North America Field Trip Presentation 1

Grand River

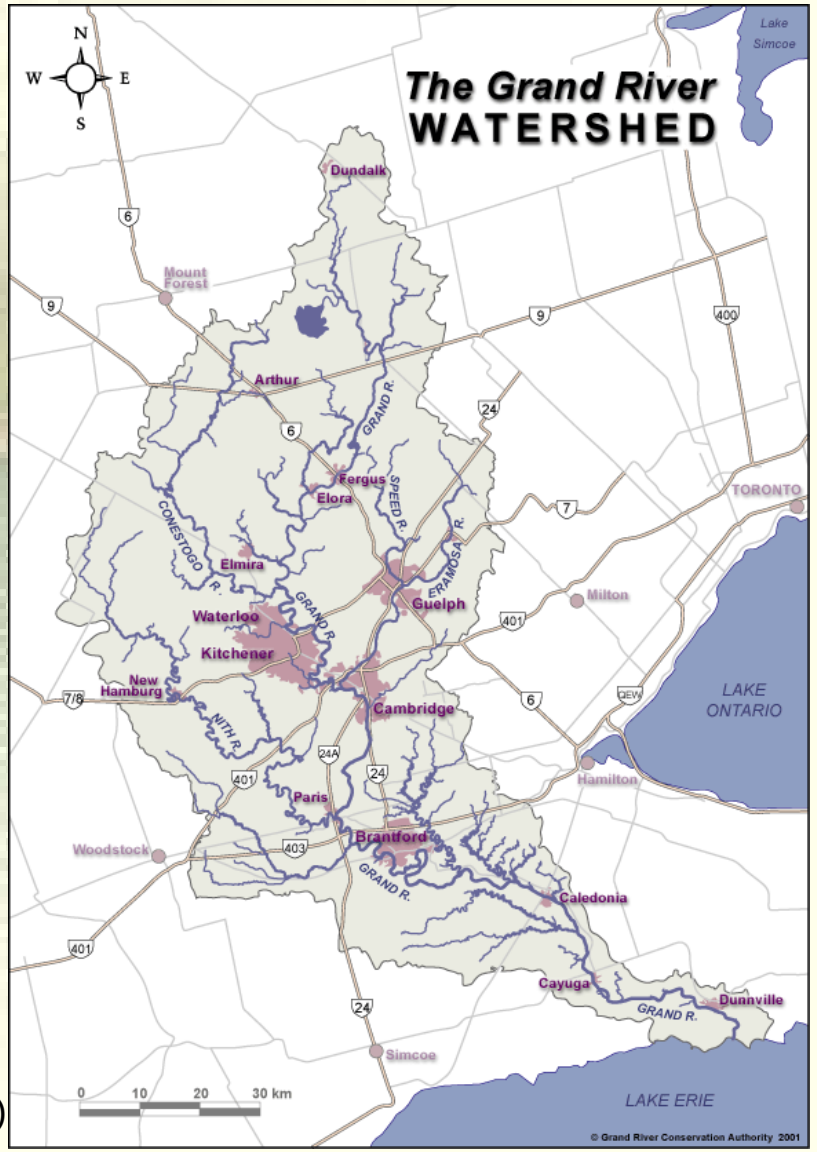
Introduction to Grand River

Location

(WorldAtlas .com, 2007)

Location

(Friends of the Grand River, 2007)



(GRCA, 2007)

Geography

Largest river in southern Ontario

Source: undulating plain near Georgian Bay , flows southwards to Lake Erie

Length: 352 km

Size of watershed: 6,965 square meter

Use of water: serving 70 per cent of the watershed's residents, as well as its farms, industries and shops

(Friends of the Grand River, 2007)

