



AESA Stream Survey

Watershed Report

Paddle River in 2005

Snapshot of the Watershed

Paddle River is a large stream that flows into the Pembina River in northern Alberta. Its watershed lies southwest of Mayerthorpe, near Anselmo (Figure 1) in the Western Alberta Upland Ecoregion. The landscape resembles foothills with linear ridges, plateaus, and broad valleys. Soils are typically clays with bare rock and saturated areas.

The Paddle River watershed occupies about 65,000 acres (261 km²) and has moderate runoff potential due to topography and soil type. The watershed is characterized by low intensity farming dominated by beef cattle production. Common crops include oats, tame hay, and alfalfa.

Monitoring Water Quality

Paddle River is sampled near the Water Survey of Canada gauging station (Figure 1). Gauging stations provide important information on the duration and volume of stream flow.

Samples are collected every year throughout the spring, summer and fall, and are analyzed for nutrients, bacteria, pesticides, and related physical and chemical characteristics. The sampling is designed to monitor non-point source pollution (runoff pollution).

For more details on sampling methods, see the following factsheets in the AESA Stream Survey series:

- *Nutrient Monitoring*
- *Pesticide Monitoring*
- *Fecal Bacteria Monitoring*

Interpreting the Data

Comparison to Guidelines: Stream data are compared to water quality guidelines as one way of evaluating stream water quality. A water quality guideline is the recommended concentration of a substance in water, or a narrative statement that describes the required water quality for a particular use. Guidelines define water quality according to the use of the water, such as for livestock watering, irrigation, recreation, or the protection of aquatic life.

Water quality guidelines are developed by federal and provincial agencies, and are a work in progress. As a result, some substances presently have either no guidelines or guidelines for only a few uses.

Index Scores: The water quality of each stream is also evaluated each year against established water quality objectives. The objectives represent baseline concentrations typically found in small agricultural streams. Baseline concentrations were determined based on five years of data from province-wide studies on agricultural watersheds.

A mathematical formula compares the data to the objectives, and converts the complex data into simple index scores of excellent, good, fair, marginal, and poor. The index scores represent how much and how often stream water quality deviated from the objectives.

Trend Analysis: The data are examined for trends to determine if water quality is improving, deteriorating, or staying the same in each watershed. Due to the variable nature of water quality, ten or more years of data may be needed before trends can be interpreted with confidence. Long-term data will help the agriculture industry assess the progress it's making as producers adopt practices that protect water quality.

