

Bow River Phosphorus Management Plan (PMP) Setting the Context

Heightened nutrient levels along the Bow River downstream of Calgary have long been a concern. In the 1970s and 1980s, high nutrient levels resulted in excessive aquatic plant growth resulting in low dissolved oxygen and the occasional fish kill. In the past, the high nutrient levels were primarily managed by placing concentration limits on point source discharges. The decision (in 2005) to discharge treated wastewater from Strathmore to the Bow River was a turning point. The environmental approval for the activity was successfully appealed to the Environmental Appeals Board (2007), who in their ruling emphasized that such decisions ought to be managed in light of their cumulative environmental impacts, particularly given that water quality guidelines were being exceeded.

An interim policy on effluent limits was released by Alberta Environment in the following year (2008) that affected discharges from Calgary, Heritage Pointe and Strathmore. This policy required that a regional nutrient load reduction plan be developed for reaches at risk of exceeding water quality guidelines. As the format of the nutrient load reduction plan was uncertain, a water quality modelling project was initiated to understand the risks to water quality from a regulatory perspective. It was found that if the regulated entities discharged phosphorus at their approved limits, the water quality guidelines for phosphorus would be frequently exceeded. The results further showed that in the spring and summer months, the phosphorus discharge from non-point sources would be similar in magnitude to the approved limit from point sources.

Also in 2008, the Bow River Basin Council (BRBC) released a Water Management Plan (WMP) that contained reach specific water quality objectives (WQOs) for a number of variables including phosphorus. The WQOs were established to maintain or improve current water quality conditions in all reaches. Much of the data used to establish the WQOs was based on water quality data from 1983 – 2005. WQOs were also developed using water quality modelling output, based on data from 1990 through 2007. This work has been highly influential and beneficial in setting limits for phosphorus in the Bow downstream of Calgary.

The current Bow PMP is based on more recent data, through 2011, and includes data from The City of Calgary on the Bow mainstem (3 sites) and tributaries such as Nose and Fish creeks, plus provincial monitoring sites as per earlier studies. Along with the City data, new in the current study is water quality data provided by Alberta Agriculture and Rural Development, with their focus on rural areas. Within the study reach, there are now five mainstem sites with data to describe current conditions in the Bow. These sites range from the Bears paw Dam to downstream at Cluny. Additional sites outside the study reach and available for wider watershed description include the Bow River at Cochrane, and downstream at Ronalane, for a total of seven sites. The BRBC (2008) Water Management Plan was based on three monitoring sites, and within the current study reach, data was available from just the one Bow River site, at Carseland.

The Bow River Water Quality Model is now updated with data through 2011, and now includes the additional mainstem and tributary monitoring sites from the City of Calgary. Updated data has also been incorporated from The City of Calgary wastewater treatment plants (WWTPs), as well as the plants at Strathmore and Okotoks. Additionally, the City of Calgary is finalizing an updated stormwater model with data through 2012-13, which will provide much new and beneficial data compared to the current stormwater model which is based on data from 2002-03. This too will be incorporated into the updated and expanded Bow River Water Quality Model.

With the results of the updated and expanded monitoring network and water quality model, we are now able to provide better predictions of management actions and environmental responses throughout the study reach, both within Calgary and downstream, for mainstem characteristics as well as impact from tributaries. Our ability to understand and manage both point and nonpoint sources of phosphorus have now increased.

Current levels of phosphorus within the Bow River are generally acceptable. However, levels will rise with future population growth and increased human activities. As well, there are concerns being raised concerning downstream loadings into the wider Saskatchewan River. Should the modelling and on-going monitoring point to the need for investments for additional phosphorus controls, now is the time to plan. Application of better management practices

(BMPs) and increased investments in municipal infrastructure (wastewater treatment and urban stormwater) will likely be required. Should there be the need for substantial layout of resources, sufficient lead time (in years) is required to allow for orderly investment decision making.

Current water quality conditions on the Bow River are generally good. Now is the time to proactively ensure conditions remain so, for all human uses and to maintain a healthy and diverse aquatic environment in the Bow River.

The Bow River Phosphorus Management Plan Initiative

Given the Government of Alberta policy to implement cumulative effects management, a planned approach that manages phosphorus inputs from multiple sources was considered appropriate to address occasional exceedences of phosphorus on the Bow River between the Bears Paw and Bassano dams. Stakeholders representing both point and non-point sectors were gathered in mid-2011 to communicate these findings and to develop a phosphorus management plan to collectively manage phosphorus levels within the Bow River.

The Shift to a Cumulative Effects Management System

How does this project fit with the Province's planning approach?

The vision of the Alberta Land-use Framework is that Albertans work together to respect and care for the land as the foundation of our economic, environmental and social well-being.

Through regional planning, as well as other initiatives, Alberta is shifting to a more effective and efficient management system that considers the cumulative effects of all activities and improves integration across the economic, environmental and social pillars. This system must adapt to place-based challenges and opportunities as well as aid decision-makers in understanding the bigger picture.

This direction is the foundation of the Land-use Framework, in which the Alberta government commits to manage the cumulative effects of development on air, water, land and biodiversity at the regional level. Cumulative effects management focuses on achievement of outcomes, understanding the effects of multiple development pressures (existing and new), assessment of risk, and collaborative work with shared responsibility for action and improved integration of economic, environmental and social considerations.

