

West Souris River Technical Water Quality Report Summary

SAMPLING BACKGROUND INFORMATION

Surface water quality data have been collected by the Water Quality Management Section, Manitoba Water Stewardship, to address various issues within the Souris River Watershed. Surface water quality data are collected primarily to assess; 1) long-term, water quality trends at routinely monitored sites, and 2) short-term, intensive studies and activities. Results of water chemistry collected from the West Souris River Conservation District (WSRCD) represent data that were generated from both long-term water quality sites and from short-term, issue-driven studies.

- Eleven sites (nine within the WSRCD and two within the Souris River) were analyzed for this report. Only sites within the WSRCD will be presented in this summary.
- Water quality information has been collected from the following sampling locations in the WSRCD
 - ANTLER RIVER, SOUTH, 1 MILE S. PR 251 SECTION 24-1-28
 - GAINSBOROUGH CREEK AT PTH 83
 - GRAHAM CREEK (TRIBUTARY OF SOURIS R.) AT PR 252
 - JACKSON CREEK (TRIBUTARY OF SOURIS R.) AT PR 252
 - PIPESTONE CREEK BRIDGE AT KOLA (NE18-10-29W)
 - PIPESTONE CREEK DIVERSION AT BOUNDARY OF PIPESTONE AND SIFTON
 - PLUM CREEK AT PR 254 D/S PLUM LAKE
 - OAK LAKE (MAIN BEACH)
 - SOURIS RIVER AT MELITA - HWY #3
 - SOURIS RIVER AT PTH #22, AT SOURIS
 - STONY CREEK (TRIBUTARY OF SOURIS R.) AT PTH 83

LONG TERM TRENDS IN SURFACE WATER

- **Water Quality Index (WQI)** combines 18 water quality parameters and three different aspects (i.e., number, duration and magnitude of water quality objective exceedances), to provide an overall snapshot of water quality.
- The basic premise of the Water Quality Index is that water quality is excellent when all guidelines or objectives set to protect water uses are met virtually all the time. When

- guidelines or objectives are not met, water quality becomes progressively poorer.
- After calculating the WQI, the water body can be considered **excellent, good, fair, marginal or poor**
 - Indices were calculated for two long-term water quality sites. These included:
 - Pipestone Creek Bridge at Kola;
 - Pipestone Creek Diversion at the Boundary of Pipestone and Sifton RMs

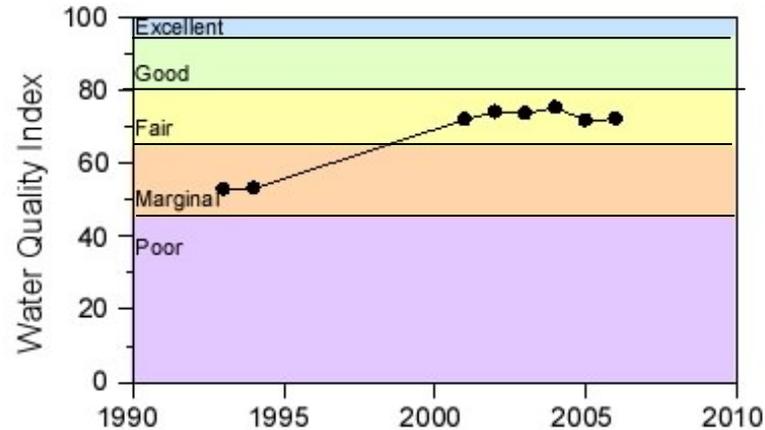


Figure 1. Water Quality Index (WQI) for the long-term water quality station located at the Pipestone Creek Bridge at Kola.

- In the early 90s, the Water Quality Index (WQI) for the Pipestone Creek Bridge at Kola (Figure 1) sampling location was considered **marginal** due to how many times, and by the amount in which **total phosphorus (TP) exceeded the water quality guidelines**. Between 1991 and 1993, TP exceeded the guidelines by a significant amount. On a positive note, since then, the WQI has improved to a **fair** rating (Figure 1).

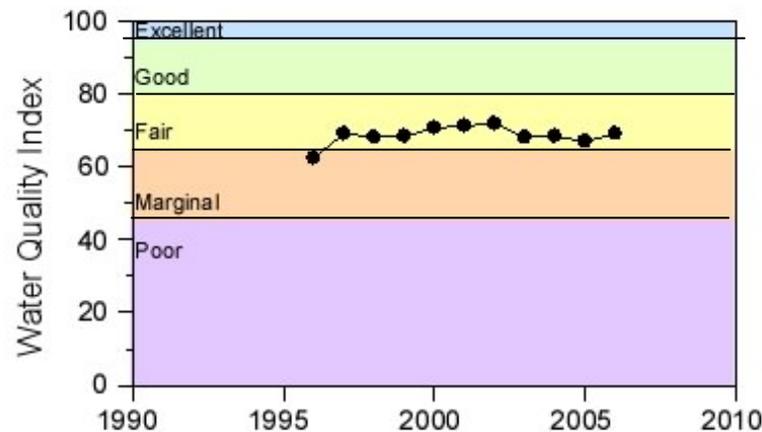


Figure 2. Water Quality Index (WQI) for the long-term water quality station located at the Pipestone Creek at the diversion.