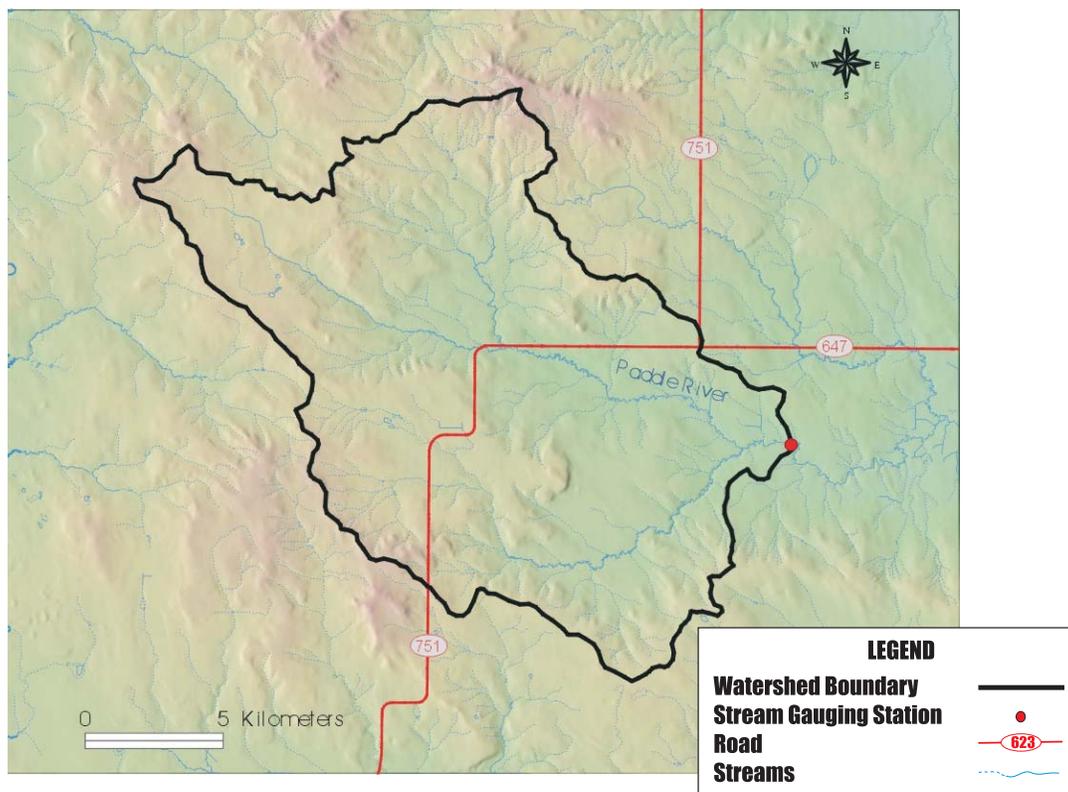


Figure 1. The Paddle River watershed.

2005 Monitoring Results

Climate

Climatic conditions, such as annual precipitation, are important to consider when interpreting water quality data.

It is more likely that agricultural contaminants will reach surface water in a year with lots of snow and rain than in a dry year. However, the concentration of contaminants may be lower in a wet year on account of dilution.

In 2005, the annual runoff volume for Paddle River watershed was 30% above average historical values.

Comparison to Guidelines

Nutrients

- 0% of samples complied with total phosphorus guidelines for the protection of aquatic life.
- 33% of samples complied with total nitrogen guidelines for the protection of aquatic life.
- 100% of samples complied with nitrite-nitrogen guidelines for the protection of aquatic life.
- 100% of samples complied with nitrate-nitrogen guidelines for the protection of aquatic life.
- 100% of samples complied with ammonia-nitrogen guidelines for the protection of aquatic life.

Pesticides

- 100% of samples complied with dicamba guidelines for irrigation.
- 100% of samples complied with MCPA guidelines for irrigation.

Bacteria

- 64% of samples complied with fecal coliform guidelines for irrigation.
- 85% of samples complied with *E. coli* guidelines for recreation.

* For a list of pesticide products that contain these compounds, see the factsheet *Pesticide Monitoring*.

Water Quality Index Scores

Nutrients

Score: **Poor**

High concentrations of all forms of nitrogen (N) and phosphorus (P) in March and April contributed to this score. Nitrogen and phosphorus are typical nutrients that contribute to water quality problems such as aquatic weed growth. Potential nutrient sources to surface waters include manure, commercial and domestic fertilizers.

Pesticides

Score: **Excellent**

The risk associated with the use of water containing a mixture of pesticides at low concentrations is uncertain. Potential sources of pesticides to waterbodies include crop applications, municipal roadside weed control, and garden pesticide use.

Bacteria

Score: **Marginal**

Fecal coliform and *E.coli* levels were highest May through July. The presence of bacteria in livestock and human drinking water may cause serious health problems - all raw surface water must be treated before drinking. Sources of bacteria to surface water include livestock manure, human sewage, and wildlife feces.

Overall

Score: **Fair**

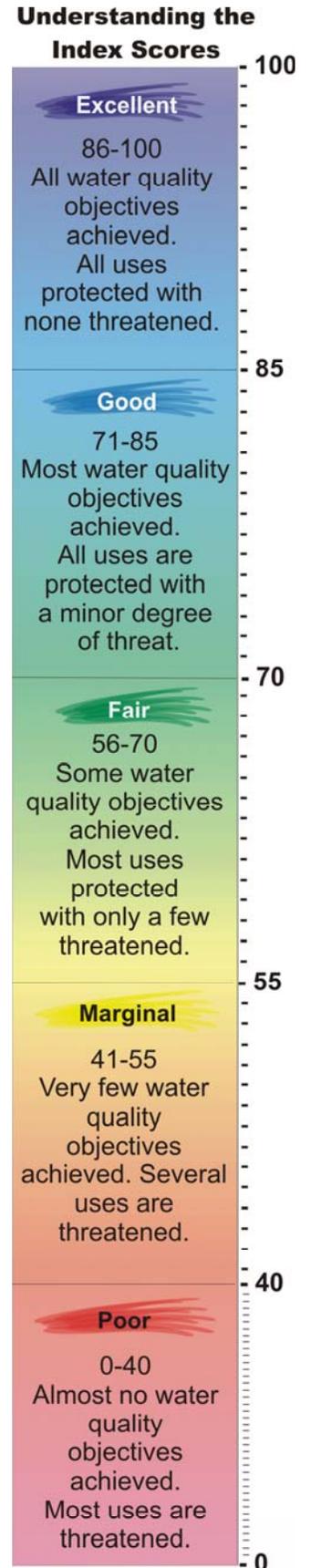
Considering nutrients, pesticides and bacteria, the overall index score for Paddle River was fair. This indicates that the Paddle River has some issues of concern in meeting water quality objectives, particularly with regard to nutrient and bacteria inputs.

