

A Study in Change

The Rose Point Trail



Description of Lesson

In this lesson, students will take a hike along the Rose Point Trail in Parry Sound, Ontario. They will look for evidence of human change, and learn how aquatic macro-invertebrates can be used to measure the impact of this change. We will also consider the history of this trail and area.

Connect with the Georgian Bay Biosphere

www.gbbr.ca
(705) 774-0978
education@gbbr.ca

This lesson plan and included media/materials are the property of GBB unless otherwise stated.



GEORGIAN BAY
BIOSPHERE
MNIDOO GAMII
Spirit of the Water

Georgian Bay Biosphere: Lesson in a Backpack Program

At a Glance

Grade Level: 9

Learning Environment:
Indoor Classroom
Rose Point Trail

Prep Time: 15 minutes

Length of Lesson: 1 and 30 minutes plus the assessment activity

Key Vocabulary:
Macroinvertebrates, Change, Pollution Sensitivity

Staffing: 1 educator /10 students

Materials:
1 copy of the Observation Booklet for each student.
Bristol Board
Glue
Printed Photos
Script

Groupings: Individual learning

Teaching/Learning Strategies:
Field Trip.

Lesson Outline

TIME	ACTIVITY	LOCATION	MATERIALS
15 minutes	Introduction	Classroom	PowerPoint Presentation
Throughout	Hike	Rose Point Trail	Have the script with you to point out important land marks.
25 minutes	Activity #1: Evidence of Human Change	Rose Point Trail	Booklet and pencil / student
25 minutes	Activity #2: Macro-invertebrates... Bio-indicators of Change	Rose Point Trail	Booklet and pencil / student
25 minutes	Activity #3: Picture of Change	Rose Point Trail	Booklet and pencil / student Camera
Homework	Assessment		Bristol Board Glue Printed Photos

Curriculum Expectations Grade 9 Geography

Geographic Inquiry and Skill Development

Overall Expectations

A1. Geographic Inquiry: Use the geographic inquiry process and the concepts of geographical thinking when investigating issues relating to Canadian geography.

Specific Expectations

A1.2 select and organize relevant data and information on geographic issues from a variety of primary and secondary sources

A1.5 use the concepts of geographic thinking (i.e., spatial significance, patterns and trends, inter-relationships, geographic perspective) when analyzing and evaluating data and information, formulating conclusions, and making judgements about geographic issues relating to Canada

A1.9 use appropriate terminology when communicating the results of their investigations

Interactions in the Physical Environment

Overall Expectations

B1. The Physical Environment and Human Activities: analyze various interactions between physical processes, phenomena, and events and human activities in Canada

Specific Expectations

B1.2 analyze interrelationships between Canada's physical characteristics and various human activities that they support

B1.4 explain how human activities can alter physical processes and contribute to occurrences of natural events and phenomena

