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Application of the WQI to Assess the Effectiveness of Best Management Practices

Aquatic Toxicity Workshop
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Department of Environment

Overview

- **Source Water Protection**

- **Best Management Practices**

- **CCME Water Quality Index**

- **Case Study – Gander Lake Watershed**

- **Conclusions / Recommendations**

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Source Water Protection

"There shall be no man or woman dare to wash any unclean linen, wash clothes…nor rinse or make clean any kettle, pot, or pan, or any suchlike vessel within twenty feet of the old well or new pump. Nor shall anyone aforesaid, within less than a quarter mile of the fort, dare to do the necessities of nature, since by these unmanly, slothful, and loathsome immodesties, the whole fort may be choked and poisoned."

Governor Gage of Virginia

Proclamation for Jamestown, Va. (1610)

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Source Water Protection

Source water protection is the first step in the Multi-Barrier Approach for drinking water safety.

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Source Water Protection

The goal is to provide a multi-use watershed that can accommodate the activities of numerous stakeholders , while at the same time minimize the adverse effects on the environment.

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Best Management Practices (BMPs)

- **Practices or combinations of practices determined to be the most effective and practical means of preventing or reducing the amount of non-point and point source pollution entering surface and ground waters while still allowing the productive use of resources.**

- **Balance between development vs. conservation**

Best Management Practices (BMPs)

Examples:

- Establishment of buffer zones along water bodies

- Establishment of no-development zones within sensitive areas

- Changes in traditional logging practices (selective cutting vs. clear cutting)

- Changes in traditional practices on construction sites

- Construction of retention basins

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CCME Water Quality Index

- Developed by a sub-committee under the CCME Water Quality Guidelines Task Group

- Simplify the reporting of water quality data

- Provide meaningful summaries of data that are useful to both technical and non-technical individuals

- Not a substitute for statistical analysis of water quality data

- Provide a broad overview of environmental performance

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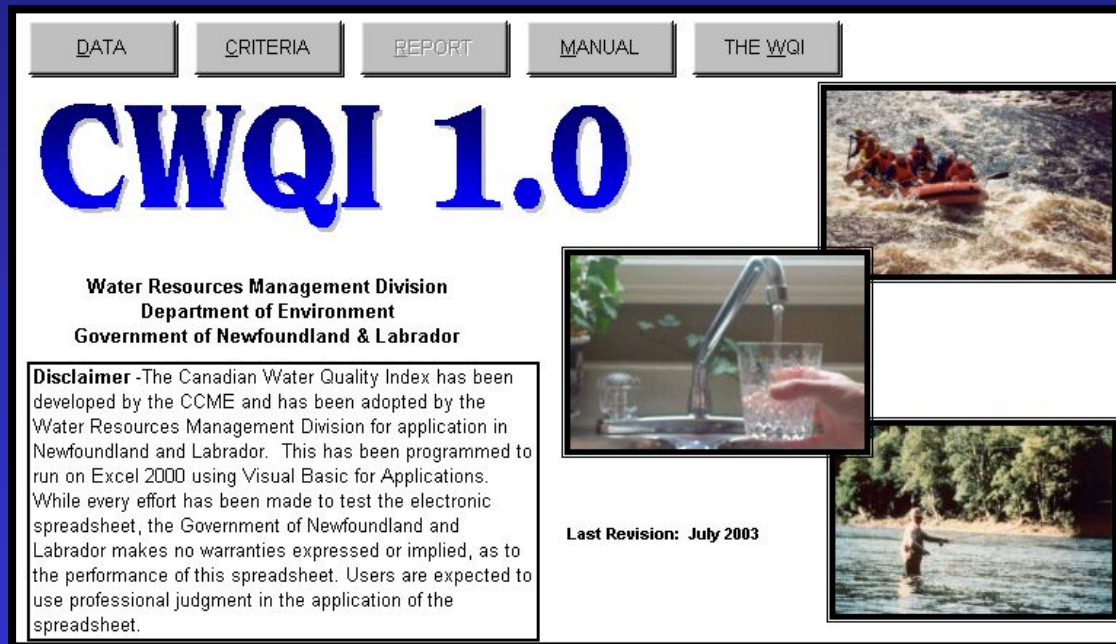Water Resources Management Division

CCME Water Quality Index

. **Consists of three measures of variance from selected water quality objectives:**

      1) Scope

      2) Frequency

      3) Amplitude

. **Three factors combine to produce a value between 0 and 100 that represents the overall water quality.**

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CCME Water Quality Index

- Used calculator developed by NL Department of Environment to calculate the WQI values

