



Mackenzie River Basin

State of the Aquatic Ecosystem Report 2003

by the Mackenzie River Basin Board

*aquatic
ecosystem*



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Legend

- | | | | |
|-----------------------|--------------------|----------------------------------|----------------|
| Mackenzie River Basin | Sub-basin Boundary | Community | Major Roadways |
| 1 Athabasca Sub-basin | 3 Liard Sub-basin | 5 Great Slave Sub-basin | |
| 2 Peace Sub-basin | 4 Peel Sub-basin | 6 Mackenzie Great Bear Sub-basin | |

According to Dene mythology, Denendeh, the homeland of the Dene people and an area that overlies much of the Mackenzie River Basin, originated from the fallen body of an Arctic giant, who was slain in battle. The giant's fallen body stretched from south of present-day Lake Athabasca in the southeast to the Bering Strait in the northwest. Many different landmarks in Denendeh came to be associated with different parts of the giant's fallen body. For example, the giant's blood flow became the Mackenzie River and its tributaries.

The giant's body symbolizes the connections among all the different parts of the Mackenzie watershed. The image of rivers arising from its blood embodies the notion of water as a life force, or as a substance that is essential for supporting our livelihoods and in sustaining our lives.

(adapted from Coutu and Hoffman-Mercredi 1999. Inkonze: the stones of traditional knowledge – a history of northeastern Alberta thunderwoman ethnographics).



The Board's Vision: A healthy and diverse aquatic ecosystem
for the benefit of present and future generations.

Mackenzie River Basin Board Secretariat, Box 1349, 95 Conibear Crescent, Fort Smith, NT X0E 0P0

June 2, 2004

To: The Honourable David Anderson, Minister of Environment, P.C., and M.P., Canada
The Honourable Andrew Mitchell, Minister of Indian Affairs and Northern Development, Canada
The Honourable Pierre Pettigrew, Minister of Health, Canada
The Honourable Lorne Taylor, Minister of Environment, Alberta
The Honourable Bill Barisoff, Minister of Water, Land and Air Protection, British Columbia
The Honourable Brendan Bell, Minister of Resources, Wildlife and Economic Development, Northwest Territories
The Honourable David Forbes, Minister Responsible for Saskatchewan Watershed Authority, Saskatchewan
The Honourable Jim Kenyon, Minister of Environment, Yukon

RE: MACKENZIE RIVER BASIN STATE OF THE AQUATIC ECOSYSTEM REPORT 2003

The members of the Mackenzie River Basin Board (MRBB) are pleased to present, in accordance with Section 2.0 of the Mackenzie River Basin Transboundary Waters Master Agreement, the first Mackenzie River Basin State of the Aquatic Ecosystem Report 2003 (SOAER).

This comprehensive report will:

- provide Ministers with an understanding of the current state of the aquatic ecosystem of one of the largest river basins in the world;
- inform basin residents and decision-makers about the ecological integrity of the entire Mackenzie River watershed;
- identify gaps and inconsistencies in knowledge and monitoring practices and point towards possible improvements; and
- highlight the value of Traditional Ecological Knowledge (TEK) as an integral component in ecological assessment.

As a multi-jurisdictional Board, the MRBB is very pleased with the way individuals from several agencies came together to collaborate on this report, drawing from existing research and TEK reports. These efforts have resulted in a document that is relevant and useful for decision-makers, residents and others with an interest in the Mackenzie River Basin.

A major finding of the report is that the aquatic ecosystem in the Mackenzie River Basin is generally healthy. Nevertheless, the report raises concerns about a number of information gaps, environmental trends, and monitoring and management practices. After reflecting on these findings, the MRBB felt it worthwhile to provide comments on these findings. The attached Observations and Advice is directed towards the MRBB's member jurisdictions, and aboriginal organizations, local governments, industries, and interested individuals.

The MRBB hopes that future decisions regarding water management within the Mackenzie River Basin will consider both the findings of this first SOAER and the Observations and Advice provided herein. For its own part, the MRBB will be using the report to craft its own business plan for the next four years. As part of its on-going cycle of reporting, the Board will again assess the state of the Mackenzie River Basin and those actions taken to address water issues in its second Mackenzie River Basin State of the Aquatic Ecosystem Report to be produced in five years.

We hope you enjoy reading this document.

Yours Sincerely,

Jim Vollmershausen
Chairman, Mackenzie River Basin Board

Observations



and Advice arising from the first Mackenzie River Basin State of the Aquatic Ecosystem Report 2003

The following summary presents the current priority issues facing the Mackenzie River Basin with recommended actions to address these issues.

These issues were identified through the preparation of the first Mackenzie River Basin State of the Aquatic Ecosystem Report 2003.