Teaching and Learning

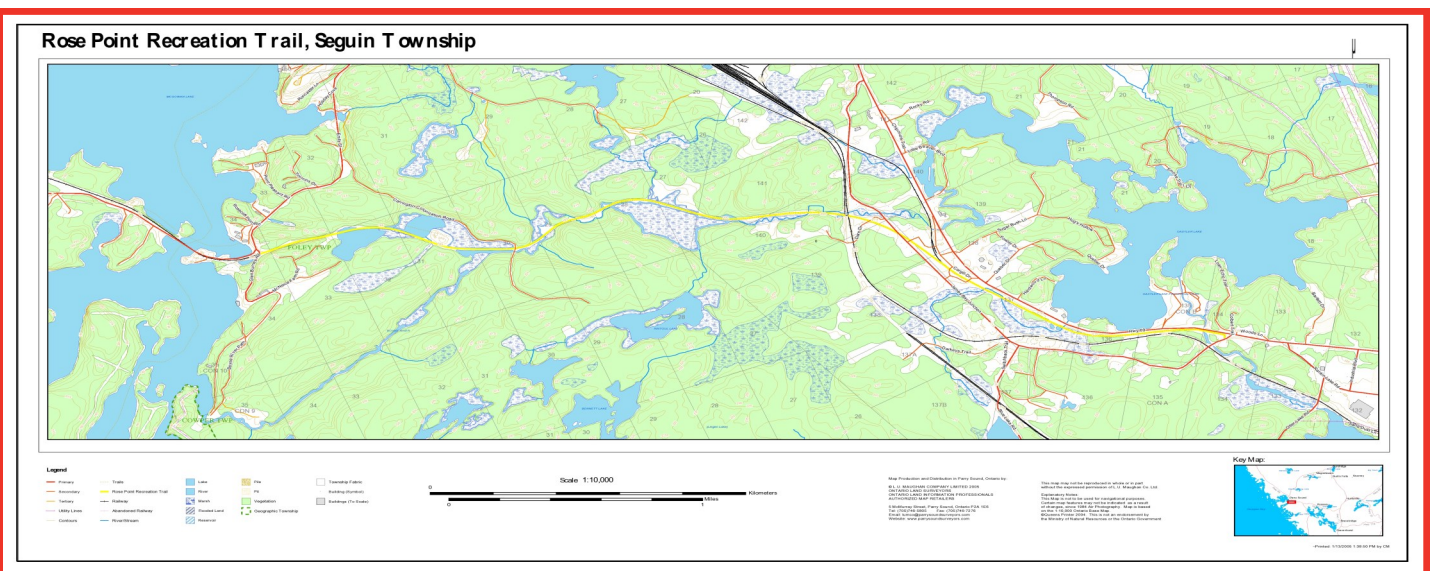
Part A: Introduction

In 1896, the Ottawa, Arnprior and Parry Sound Railway was completed, connecting Ottawa to Depot Harbour, the deepest freshwater harbour in the world, thus creating the shortest route from the grain producers of the west to the heavily populated and industrialized eastern seaboard at that time.

The hike travels along 4.5 kilometres of this railway built by the lumber and railway baron, JR Booth, one of the wealthiest men in Canadian history, who amassed his fortune through lumber, mills, and railway building.

Railway building, as highway building in our times, dramatically changed the areas that it went through. Even though the construction of the railway occurred over 100 years ago, evidence of lasting change still exists today.

Today, hiking the trail we'll look for evidence of human change, how aquatic macroinvertebrates can be used to measure the impact of the change, and finally, we'll take photos of what can be seen today to keep so we can see how this place has changed in the future.



Part B. The Hike!

The Rock

This rock was formed 25-35 km under the surface – at temperatures of up to rock-melting 750 degrees Celsius underneath mountains several kilometers in height.

The mountains of the Parry Sound area were called the Grenville Mountains, created over 1.3 billion years ago. At that time the continents weren't in the same shape or formations as they are now, but as now, were always on the move.



Two continents Nena, the early North American continent, and Atlantica pushed together to form the supercontinent of Rodinia. As the two continents moved towards each other, terranes (island landmasses separated by seas and small oceans) were pushed upwards on top of Nena during the continental collision. The terrane that formed this area is known as the Parry Sound terrane and it was added 1.45 billion years ago to the Grenville Mountain range. Many people believe that the Grenville Mountains once resembled the present-day Himalayas in both size and structure.

So what happened to those mountains? Over millions of years, the mighty forces of weathering reduced them to the flat, peneplain area that we have here in the Parry Sound.

Those powerful forces of weathering include mechanical, chemical, and biotic weathering. Mechanical weathering takes place when the rocks are torn apart by physical force but not changed in their chemical makeup. Examples of mechanical weathering include: pent up energy in the earth's crust pounding together on fault lines; the constant freezing and thawing of water that expands 10% when frozen, pushing existing cracks outward; and sand abrasion finely removing layers of rock.

In chemical weathering, existing rock has a chemical reaction with either oxygen, water, or carbon dioxide that weakens the bonds holding the rocks together causing them to break into smaller pieces.

Finally, biotic weathering is any type of weathering caused by living things. Biotic weathering culprits include the rock-digesting enzymes of lichen and mosses, the rock-wedging power of plant roots, and the digging of animals.

These rocks that we see on the trail were underneath the mountains. Imagine the sheer weight and pressure of the mountains upon them. The rocks we have in the area show signs of being changed, or "metamorphosized," by tremendous weight of the mountains. The rocks of our area are metamorphic gneiss (pronounced "nice") composed of alternating layers of light and dark minerals. The main minerals that make up the rocks in the area are quartz, mica, hornblende, and feldspar. (Some of best examples of metamorphic rock that has been twisted and bent by the weight and pressure of the mountains can be seen south of Mill Lake on Highway 400 on the rock cuts blasted when building Highway 400.)