- Available at www.gov.nl.ca/Env/env/water_resources.asp

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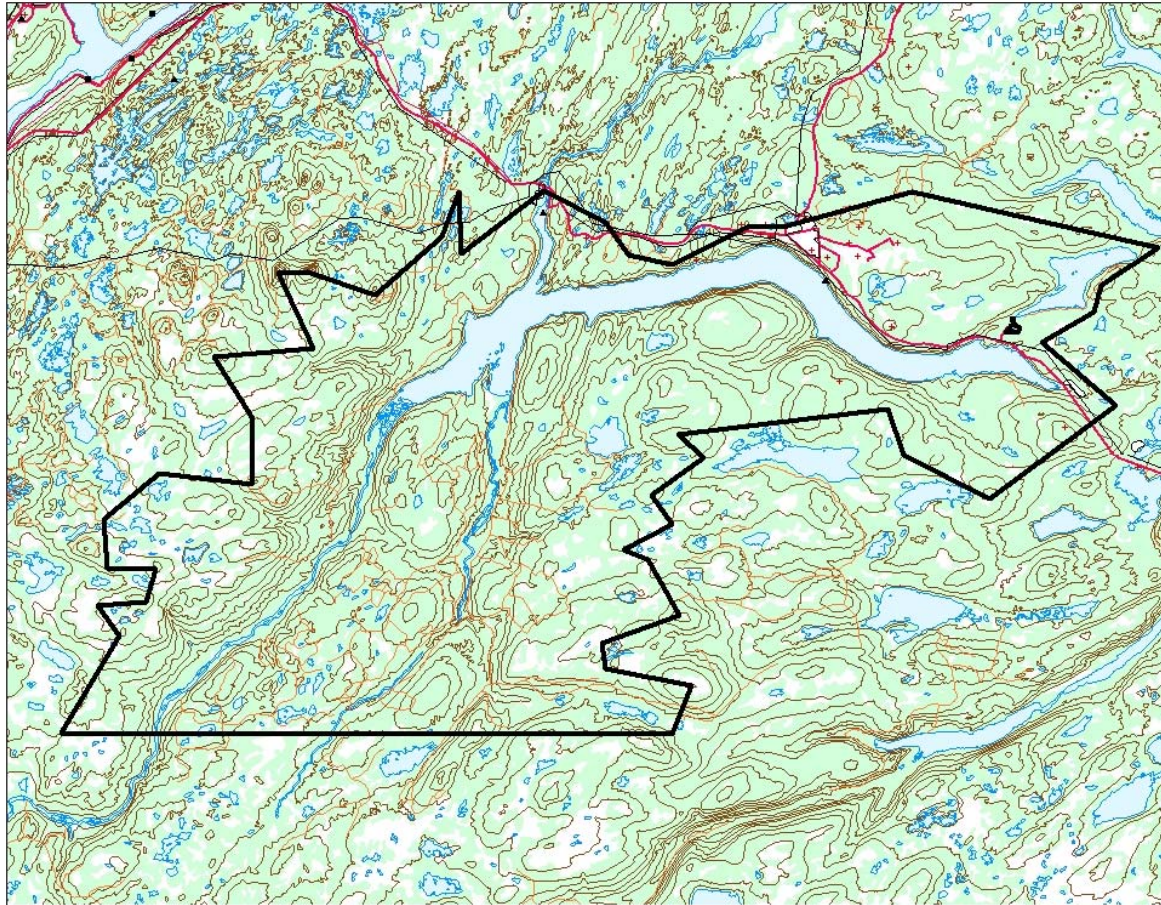
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Case Study – Gander Lake Watershed

- Gander Lake is one of the largest lakes in the province

- Natural drainage area of 5,310 km^2

- Approximately 50 km at its maximum length

- Average width of approximately 2 km

- Surface area of 112 km^2

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Case Study – Gander Lake Watershed

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Case Study – Gander Lake Watershed

Drinking Water

Recreation

Major Uses of Gander Lake Watershed

Forestry and Quarries

Urban Development

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Case Study – Gander Lake Watershed

Methodology:

- Data collected under the drinking water quality monitoring program for Gander Lake was subdivided into various datasets by year groupings.

- CCME WQI was applied to the datasets using the NL calculator.

- Utilized all parameters that had established guidelines from the *"Guidelines for Canadian Drinking Water Quality"*.

- Met the requirements of the CCME WQI (at least 4 parameters & at least 4 samples).

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Case Study – Gander Lake Watershed Results:

Datasets	Time Frame	# of parameters	# of samples	CCME WQI Value	CCME WQI Ranking
1	1993-1996	16	8	**84**	Good
	1997-2002	16	26	**82**	Good
2	1993-1997	16	11	**84**	Good
	1998-2002	16	23	**83**	Good
3	1993-1998	16	19	**82**	Good
	1999-2002	16	15	**86**	Good
4	1993-1999	16	25	**82**	Good
	2000-2002	16	9	**88**	Good

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Conclusions / Recommendations

- **The CCME WQI can be used as a performance measurement tool to assess the effectiveness of BMPs.**

- **Additional case studies should be conducted.**

- **This case study demonstrates the need to develop source water quality guidelines.**

- **There are countless possibilities in applying the CCME WQI to water quality data.**

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