Improved Knowledge

An overall observation recurring throughout the Mackenzie River Basin State of the Aquatic Ecosystem Report 2003 (SOAER) is the requirement for improved knowledge. Specifically, there is a need for improved environmental monitoring programs, compatible data collection methods, and a comprehensive evaluation of the data in order to transform numbers into knowledge and understanding.

Traditional (Aboriginal) Environmental Knowledge

Traditional aboriginal and local environmental knowledge provides a broad understanding of the inter-relationship of air, land, water, plants and animals and represents an important source of information available for producing state of the aquatic ecosystem reports. Much of the traditional and local knowledge used in this report was gathered prior to 1995.

The next state of the aquatic ecosystem report would benefit from complete and up-to-date reporting on traditional and local knowledge (TEK). Gaps in reporting on TEK should be identified and, where needed, steps taken to fill them. This up-to-date information is critical for presenting the observations of aboriginal people and forming a complete picture of the state of the aquatic ecosystem. MRBB member jurisdictions should support the aboriginal community in

collecting up-to-date traditional and local ecological knowledge within their respective jurisdictions. The MRBB will then be able to incorporate this knowledge into its next SOAER.

In addition, the MRBB believes that all environmental studies and assessments undertaken within the Mackenzie River Basin should determine the need for traditional and local ecological knowledge as an information source. This type of knowledge provides additional information and a valuable perspective on a wide range of environmental issues.

External Sources of Pollution

The assessment of the state of the aquatic ecosystem indicates that there are external influences that are impacting the condition of the Mackenzie River Basin. The long range transport of contaminants and their deposition in the basin is contributing to concerns over the quality of water and the health and quality of country foods. Governments should continue research to understand the impacts of these external sources and, where required, work within Canada and the international community to resolve them.

Climate Changes and Variability

In common with many other regions around the world, climatic changes and variability are being observed in the Mackenzie River Basin. A warming trend and changes in precipitation patterns during the last half of the 20th century has affected river

flows, snow packs, ice formation and melt timing, permafrost depths and plant, animal and human communities.

Some excellent research projects aimed at better understanding climate change and variability have, and continue to, take place. As this issue is critical to the residents of the Mackenzie River Basin, all levels of government should intensify research efforts and cooperation to increase our understanding of climate changes and variability that the Mackenzie River Basin is likely to experience. Additional research is needed to better understand how expected climatic changes in the basin will affect river flows, lake levels, habitat, pollutant concentrations and other important attributes of the aquatic ecosystem. Governments, industries and individuals should consider this new information when developing strategies to manage water resources and conserve the aquatic ecosystem.

Water Quality

Significant work has taken place in the Mackenzie River Basin since the 1980s to address water quality issues, and there have been some improvements. Water quality in the Basin is generally good. However, the MRBB found it very difficult to provide a uniform evaluation of the state of water quality across the basin. Jurisdictions monitor and report on water quality in different ways. Some of these differences are required because of specific issues of concern. However, there are some changes that would improve the ability to evaluate and compare water quality across the entire basin.

The Technical Sub-Committee of the MRBB should investigate this issue and provide detailed recommendations to the MRBB and its partners. The bilateral agreements should also address water quality monitoring and reporting consistency between jurisdictions and across the basin. However, the control of water quality programs resides with the member jurisdictions and their support is required to fully address this issue and to make the necessary changes.

Industrial Wastes

The findings of the SOAER clearly indicate that there have been significant improvements to water quality in some parts of the Mackenzie River Basin since the 1980s. The quality of effluent discharges from industries and communities, in particular, has improved in most areas. However, some priority issues require further attention.

Contaminated and orphaned sites pose a long-term risk to both the surface and groundwater of the Mackenzie River Basin. The abandoned uranium mines around Lake Athabasca and the arsenic storage sites near Great Slave Lake are examples of these threats. All governments should accelerate the development and implementation of plans for managing or removing these threats.

The quality of effluents from pulp mills continues to improve. However, the low levels of dissolved oxygen due to nutrient loadings from a variety of sources may pose a threat to fish during winter under ice conditions. This issue is a concern on the Athabasca River and needs to be more fully addressed by governments and industry.

An accident related to the failure of one of the oil sands tailing ponds could have a catastrophic impact on the aquatic ecosystem of the Mackenzie River Basin due to the size of these ponds and their proximity to the Athabasca River. The oil sands industry and government should continue to work to ensure the integrity of these structures. They should also continue to investigate strategies for dealing with oil sand tailings.

Groundwater

There is very little groundwater information presented in this SOAER. This does not mean that there are no issues with groundwater. Many residents use groundwater for drinking. The safety and security of this supply is a priority issue to these residents.

All levels of government should work together to improve the knowledge and reporting on groundwater in the Mackenzie River Basin. Industries that undertake sub-surface exploration should make this information available to governments where there is the opportunity to learn more about groundwater from this source.