Wetlands

Picture giant bulldozers ploughing over the area removing any soil and depositing it in Southern Ontario. The greatest agent of weathering to shape this area were these bulldozers, the glaciers that finally retreated from this area only 10,000 years ago. This area was covered at least three times by an ice sheet that exceeded a kilometre and a half in thickness. They not only carried soil, but also house-sized boulders that scraped the bedrock below. The vast majority of inadequately drained depressions that were left behind, as well as natural faults in the bedrock, now form the millions of lakes, ponds and wetlands that give this area its distinctive characteristic.



How much is a wetland worth? There are many wetlands in our area – so many that it is easy to come to see these places as wastelands – places that could be used for a multitude of other uses.

The economic or market value of wetlands hasn't traditionally been high. Wetland property could be purchased cheaply and developed – much of the developed area of Parry Sound sits on sites of former wetlands. But what do we lose when we lose a wetland?

Market failure exists when the market fails to reflect the full or true cost of a good or service. The economic value of filling a wetland for building does not include what is lost by the permanent destruction of that wetland, things like loss of water quality or flood control because these services don't have readily available dollar values. The real estate value of wetlands has not traditionally reflected its true value. Most of what a wetland does for people it does so freely – called “ecosystem services” these services include the following both direct and indirect economic benefits:

Use Benefits			Non-use Benefits
<i>Direct Use Benefits</i>	<i>Indirect Use Benefits</i>	<i>Option Benefits</i>	<i>Existence Benefits</i>
Recreation (boating, birding, wildlife viewing, walking, fishing) Hunting/Trapping Commercial Harvest (nuts, berries, grains, fish, peat, forestry)	Nutrient retention Water filtration Flood control Shoreline protection Groundwater exchange External ecosystem support Microclimate stabilization Erosion control Associated expenditures, travel, guides, gear, etc.	Potential future uses Future value of information Education	Biodiversity Culture Heritage Bequest value

Like the Joanie Mitchell song “Big Yellow Taxi,” with wetlands we often don’t know what we have until it is gone. The zero price of wetland services doesn’t reflect the high value of wetland services to human well-being.

In addition, the benefits of having a wetland are more of a communal benefit than an individual benefit. The person that owns the wetland might be better off financially to fill it and build on it. But as a whole, the community is better off to leave the wetland. The challenge is then to convince individual landowners to protect their wetlands on the property that they own.

Living Things of the Shield

Over a hundred years ago, early European settlers came to the area trying to eek out an existence through farming. They cleared the land of trees and boulders and planted crops. In most cases, the farms around this area were subsistence farms – growing just enough to get by. Each year the freeze/thaw would bring more rocks to the surface that would have to be cleared and the acidity of the soil didn't lend itself to growing crops. Further challenges included short growing seasons and cold winters.



An ecozone is a where geology meets biology – the interaction between the geology of an area and its life forms. The landform region that we live on here is the Canadian Shield and the corresponding ecozone is the Boreal Ecozone - a huge area that stretches from Saskatchewan to Newfoundland. An ecozone is the largest scale biogeographic division of the Earth's land surface, based on the distribution patterns of plants and animals.

In these large similar landform regions, plants and animals developed based on the geology around them. Metamorphic rock, such as the one that developed under the Grenville Mountains that are exposed today, tend to create acidic soils that are low in nutrients. The plants and animals that have survived here had to adapt to the conditions found here.

The soil found in this area is very thin, having been scraped away by those 1 1/2 kilometre thick glaciers. So plants found here also impacted by both a lack of moisture and a very limited nutrient supply. The tendency in this area is for soils to be very dry in the higher ground, since water quickly flows out of the soil, and saturated in the low areas, often forming wetlands. The richest plant growth in the area can be found in the small valleys where soil has accumulated and moisture loss is reduced because of shading from the walls of the valley.

The types of plants found around the Parry Sound area, therefore, can be grouped into habitat types whose characteristics can be traced back to geology. (Examples are listed in the table below).

Habitat Type	Characteristics
Upland forest	Soils drain quickly – so plants found in these areas can withstand drought. Typical
Lowland forest	Plants found in these areas require more moisture. Typical species are: white pine, red maple, sugar maple, white birch, yellow birch, mountain ash, blueberry,
Evergreen scrub	This vegetation type tends to occur in shallow areas with impeded drainage. The
Rock crevices	Plants found in these areas are both aggressive and opportunistic. Typical

Plants in this area can tolerate short growing seasons, acidic soils, and cold winters. Characteristic plant species found here Parry Sound, the southern most part of the Boreal Ecozone include deciduous trees such as sugar maple, beech, white birch, trembling aspen, and yellow birch and conifers such as white pine, balsam, tamarack, hemlock, and eastern white cedar. Around the area, rock outcrops bare from our glacial past still remain, covered by lichen and ground-hugging shrubs.

