

# Surface Water Quality Management Frameworks

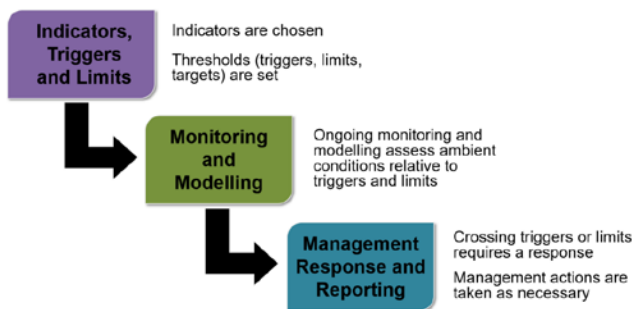
In Alberta, our quality of life depends on having clean water for the environment, for our communities and for our economic well-being. Our rivers and streams provide source water for a growing population, habitat for aquatic life, irrigation for crops, drinking water for livestock, and support recreational opportunities and traditional land use activities.

Water quality is affected by a wide range of natural and human influences. Land use activities in a watershed will collectively influence water quality, and must be managed collectively. A cumulative effects management approach takes into consideration multiple activities in an area, and establishes an approach to ensure our environment is protected and sustained into the future.

## What is a Surface Water Quality Management Framework?

A surface water quality management framework (SWQMF) establishes an approach to monitoring and managing long-term cumulative impacts of human activities on water quality in the mainstem rivers in a region. A SWQMF is just one component of a larger environmental management system manages development activity to ensure water quality is protected.

Figure 1: Management Framework Approach



Each SWQMF has a regional objective that reflects the needs of the region and determines how surface water quality should be managed. For example, the following objective is from the South Saskatchewan Region SWQMF:

**“Water quality in the Bow, Milk, Oldman, and South Saskatchewan rivers is managed so current and future water uses are protected.”**

## Indicators, Triggers, Limits and Targets

A SWQMF relies upon the monitoring of a core set of water quality indicators. Indicators are aspects of water quality that

can be measured year after year and used to understand the condition of a river over time.

Indicators are selected so that they are responsive to the human activities or pressures in the watershed. Other factors that are considered include: the amount of historical data available from the Long Term River Network (LTRN) monitoring stations, whether historical data has shown emerging trends, and whether there have been past exceedances of the Environmental Quality Guidelines for Alberta Surface Waters.

| Examples of Common SWQMF Indicators           |                            |                               |
|---|----------------------------|-------------------------------|
| General                                       | Ions                       | Nutrients                     |
| Suspended and dissolved solids, turbidity, pH | Chloride, sodium, sulphate | Phosphorus, nitrogen, ammonia |
| Organic                                       | Biological                 | Metal                         |
| Carbon, pesticides                            | E. coli                    | Lead, mercury, selenium, iron |

In a framework, indicators are assessed against management thresholds to determine whether or not a regional objective is being met. There are three types of management thresholds:

**Triggers** are values used to assess whether water quality is changing over time. Triggers serve as a signal. If crossed, they serve as prompt for data to be assessed to evaluate whether there is a potential surface water quality issue. Triggers are site specific, set using historical baseline monitoring data for each monitoring station.

**Limits** are values that identify concentrations where the risk of adverse effects is unacceptable, and are the same at each water quality station. They are set using the most stringent quality guidelines from the [Environmental Quality Guidelines for Alberta Surface Waters](#), a set of guidelines that identify the maximum concentrations allowable for different use categories, such as protection of aquatic life, recreation and aesthetics, and agriculture.