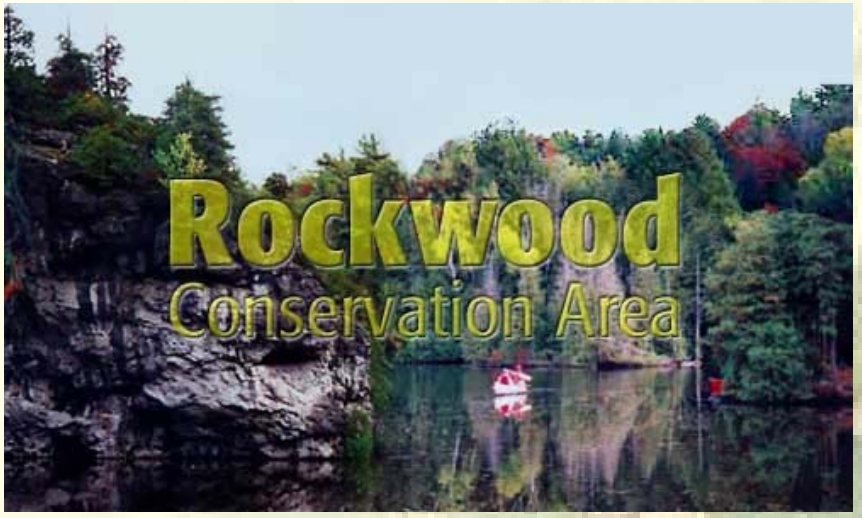
Natural Value: Luther Marsh

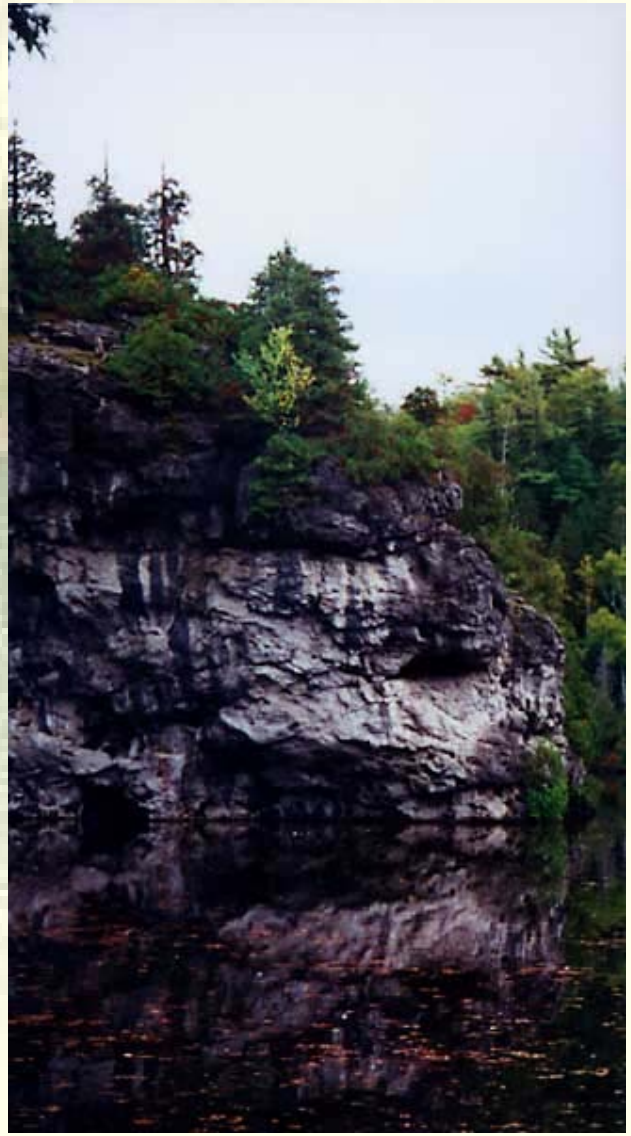
- 4000 hectare marsh and open water area
- one of southern Ontario's most significant wetlands
- a significant reservoir at the headwaters
- Luther Marsh Wildlife Management Area--- 5,200 hectares of forests, fields, wetlands and lakes
- Activities: Hiking, mountain biking, snowmobiling,, skiing, nature observation, birding, canoeing……