In the animal world, the herbivores of this area have evolved to feed on the plant life available. These include snow-shoe hare, white-tailed deer, moose, beaver, and many others. Carnivores include members of the weasel family, wolves and lynx.



T. Burke

Human Activity on the Trail

When hiking the Rose Point Trail, some of the human activity that would have gone on here remains hidden such as hunting and gathering by the First Nations peoples. Some of the settlement history can still be seen such as the colonization road to Carrington, which became known as Parry Harbour when the Town of Parry Sound acquired land on the south side of the Sequin.

The forests that grow on either side of the trail are second growth, the towering white pines having been removed during the

The railway would have brought early tourists to this area – some of them coming to the Rose Point Hotel to experience the Canadian wilderness and fabulous fishing opportunities.

The Rose Point Trail just like the railway before it is important for bringing tourists to the area. The Rose Point Trail is an important link in the Park-to-Park trail system, joining Killbear Provincial Park to Algonquin Provincial Park with a 230 kilometre multi-use trail. It is also part of the Ontario Federation of Snowmobile Clubs' Trans Ontario Provincial

Trunk Trail. It has been estimated that the Seguin Recreation Trail brings 7 million dollars a year from snowmobiling alone, and that the completed Park-to-Park Trail would bring in between \$700,000 to \$1.4 million a year on top of snowmobile estimates (Rose Point Trail Management Plan, 2006).

Hiking, wildlife viewing, bird watching, snowmobiling can be done on the Rose Point Trail.



Conclusion

The rugged beauty of the landscape with its lakes, rivers, and wetlands, as jagged rock outcrops are a result of our geological past

Part C. Evidence of Human Change

- On the map in their individual booklets:
- Place "X's" on locations that you think would have been changed during the building of the railway. Label how it would have been changed.
- Place "#s" on locations that you think would have been changed recently. Label how it would have been changed.

Part D. Macroinvertebrates: Bio indicators of Change

Ask students to consider: *What are some of the impacts that railway building would have had on the wetland areas that it went through?*

Macroinvertebrates are “macro” in size - that is they can be seen with the naked eye or are larger than 0.5 mm. They are also “invertebrates,” so they include insects, arachnids, mollusks and crustaceans - any creature without a backbone.

Aquatic macroinvertebrates can be used effectively as bioindicators of healthy wetland areas. Wetland areas can be negatively impacted by development through sedimentation, chemicals and oils, and animal and human waste.

As the water quality and available oxygen decreases, many macroinvertebrates are unable to survive. These macroinvertebrates are said to be “pollution intolerant.”

Some macroinvertebrates, such as mosquito and midge larva, can survive regardless of water quality and amount of dissolved oxygen. They are said to be “pollution tolerant.” The presence of exclusively these organisms indicates poor quality.

Most of the macroinvertebrates found in wetland areas fall somewhere in the middle and are said to be “somewhat pollution tolerant.” Since most wetlands, as compared to streams and creeks, have less circulation of water, many wetland macroinvertebrates (as opposed to those found in streams) can handle lower oxygen conditions. The amount of diversity of the macroinvertebrates in this category can indicate wetland health.