Source Water Protection

All of the MRBB member jurisdictions have recently adopted policies and are implementing programs that focus on protecting the sources (rivers, lakes and groundwater) of drinking water as part of the multi-barrier approach to drinking water safety. Given the importance of drinking water safety, the MRBB wants to highlight this issue and encourage all levels of government, industries and individuals to implement

and practice source protection when planning and conducting activities within the watersheds of the Mackenzie River Basin.

Country Food Safety

Many residents of the Mackenzie River Basin consume fish, aquatic mammals and waterfowl as part of their daily diet. While undertaking this state of the aquatic ecosystem initiative, the MRBB found that efforts expended on conducting risk assessments and on issuing and updating consumption advisories varied widely across the basin. The availability of this information to those individuals that most need the warnings is also limited.

Member jurisdictions should continue, and where necessary improve, the monitoring and assessment of the safety of fish and country foods for consumption. The nature of cultural dietary practices should be taken into account in these assessments.

Consumption advisories should be prepared and delivered in a form most useable by those that consume these foods. The advisories should be updated in a timely fashion based on the results of new assessments. The people that consume these foods want to continue to do so and want to see them available for many generations in the future.

Protection of Aquatic Ecosystem Biodiversity

While the overall condition of aquatic biodiversity appears in general to be good, the MRBB found it difficult to make a specific assessment of its status

within the Mackenzie River Basin. Many factors affect biodiversity. For some factors, there is good information, but for others there is little. For water quality, national guidelines for the protection of aquatic life provide a means for assessing whether water is of good enough quality to protect aquatic plants and animals. For river flows, however, there was little applicable information identifying the flow required at various times of the year to support healthy aquatic ecosystems. For commercial and sport fishery harvests, there was mixed information across the basins regarding population numbers, trends and sustainable catch rates. For species at risk, updates on the status of species have not been done at regular intervals nor were assessments available on the efficacy of various measures intended to protect species at risk. No consolidated assessment of all factors exists to indicate the requirements of a diverse, well-functioning aquatic ecosystem.

Decision-makers need to know the base needs of aquatic plants and animals before they can determine how much water can safely be withdrawn from the environment for human and industrial uses or how much effluent can safely be discharged to the environment. This is an issue that will become even more important as the demands for water withdrawals and effluent discharges increase in the Mackenzie River Basin. Should climate change reduce flow rates even further, such impacts may become even more magnified. All partners and industries that use the resource should place a high priority on determining the needs of the aquatic ecosystem and managing the resource to achieve those needs.

The Peace-Athabasca, Slave and Mackenzie Deltas

Three of the world's major freshwater river deltas are located within the Mackenzie River Basin. They are the Peace-Athabasca Delta, the Slave River Delta and the Mackenzie Delta. These deltas sustain a wealth of fish and wildlife and continue to be important areas for many aboriginal people in the basin. Traditional ecological knowledge and science assessments agree that there have been significant changes to the ecology of the Peace-Athabasca Delta. There have been numerous studies to determine the impact of climatic variability and altered flow regimes on the delta and to design mitigation measures. However, all of this information has not been synthesized nor has a consensus emerged regarding the relative importance of different anthropogenic impacts on the delta ecosystem. Efforts in those regards would be beneficial to the development of a cohesive management plan for achieving the long-term health of the delta. The impacts from an altered flow regime, climate change and other factors, may also extend further downstream, affecting both the Slave and Mackenzie deltas as well. Research, understanding and effective management of the Peace-Athabasca Delta will likely benefit all three deltas found in this basin.

Member jurisdictions and other appropriate agencies should complete the determination of the needs of the aquatic ecosystem within the Peace-Athabasca Delta and prepare a comprehensive management plan to ensure these needs are met.

Bilateral Agreements

The partners to the MRBB Transboundary Waters Master Agreement committed to the development of bilateral agreements between neighboring

jurisdictions. To date, the NWT and Yukon bilateral agreement is the only agreement completed. These agreements are seen as a cornerstone for addressing water quality and quantity targets and achieving a healthy aquatic ecosystem within the Mackenzie River Basin. The bilateral agreements are a priority of the MRBB and the Board encourages the individual partners to give the development of bilateral agreements an equally high priority. This SOAER and all the analysis that was undertaken to produce it is valuable information that will assist the jurisdictions in preparing the bilateral agreements.

Watershed Approach

The ability to manage and sustain aquatic resources is limited by a scarcity of information linking land use practices to the health of the aquatic ecosystem. The watershed approach is a means of linking land use and aquatic ecosystem health, and it is encouraging to see that all of the partners are moving towards the planning and management of the Mackenzie River Basin using this integrated approach. All literature, locally, nationally and internationally, supports the adoption of a watershed-based management regime. In addition, this concept incorporates many other sound methodologies, such as integrated resource (land and water) management, cumulative impact assessments and involvement of all people, agencies and industries.