To achieve the desired outcomes under the Land-Use Framework, management frameworks will be developed for air, water, and biodiversity. These are intended to provide context within which decisions about future activities and management of existing activities should occur. The management frameworks do this by confirming regional objectives and establishing ambient environmental triggers and limits for key indicators.

In the South Saskatchewan Regional Plan (SSRP), a surface water quality management framework will provide triggers and/or limits for a range of water quality parameters, including phosphorus. The framework will set limits at which the risk of adverse effects on environmental quality is becoming unacceptable. These are clear boundaries in the system not to be exceeded. Triggers are set in advance of limits as early warning signals and support proactive management.

The Bow River Phosphorus Management Plan is a prototype to test and demonstrate how Albertans can work together to address an evolving environmental issue from both point and non-point perspectives, and to demonstrate how management frameworks could be implemented through collaboration and shared stewardship.

How does this project align with Alberta Environment and Sustainable Development Goals and Objectives?

Alberta Environment and Sustainable Resource Development (ESRD) is a part of Alberta's integrated resource management system, with a focus on air, land, water, biodiversity and climate change.¹ The ministry manages the cumulative effects of human activity to achieve Albertans' desired future. The ministry also oversees the development, implementation, review and amendment of regional plans under the Land-use Framework. To accomplish its mission, the ministry collaborates with Albertans and representatives of communities, other governments and industry across jurisdictions – locally, nationally and internationally. The ministry commits to Albertans that decisions are informed, responsible and accountable, and respect the right mix of opportunities and benefits to achieve desired outcomes.

The ministry's core business is leading and enabling the achievement of desired environmental outcomes and natural resource sustainable development to provide economic and environmental benefits and to enrich Albertans' quality of life.

Goal One, from ESRD's 2013-2016 Business Plan, states: Desired environmental outcomes for air, land, water and biodiversity are achieved.

- Stewardship, a shared responsibility among citizens, communities, governments and industries, is key to achieving an outcomes-based cumulative effects management system as a basis for attaining desired environmental outcomes.
- Developing a stewardship culture rests on increasing knowledge, motivation and capacity through collaboration, voluntary action and clear rules.

Lots of work, how to get it done?

Getting the right people to the table

ESRD has generally addressed water quality issues through its regulatory system of approvals. This works well for point source discharges of water into water bodies, but what about non-point sources of discharge, particularly run-off from the land into rivers?

The cumulative effects approach provides the opportunity to bring together not just the regulated community, but all sectors that have an impact on, and are impacted by, phosphorus levels in the Bow River.

Using networks such as the Bow River Basin Council, Alberta government staff, and other contacts, a list of possible participants was generated, and these people were invited to an initial stakeholder meeting in June 2011. A Social Network Analysis Pilot Project (SNAPP) further identified people interested in phosphorus, and helped us understand how these groups and individuals were connected to one another.

In the months following the initial June 2011 meeting, a Terms of Reference for the development of the Bow River Phosphorus Management Plan was developed by the stakeholders, and a Steering Committee of twenty members was struck.

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Participatory Decision Making: Task Teams

Tackling phosphorus is complex, requiring a lot of work. To make this manageable, the work needed to be delegated to subject matter experts who understand the problem and their sectors. The stakeholders involved in this project bring varying skills and expertise that align along distinct subject matter lines. They are drawn from urban and rural sectors representing both point and non-point sources of phosphorus.

At the June 2012 Steering Committee meeting, three task teams were formed to develop and analyze strategies and actions to recommend to the Steering Committee. These teams were made up of members of the Steering Committee, Stakeholder Advisory Group, and other experts as required for the task. Each of the teams – Urban Point Source, Urban Non-point Source and Rural Non-point Source – is chaired by a Steering Committee member. The teams have built their work on a risk assessment done by the steering committee.

Additional expertise was needed to address the technical data and communications needs as the plan progresses. A data acquisition team was struck early on, and through the work of this team, a water quality data report was completed. This brings together and updates data sets from across the reach.

Decision Support

How will the Steering Committee determine how effective the recommended strategies and actions will be? Several tools are available.

Water quality models have been updated to allow the Steering Committee to choose scenarios to run, and in 2013, ESRD's Load Duration Curve (LDC) tool was updated. The updated tool computes target and observed phosphorus loads in selected places of the Bow River during different times of year as the flow regime changes. By combining the information about the amount of water flow and the water quality objectives or triggers, this tool can calculate the maximum allowable load in the river.

The Investment Framework for Environmental Resources (INFFER) is a decision support tool used to assess and prioritize projects to address diverse environmental issues. The Land Stewardship Centre is working with the Steering Committee to assess the strategies and actions being proposed. From this, a baseline benefit/cost index is being developed that can be used to compare a variety of program options to assist the Steering Committee, and ultimately policy makers, to prioritize and allocate limited financial and human resources in a cost effective manner.

What's next?

Once the plan is ready to be launched, an implementation team will be struck and work plans to implement the strategies and actions will be developed. As this is a prototype for the implementation of a cumulative effects management system to address chronic environmental issues, the lessons learned over the course of the planning process will be collected, analyzed and shared with other projects to further refine and clarify what it means in the Alberta context to work collaboratively with all applicable sectors to ensure that we respond effectively to maintain and improve our environment.

What is the schedule and how do I get more information about the Bow River Phosphorus Management Plan?

A draft plan is to be completed by March 2014. Stakeholder constituencies will be engaged in discussions about the strategies and actions recommended in the plan, and the role of their agencies to move toward implementation.

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