Natural Value: Elora Gorge

- Elora Gorge Conservation Area
- characterized by a gorge which has 22-metre high cliffs
- Riverside trails and scenic overlooks.
- Activities: camping, canoeing, fishing, hiking, swimming, tubing……

Rockwood Conservation Area





- historical, architectural and geological interest
- Old Harris Woollen Mill, the dam and millpond, Old Valley Road
- Caves
- Pot holes: including the world's largest pothole, and the largest concentration of potholes in Ontario, numbering some 300

GRAND ACTIONS

THE GRAND STRATEGY NEWSLETTER

VOLUME 7, NUMBER 4 - MAY/JUNE 2002

Grand River Conservation Authority

The Grand: A Canadian Heritage River

INSIDE

Cover photo

This unusual view shows the inside of the Devil's Well pothole near Rockwood. The photo was provided by Dr. Alan Morgan and first reproduced in *Wat on Earth*, fall 2001.

GLACIAL POTHOLES AT ROCKWOOD

By Dr. Alan Morgan, Quaternary Sciences Institute, University of Waterloo.

Potholes are quite numerous within and outside the conservation area at Rockwood, northeast of Guelph, and also in the area immediately south of Everton, about 5 km north of Rockwood. My first visit to Rockwood was made in 1971 and I have visited the Eramosa Valley, including the potholes in the Everton area several times since then. However, in this article, much of the information on the Devil's Well is derived from Kershaw (1973) and Kunert (1997).

The earliest ideas on the creation of potholes are that they were associated with "moulins de glacier" (glacier mills) — formed where surface streams on glaciers and ice sheets fall into holes in the ice. Water entering these surficial holes was believed to impact on the bedrock beneath creating a large pothole. The "Moulin Hypothesis", first suggested in 1874, continued to be accepted by many authors until the 1950s. However, commencing in the 1930s, other authors have suggested dissatisfaction with the moulin hypothesis, largely on the grounds that it failed to explain how ice could remain stable long enough for the "giant" potholes to form and why many potholes (like those at Rockwood) were present in large numbers.

In summary "glacial" potholes are similar to more normal (or at least, more frequently encountered) "fluvial" potholes. A walk along a dry riverbed, particularly one that runs over bare expanses of soft or soluble or well-jointed bedrock will reveal potholes. Certainly the Rockwood potholes are glacio-fluvial in origin, probably formed by subglacial or latero-glacial (ice-marginal) streams.

There seems to be general agreement amongst Quaternary workers that the Eramosa Valley is part of a complex series of meltwater channels that drained the ice margins retreating both into the Huron and Ontario Basins. The potholes that are found at Everton and at Rockwood appear to be associated with the floods of meltwater associated with the

• *See page 2*

Devil's Well

- 13.1m deep
- 6.4m wide at the top
- 4.9m wide at the bottom

GRAND RIVER CONSERVATION AUTHORITY

History of the GRCA

1932 – 8 municipalities form the Grand River Conservation Commission.

1946 – Ontario passed the Conservation Authorities Act

1948 – the Grand Valley Conservation Authority was formed

Mission

1. develop and implement programs
2. improve water quality
3. reduce flood damages
4. maintain a reliable water supply
5. facilitate watershed planning
6. protect natural areas and biodiversity
7. provide environmental education

Who pay for the programs?