Watch Points

Based on the index ranking, attention should be given to nutrient and bacteria management in the Paddle River watershed. General strategies to reduce inputs to Paddle River include:

- Diverting up-slope runoff away from pens to prevent leaching from manure packs.
- Applying manure and fertilizers at recommended rates according to soil and crop nutrient requirements.
- Not applying manure on frozen, saturated or compacted soils, or if heavy rain is predicted.
- Injecting or incorporating manure and fertilizers immediately after application.
- Maintaining grassed waterways and leaving buffer strips along streams and wetlands.
- Using off-stream watering sources, controlled access points, and/or rotational or temporary grazing to minimize animal activities in and along surface water resources.

For a list of resources on agricultural management solutions to protect water quality, see the factsheet *Agriculture and Water Quality: Beneficial Management Practices (BMP) Resources*.



* For a list of pesticide products that contain these compounds, see the factsheet *Pesticide Monitoring*.

One Piece of a Big Picture

The Paddle River watershed is just one part of a much bigger picture of water quality in Alberta.

The 23 watersheds monitored by AESA Stream Survey are shown in Figure 2. Each watershed was selected for monitoring because it is representative of runoff characteristics and agricultural activities. This allows the monitored watersheds to be compared to similar watersheds, and helps researchers to obtain an overall picture of water quality in agricultural areas of Alberta.

For more information on how the AESA Stream Survey watersheds were selected, see the fact sheet Watershed Selection Process.

Just as each AESA Stream Survey watershed is only one part of the picture of water quality in agricultural areas, the agricultural industry is just one of many human activities that affect water quality. Whatever happens on the land - agriculture, forestry, mining, urbanization, or other activity - can affect water quality. Everyone needs to play a part in protecting the quality of this important resource.

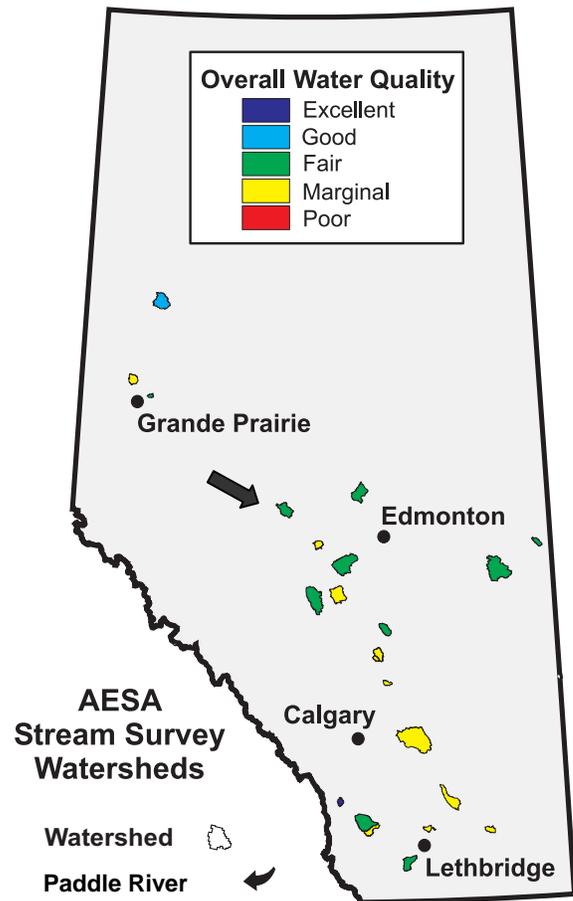


Figure 2. Overall water quality in AESA Stream Survey watersheds in 2005.

Contacts for More Information

Information on AESA Stream Survey

Alberta Agriculture, Food and Rural Development (AAFRD)
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#206, 7000-113 Street
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Information on Agricultural Practices to Protect Water Quality

Contact the AAFRD Conservation Coordinator of the AESA Program in your region.
Alberta Ag-Info Centre: 1-866-882-7677.

Contact any Alberta Government office toll-free at 310-0000.