withdrawn 'Common Ground Drainage Diversion Project' which would redirect fresh and saline water, from Kutawagan Lake into Last Mountain Lake and the Lower Qu'Appelle Lakes.

This project is more or less just on hold, the threat and impacts of flooding have not gone away.

The concern with this project is that the potential impacts to water quality are not fully known to the public and thorough analysis of the short and long term environment impacts have not been completed. There was and is widespread concern regarding the proposal due to a lack of transparency of the project, public communication and lack of consultation with Saskatchewan's citizens and Indigenous peoples.

Information on the Province's assessment of the project was eventually released in response to Freedom of Information requests. In Dave Sutherlands review of the released information, it was found that the basis for approving the project was not adequate:

- The scientific basis for approving the acceptability of discharging diverted Kutuwagan basin water into the Qu'Appelle River water bodies was found to be incomplete, including hydrology to confirm the diversion discharge rates and appropriate water quality protection criteria.
- The projected but unsubstantiated diversion volumes likely would provide minimal relief to Quill Lakes flooding, and the available information on the proposed diversion ditching system would not justify the potential impacts on the wetlands.

A broader selection of options is required. With the suspension of the project, there is the opportunity to select more suitable options such as:

- reduction of drainage off agricultural lands,
- upstream surface water storage,
- requiring potash mines to utilize the Quill Lake water as part of permit to construct and/or operate,
- deep well injection.

## **Quill Lake Approval Process:**

The process of determining whether the Common Ground Drainage Diversion Project was eligible for formal environmental assessment was flawed in various ways. It was not transparent: information used to make the Determination under the *Environmental Assessment Act* was not made available to other parties prior to the decision, nor has critical information for permitting decisions been made available. When information was released, following the Determination, it was not clear how the decision criteria were met, and neither the decision makers nor the applicants responded to written questions. Perhaps most importantly, other options for reducing flooding were not evaluated, so that a balance between benefits and environmental costs could be determined.

Application of the federal environmental assessment process was requested by various public project reviewers. No decision was made by Environment Canada on whether or not a formal federal review was

needed, but Environment Canada staff have stated that application of a regional, rather than single project review process is being considered, in consultation with provincial agencies. A revised process should be designed to be as efficient as possible, so as not to delay flood relief benefits, without compromising the rigour of the decisions or public opportunities to review and provide input to the decisions.

Provincial agencies such as the Water Security Agency should now apply the accumulated knowledge of hydrology and quality from various basin sources to a review of options.

### **Wastewater from upstream communities:**

City of Regina - Reported that it can handle a major rain event, what is the return period rain event that it is designed to handle?

Status of Moose Jaw, Lumsden, Lebret? New guidelines but without funding, it is nearly impossible for small communities to upgrade to meet the higher requirements.

Monitoring and enforcement in non-compliance – so many times communities receive approval to complete emergency discharges of untreated or not fully treated wastewater without consequences.

### **E.Coli Contamination:**

In 2014 an E.Coli contamination occurred causing the beaches to be closed and warnings issued to the public in the Lower Qu'Appelle watershed.

There were a number of factors that could have, by themselves or together, caused the beach closures due to high *E. Coli* levels.

- Flushing of nutrients off the surrounding lands,
- the overflow of storm drains (especially where cross-connected with sewer lines),
- Regina and other community sewage system overflows,
- and re-suspension of contaminated lake bottom sediment were the most likely bacteria sources.

Unfortunately, monitoring of the River and tributaries over that short timeframe, and following a 2015 rainfall event, was not done effectively enough to identify the most likely contributors.

Estimates by the WSA of the rate of travel of River water during the 2014 rain event indicate that it was unlikely that the slug of Regina bypassed sewage could have reached Katepwa Lake, although Regina Beach was more likely.

- However, direct monitoring of *E. Coli* levels from of all future potential contributors is needed to determine the cause of beach closures or other contamination events.

Of course, the risk to River water uses and to the long-term recovery of the lakes from sewage bypassing is not acceptable, and that risk is being reduced through the City of Regina's sewage system upgrades, although the risk of beach closures has still not been adequately assessed.

### **Yancoal:**

It is unclear what the status of this project is but there were significant concerns from local stakeholders and downstream stakeholders.

Concerns: potential drinking water source impacts, salt spray contamination, lack of adequate study

Measures such as assessing potential future potash mine use of water from the Quill Lakes watershed should be included in formal project review requirements.

### **Illegal Drainage:**

Work done by John Pomeroy and associates, through the University of Saskatchewan demonstrates that agricultural land drainage can contribute significantly to runoff volumes. The water holding and evaporation capacity of lands is diminished by systems designed to expeditiously drain snowmelt and summer precipitation into the nearest waterbodies. The infilling of wetlands without restoration permanently reduces water storage capacity. The effects of agricultural drainage throughout the Quill Lake and all watersheds needs to be quantified, so that the potential contribution to runoff reduction can be quantified and compared with other flood reduction options.

In November 2016, Water Security Agency (WSA) introduced amendments to *The Water Security Agency Act* that will change how agricultural drainage complaints are handled in Saskatchewan.

These changes mean a quicker resolution of requests for assistance on drainage issues for producers and encourages producer co-operation within their own networks. This process is focused on ensuring drainage projects can be permitted when they have downstream landowner permission to drain and are draining into an adequate outlet.

There have been several pilot drainage projects within the province, two pilot projects are taking place within the Lower Qu'Appelle Watershed.

It is unclear what efforts by Water Security Agency are being made to quantify agricultural drainage management potential. Ducks Unlimited Canada have indicated an interest in applying its information base on drainage works, in collaboration with Water Security and the University of Saskatchewan. A high priority needs to be put on this work, so that the potential benefits of fulfilling the Province's policy on eliminating illegal drainage and reducing approved drainage can be assessed.

Wetlands also greatly affect water quality:

Water accumulates in the spring, organic matter breaks down turning the phosphorus into soluble phosphorous. However if the water is drained the phosphorous before it is broken down is also conveyed to the downstream water body; further increasing the nutrient levels.

Trees and plants are also dormant in the spring, so no nutrients are absorbed by the plants and trees when the snow begins to melt and drains overland. The wetlands gave the trees and plants an opportunity to absorb these nutrients.

Sources of Information:

- Dave Sutherland, Scientist, Chairmain of the Lower Qu'Appelle Watershed Stewards Research and Monitoring Committee
- Lower Qu'Appelle Watershed Stewards
- Calling Lakes Ecomuseum
- Regional Centre of Expertise on Education for Sustainable Development
- Parcs Update #75, July 2017
- Government of Alberta – Water for Life Strategy