1. Watershed municipal levies
2. Provincial & federal grants
3. Conservation Area & Nature Centre user fees
4. Property rental income
5. Hydro-electric production
6. Tree-planting user fees & tree sales
7. Financial support from partners
8. Grand River Conservation Foundation

Successes of the GRCA

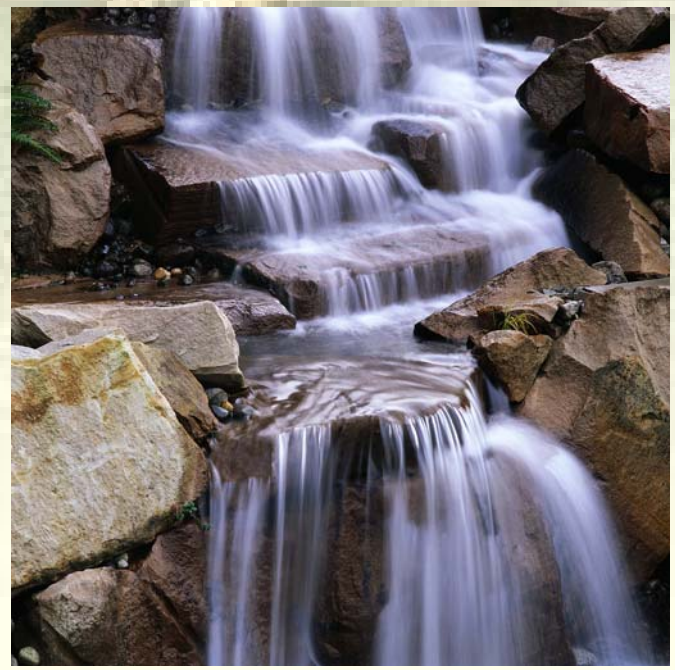
- recreational use increased
- In 1994, it was declared a Canadian Heritage River
- People are motivated to work together
- Implement “The Grand Strategy”

Future direction

- Review programs and services with the watershed municipalities
- Built partnerships and resources pooled
- Determine future growth

Expected topics

Floodplain management



History of Flooding

- early settlement of the basin during the 1800's by Europeans

- development of the floodplain land

↓

- deforestation and drainage of wetlands

↓

- periodic flooding of these communities

History of flooding

- In 1938 : the Grand River Commission
  - » to deal with flooding
  - » the Shand Dam was built in 1942
  - » the Conservation Authorities Act was passed in 1946

    - it were empowered to initiate joint conservation measures, with technical and financial help from the Province of Ontario.

Background

- **Why there are floodplain management?**

  - Structural measures, flood warning system and floodproofing will be of little value if the reduction in damages is more than offset by new damage potential in the floodplains.

Existing floodplain management

- Flood management implies managing the flood risk
  - balances the risk associated with the floodplain against the desire to make use of the floodplain lands
  - ensure flexibility and the ability to deal both with new uses as well as pre-existing uses of floodplain areas

Existing floodplain management

- three important components:
  - Development of floodplain mapping to define floodplain extent and characteristics
  - the implementation of policies for floodplain areas
  - maintenance of the mapping and policies supporting the program

Floodplain policy areas

- one-zone policy areas:

  Scope: entire floodplain of the Grand River and its tributaries

  Restriction: no new development is permitted within the floodplain except for passive parks, flood control structures, marinas, agriculture, or public works requiring proximity to water

- two zone policy areas:

  Scope: floodway and flood fringe

  Restriction: new development can occur in the flood fringe under certain criteria

- special policy areas:

  Scope: historically settled areas where the application of One-Zone or Two-Zone Policies causes social and economic hardship for the community

  Restriction: Each SPA has its own development criteria. Considerations for development within SPAs include structural flood proofing, safe access and egress, nature of the land use

Canadian Heritage River

Heritage River

- Officially designated as a Canadian Heritage River in 1994
- Honoured for its harmony with human settlement around it
- Native cultures flourished in the watershed for more than 10,000 years

Brief History of Grand River

- 7000 - 11,000 years ago:
  - Paleo-Indian
- 17-18th century:
  - French explorers
  - renamed the river as Grande Rivière and Rivière Ouse later
- Late 18th century
  - Immigrants from United States, England, Scotland, and Ireland