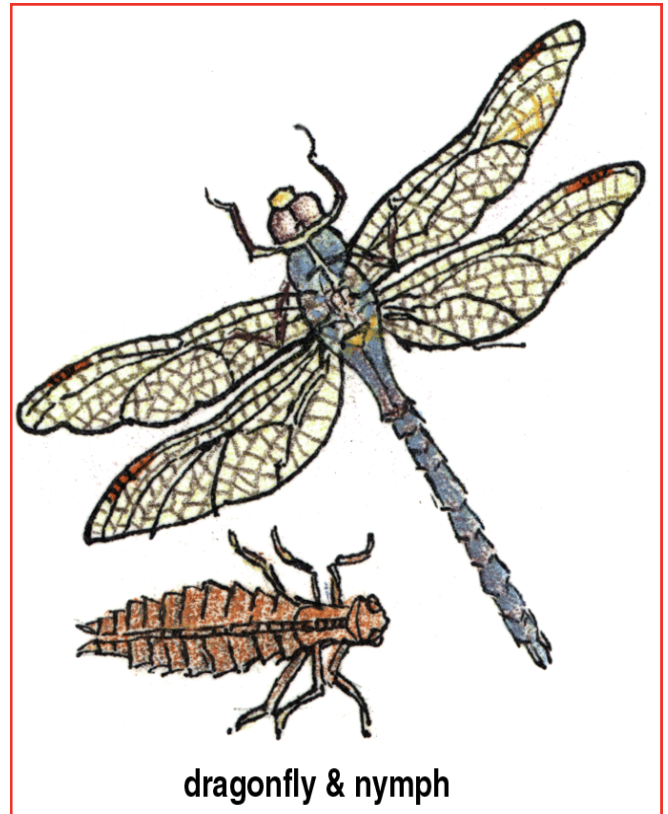
Some possible impacts of railway building include sedimentation, chemical contamination from creosote railway ties, and human waste. At the time of building, over 100 years ago, very little thought would be been paid to the changes the railway would make to the wetland areas.

We can take samples of the macroinvertebrates found in the wetland areas today as a way to determine wetland health. The actual scientific sampling is much more complicated, but the diversity of living organisms found can give a good indication of wetland health.

Ask students to consider and discuss: *Do you think that railway building had a long lasting impact on wetland macroinvertebrates? What about on wetland health?*

Individually or in small groups, find as many macroinvertebrates as possible. Using the key provided, identify the macroinvertebrate and enter number found on the above chart.

As a class we'll discuss the different types of macroinvertebrates that are found and how they might indicate wetland health.



Part E. Picture of Change

One of the easiest ways to see how an area has been changed by human development is to look at old photographs and to compare to what is seen there today.

As the students walk the rest of the trail, take photos of evidence of human change, both past and present to the area of trail. Think about how the rocks, vegetation, and wildlife would have been impacted and changed by the building of the railway, the use of it as a railway, and the present day use of it as a trail.

Part E. Assessment

Ask students to take 3 of their pictures and label evidence of human change. Write a small report describing the change in the images

Please email pictures to
education@gbbr.ca.



**THE ONTARIO
TRILLIUM
FOUNDATION**



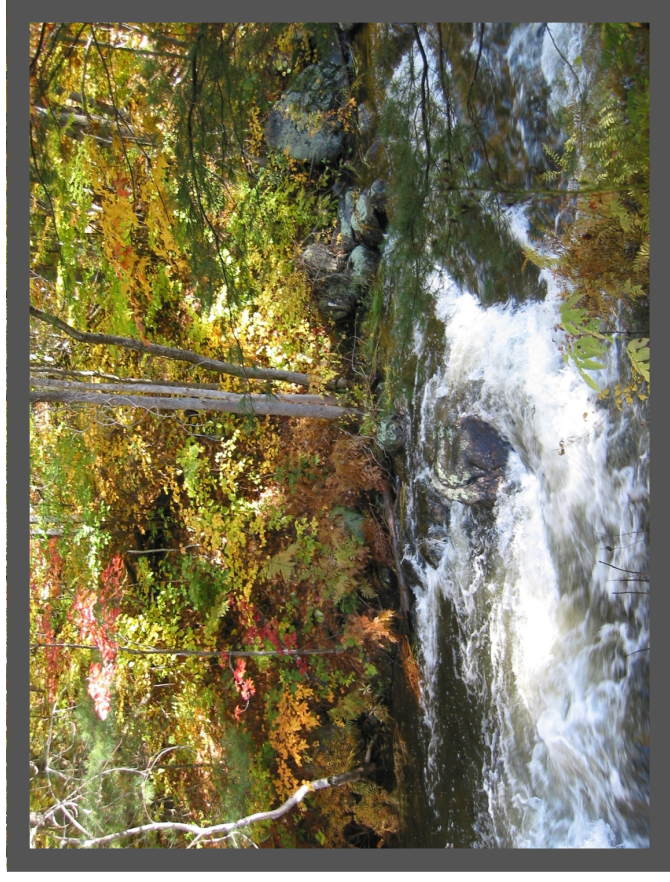
**LA FONDATION
TRILLIUM
DE L'ONTARIO**



STUDENT WORKBOOK

A STUDY IN CHANGE.