The MRBB supports this move to the watershed approach and encourages the partners and all basin residents to work within this approach to achieve a healthy and prosperous Mackenzie River Basin.

Mackenzie River Basin
State of the Aquatic Ecosystem Report 2003

By
The Mackenzie River Basin Board
2004

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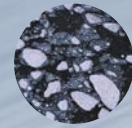
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Preface



The Mackenzie River Basin Board is pleased to present the **Mackenzie River Basin State of the Aquatic Ecosystem Report 2003**.

The Mackenzie River Basin is Canada's largest river basin. It overlies portions of five provinces and territories: British Columbia, Alberta, Saskatchewan, Yukon Territory and the Northwest Territories. The basin is rich in natural resources and its residents have a long history of using many of those resources to enrich and sustain their lives. The widespread use of the basin's natural resources by people and industries creates a need for attitudes, practices, policies and rules that support healthy aquatic ecosystems. Furthermore, because activities undertaken in one part of the watershed can affect people living in another, it is important that all the jurisdictions work together to maintain the ecological integrity of the entire Mackenzie watershed.

In order to create a cooperative forum to inform about and advocate for the maintenance of the ecological integrity of the entire Mackenzie River Basin, the governments of Canada, British Columbia, Alberta, Saskatchewan, the Northwest Territories and Yukon signed the *Mackenzie River Basin Transboundary Waters Master Agreement*.

The Mackenzie River Basin Board was created to implement the agreement. The Board has identified six important goals for the Mackenzie River Basin. They are:

1. Improve water quality;
2. Ensure sufficient water quantity;
3. Sustain in-stream water uses;
4. Ensure healthy, abundant and diverse aquatic species and habitat;
5. Ensure human health and safety; and
6. Ensure a knowledgeable and involved public.

One of the key duties of the Board is to report on the State of the Aquatic Ecosystem at five-year intervals. This is its first State of the Aquatic Ecosystem Report.

The purpose of this report is to inform residents of the Mackenzie River Basin and their decision-makers about the state of the basin's aquatic ecosystems. The report is an important means by which the Mackenzie River Basin Board aims to achieve one of its key goals, which is to ensure a knowledgeable, involved public. Information in this report points to environmental successes and also helps to determine areas where environmental performance needs to be improved. Governments can use this report to pinpoint critical areas that

need further attention and to guide development of environmental policies, programs and regulations. Organizations, industries and individuals are encouraged to use the information in this report to make informed decisions that support healthy aquatic ecosystems.

The report uses environmental indicators to assess whether its five environmental goals are being met, and identifies critical information gaps in the major sub-basins that comprise the Mackenzie River Basin; the Athabasca, Peace, Liard, Peel, Great Slave and Mackenzie-Great Bear sub-basins. By considering each sub-basin separately, it is possible to focus on particular environmental issues that may be unique to a sub-basin, while still allowing for the examination of issues that are common among sub-basins.

The report provides an overall assessment of each indicator, and uses symbols to convey whether the five environmental goals are being met. Using this approach, indicators are described as “Favourable”, “Mixed Signals” or “Unfavourable”. The symbols and their definitions are shown below.

Definition of Symbols

- ✔ Environmental quality is favourable or improving or pressure on the environment is decreasing.
- ▽ Environmental quality is intermediate or there is no clear trend in environmental quality because of (1) insufficient information or (2) the presence of mixed (positive and negative) signals.
- Environmental quality is unfavourable or deteriorating or pressure on the environment is increasing.

An overview chapter covers basin-wide issues including geography, human population, industry, Traditional Environmental Knowledge (TEK) and protected areas. It also includes indicators related to contaminants and climate change. Five of six sub-basin chapters contain descriptive information on key ecological areas or important human activities that may impact the aquatic ecosystem. The final chapter covers recent and anticipated developments in the basin.

Information in this report comes from existing monitoring programs, scientific studies or traditional knowledge reports. No new scientific or traditional knowledge studies were undertaken specifically for this report. The environmental indicators in this report were limited, to some extent, by the availability of pertinent information in each of the sub-basins.

One key message of this report is that the different jurisdictions must work together to protect the aquatic ecosystems of the Mackenzie River Basin. Governments, communities, industries, volunteer organizations and individuals must all share responsibility for protecting the environment. Another important message is that we need to increasingly focus our attention internationally in order to protect our local environments from global forces such as climate change and pollution.

We encourage readers to share their comments and concerns about this report with the Board as well as with government agencies responsible for protecting the environment in the Mackenzie River Basin.



About the cover:

Springtime at the confluence of the Mackenzie River (left) and the Liard River (right), as they join in their northward progression towards the Arctic Ocean.

Courtesy of: Terry Prowse