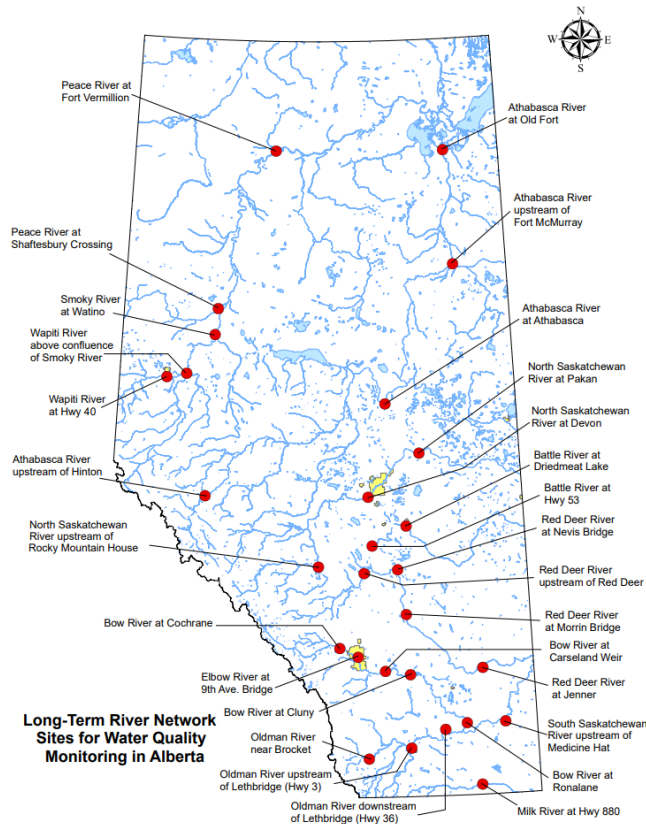
**Targets** describe desired future conditions, usually for water quality improvement, and can guide management direction and inform decisions about existing and future activities.

## Monitoring Surface Water Quality

Managing surface water quality relies on consistent long-term monitoring. Monitoring data is used to assess the condition of a river as compared to the management thresholds set for indicators identified in the SWQMF (e.g. triggers, limits and targets). Alberta has a comprehensive water quality monitoring network that includes monitoring of

larger rivers and their tributaries. One of Alberta Environment and Parks' surface water quality monitoring programs, the Long Term River Network, produces the publicly available dataset of water quality that is the primary source of data used for the development and implementation of a SWQMF.

Figure 2: [Long-Term River Network](#)



## Evaluating Water Quality Using Management Thresholds

Each water quality indicator is routinely monitored in the river, and is assessed each year in relation to the management thresholds. Exceedences of a trigger or limit prompt a management response.

## Management Response

SWQMFs identify the steps in a management response process that will be taken if monitoring data shows that a surface water quality trigger or limit has been exceeded. These steps include verifying the data, investigating potential causes of trigger or limit exceedences, and identifying management actions that can be taken to address the cause of exceedance.

Investigation informs the identification and selection of management actions. Alberta Environment and Parks leads the identification and selection of management actions, and will identify parties, including other provincial government departments and agencies, local governments, Indigenous Peoples, industry and other stakeholders, to work collaboratively in this process.

There are various management actions that can be utilized ranging from education and stewardship to regulatory change, becoming more stringent when thresholds are exceeded. Management actions can include:

| Stewardship Action  |
|---|
| <ul style="list-style-type: none"> <li>• Increased education (e.g. education programs to reduce river contaminants)</li> <li>• Application of economic instruments (e.g. trading of load allocation)</li> </ul>   |
| Collaborative Action  |
| <ul style="list-style-type: none"> <li>• Development of new municipal programs, planning and policies (e.g., water saving devices, what not to pour down the drain, green space, low impact development, riparian protection programs)</li> <li>• Introduction of new mechanisms for managing non-regulated sources</li> <li>• Load apportionment and other mechanisms for management</li> <li>• Additional monitoring and/or monitoring network improvements</li> </ul>  |
| Regulatory Action   |
| <ul style="list-style-type: none"> <li>• Amending existing approvals, or limiting new approvals</li> <li>• Developing or updating codes of practice</li> <li>• Issuing Environmental Protection Orders</li> <li>• Restricting further wastewater effluent sources or reducing existing wastewater effluent sources to allow for new sources</li> <li>• Enhanced policies, plans and performance standards for new and existing pollution sources</li> <li>• Facility-enhancements to address indicators of concern</li> </ul> |

## Reporting

Annual *Status of Surface Water Quality* reporting provides the public and decision-makers with information on indicator conditions and where they fall in relation to thresholds. A report on the *Status of Management Response* is released every two years to provide information on any investigations and management actions undertaken by Alberta Environment and Parks.