- With the exception of 1996, the Pipestone Creek at the diversion sampling site received WQI rating of **marginal** (Figure 2). Consistently **high total phosphorus** throughout the testing period (1995-2006) is likely the cause of the indicated WQI rating. Between 1996 and 2004, total phosphorus exceeded the guidelines 100% of the time and by a significant amount.
- For both sites, other parameters that exceeded water quality guidelines included **conductivity, suspended solids, dissolved oxygen, manganese, total nitrogen** and in particular, **total phosphorus**.

WATER QUALITY IN THE ANTLER RIVER, GAINSBOROUGH, GRAHAM, JACKSON, PIPESTONE, PLUM AND STONY CREEKS

- Eight long-term water quality sampling sites are found in the West Souris River Conservation District. Sampling of six sites started in 1997 while sampling at the two sites in Pipestone Creek starting the late 80s and mid 90s.
- For this report, water quality data was analyzed from 2000 to 2009.

NUTRIENTS

- **Total nitrogen (TN)** was well below the 10 mg/L objective for the entire period.
- **Total phosphorus (TP)** consistently exceeded the narrative guidelines of 0.05 mg/L in all seven waterbodies (Figure 3).

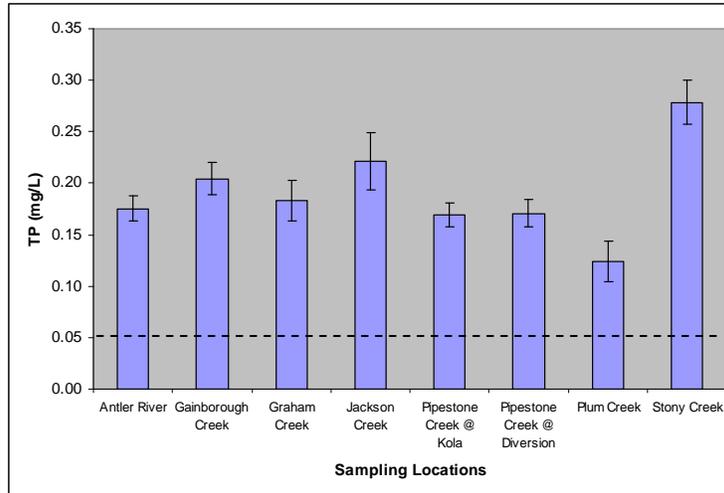


Figure 3. Average total phosphorus (TP) (pooled data) at the eight water sampling locations in the West Souris River Conservation District sampled between 2000 and 2009. Dashed line indicates objective level (0.05 mg/L).

- While some water bodies contain naturally elevated concentrations of nutrients due to watershed characteristics, many human alterations such as not maintaining natural riparian buffers may impact nutrient loading to these seven waterbodies.

WATER QUALITY PARAMETERS

- **Dissolved oxygen (DO)** periodically declined below the 5 mg/L guideline at all sites. A few sites recorded critically low oxygen concentrations (less than 1 mg/L), which can result fish kills and foul smelling water.
- Low DO levels reoccurred year-to-year mainly between 2003 and 2006. In consequence, these sampling sites could naturally have low DO levels due to low water flow in the channels, to the point in some years, some creeks were dry.
- **Total suspended solids (TSS)** often exceeded the objective level in both Pipestone Creek sampling locations.
- Overland runoff carries soil, silt, and organic debris all of which will increase the concentration of suspended sediments. Bank erosion will also contribute to increased suspended sediments. Maintaining vegetated buffer strips along rivers and smaller tributaries will reduce the overland movement of soil and other debris into the water.
- **Conductivity** in water is a measure of the amount of dissolved salts and minerals such as chloride, nitrate, sulphate, sodium, calcium, iron, etc.

- Conductivity exceeded water quality objectives occasionally in Jackson, Stony, Graham and Plum creeks. Conductivity values consistently exceeded the water quality objective in Pipestone Creek.
- ***Escherichia coli*** bacteria or *E. coli*, rarely exceeded the recreation objective at the eight sites.
- Occasionally, bacteria densities are above recreational guidelines, yet generally return within acceptable levels within a day or so. Large storm event washing the bacteria from the shore or the presence of wildlife near the water may also lead to infrequent elevated *E. coli* values.

PESTICIDES

- **Pesticides** were tested in Pipestone Creek. Overall, the vast majority of pesticides were not detected as values were well below the strictest detection limits.

TRACE ELEMENTS

- Samples collected in both Pipestone Creek locations were tested for trace elements such as **arsenic, cadmium, copper, lead, nickel, and zinc**. The elements were frequently detected but none exceed the strictest water quality guidelines or objectives.
- Total **iron** concentrations commonly exceeded the drinking water and aquatic life guidelines in Pipestone Creek. Iron was not detected at the other six sites.
- The majority of total **manganese** concentrations exceeded the drinking water guideline in Pipestone Creek.

OAK LAKE

- As a part of Manitoba Water Stewardship's Clean Beaches Program, each summer beaches are routinely monitored for ***Escherichia coli*** densities. *Escherichia coli* is routinely monitored on a monthly basis from the Main Beach of Oak Lake.
- Generally, recreational water quality is excellent at the Main Beach with geometric means well below the recreational guideline.