Brief History of Grand River

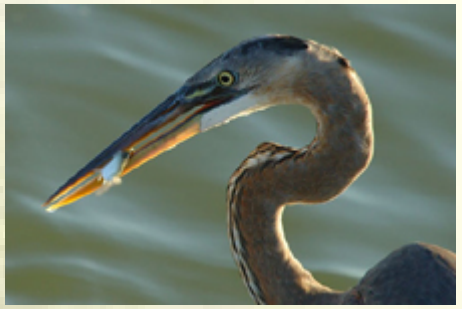
- 18th century
  - Old Order Mennonites
  - settled upstream of the Grand
  - pursuit of a simple, self-sufficient life
  - extreme conservatives in their attachment to older ways of life
    - Anti-modern technology
    - use horse for transportation
    - Do not use electricity

Cultural heritage --- Apps' Mill

- Built about 1840
- located between Paris and Brantford
- ran for grinding grain for local farmers for 100 years
- In 1970, purchased by the Grand River Conservation Authority
  - nature centre opened in 1981

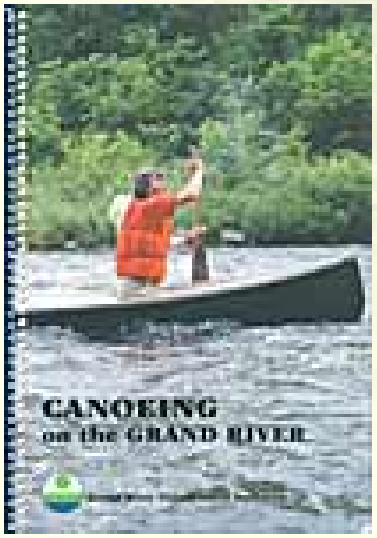
Man-land interaction nowadays

•Parks & camping



•Birding

Recreational activities



•Canoeing
•Kayaking

•Trails

•Fishing
•Hiking

Watershed Planning

Purpose

- regulate activities in natural and hazardous areas
- keep steady supply of clean, safe drinking water (no E.coli)
- prevent the loss of life and property due to flooding and erosion
- conserve and enhance natural resources

Threats from human activities

- waste disposal
- chemical use (e.g. industrial use of toxic chemicals, fertilizers used in farming practices)
- handling methods for waste and chemicals

Focus on Vulnerable lands

- Wellhead areas
- Intake areas
- Areas susceptible to contamination
- Recharge areas

Wellhead Protection Area

Measure→ source protection planning

1. carry out groundwater studies
2. map out “time of travel zones” (amount of time it takes water in the aquifer to reach the well)

Fig. 1 Red dye floats

Wellhead Protection Area

3. improve sewage treatment by investments to protect water quality
4. legislative (municipal land use, water conservation, pesticide and chemical control regulations)
5. storm water management programs
6. farm programs (Environmental Farm Plans, Rural Water Quality Program)

Terrestrial Resources

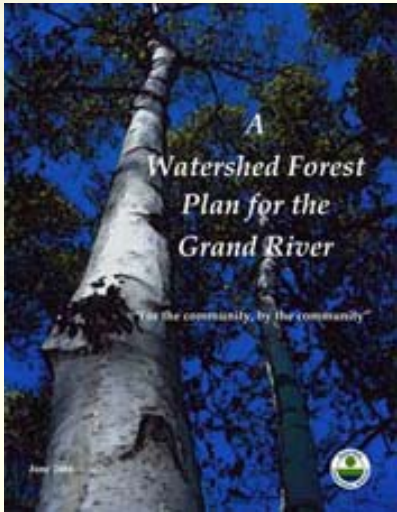
- Important to watershed
- determine the amount and quality of the water in the river
- Removal of forest during 1800s→flooding and died off of important species

- Measures:

Grand River Watershed Forest Plan

American Sweet Chestnut Recovery Program

GRCA Wetlands Policy



What do we want to study?

- What are the impacts of urbanization and industrialization on water quality?
- What are the difficulties in watershed management?
- Evaluate the effectiveness of “Wellhead protection area”
- What are the effectiveness and difficulties of floodplain management?

Reference

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