ROSE POINT TRAIL

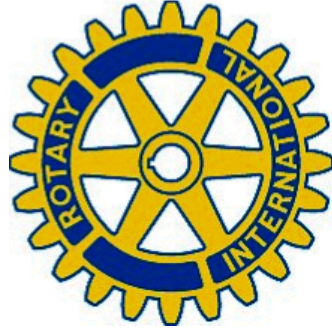


United Nations
Educational, Scientific and
Cultural Organization

In partnership with the Near North District School Board, the Lessons-In-A-Backpack program is an initiative of the Georgian Bay Biosphere for the development of locally based outdoor and environmental studies in West Parry Sound District schools with the goal to increase awareness of eastern Georgian Bay's ecosystems and foster the participation of students and teachers in stewardship actions.

Acknowledgments:

Development of materials and resources for the Rose Point Trail Lessons-In-A-Backpack has been made possible through the support of the Parry Sound Rotary Club, Seguin Township, and the Ontario Trillium Foundation.



Ontario
Trillium
Foundation

Fondation
Trillium
de l'Ontario

An agency of the Government of Ontario.

Relève du gouvernement de l'Ontario.

A Time of Change



JR Booth - one of the wealthiest men in Canadian history, profiting from lumber holdings, mills, and railways.

In 1896, the Ottawa, Arnprior and Parry Sound Railway was completed, connecting Ottawa to Depot Harbour, the deepest freshwater harbour in the world, thus creating the shortest route from the grain producers of the west to the heavily populated and industrialized eastern seaboard at that time.

The hike travels along 4.5 kilometres of this railway built by the lumber and railway baron, JR Booth, one of the wealthiest men in Canadian history, who amassed his fortune through lumber, mills, and railway building.

Railway building, as highway building in our times, dramatically changed the areas that it went through. Even though the construction of the railway occurred over 100 years ago, evidence of lasting change still exists today.

Today, hiking the trail we'll look for evidence of human change, how aquatic macroinvertebrates can be used to measure the impact of the change, and finally, we'll take photos of what can be seen today to keep so we can see how this place has changed in the future.

Rose Point Recreation Trail, Seguin Township



This Rose Point Trail map shows its route from Rose Point Road to James Bay Junction Road. The trail crosses the Boyne River three times and winds its way through the wetland areas surrounding the trail.

Evidence of Human Change

Activity #1

On the map:

- Place “X’s” on locations that you think would have been changed during the building of the railway. Label how it would have been changed.
- Place “#’s” on locations that you think would have been changed recently. Label how it would have been changed.

Activity #2

Macroinvertebrates - Bioindicators of Change

What are some of the impacts that railway building would have had on the wetland areas that it went through?

Macroinvertebrates are “macro” in size - that is they can be seen with the naked eye or are larger than 0.5mm. They are also “invertebrates,” so they include insects, arachnids, mollusks and crustaceans - any creature without a backbone.

Aquatic macroinvertebrates can be used effectively as bioindicators of healthy wetland areas. Wetland areas can be negatively impacted by development through sedimentation, chemicals and oils, and animal and human waste.

As the water quality and available oxygen decreases, many macroinvertebrates are unable to survive. These macroinvertebrates are said to be “pollution intolerant.”

Some macroinvertebrates, such as mosquito and midge larva, can survive regardless of water quality and amount of dissolved oxygen. They are said to be “pollution tolerant.” The presence of exclusively these organisms indicates poor quality.

Most of the macroinvertebrates found in wetland areas fall somewhere in the middle and are said to be “somewhat pollution tolerant.” Since most wetlands, as compared to streams and creeks, have less circulation of water, many wetland macroinvertebrates (as opposed to those found in streams) can handle lower oxygen conditions. The amount of diversity of the macroinvertebrates in this category can indicate wetland health.

Some possible impacts of railway building include sedimentation, chemical contamination from creosote railway ties, and human waste. At the time of building, over 100 years ago, very little thought would be been paid to the changes the railway would make to the wetland areas.

We can take samples of the macroinvertebrates found in the wetland areas today as a way to determine wetland health. The actual scientific sampling is much more complicated, but the diversity of living organisms found can give a good indication of wetland health. In small groups, find as many macroinvertebrates as possible. Using the key provided, identify the macroinvertebrate and enter number found on the above chart.

As a class we'll discuss the different types of macroinvertebrates that are found and how they might indicate wetland health.

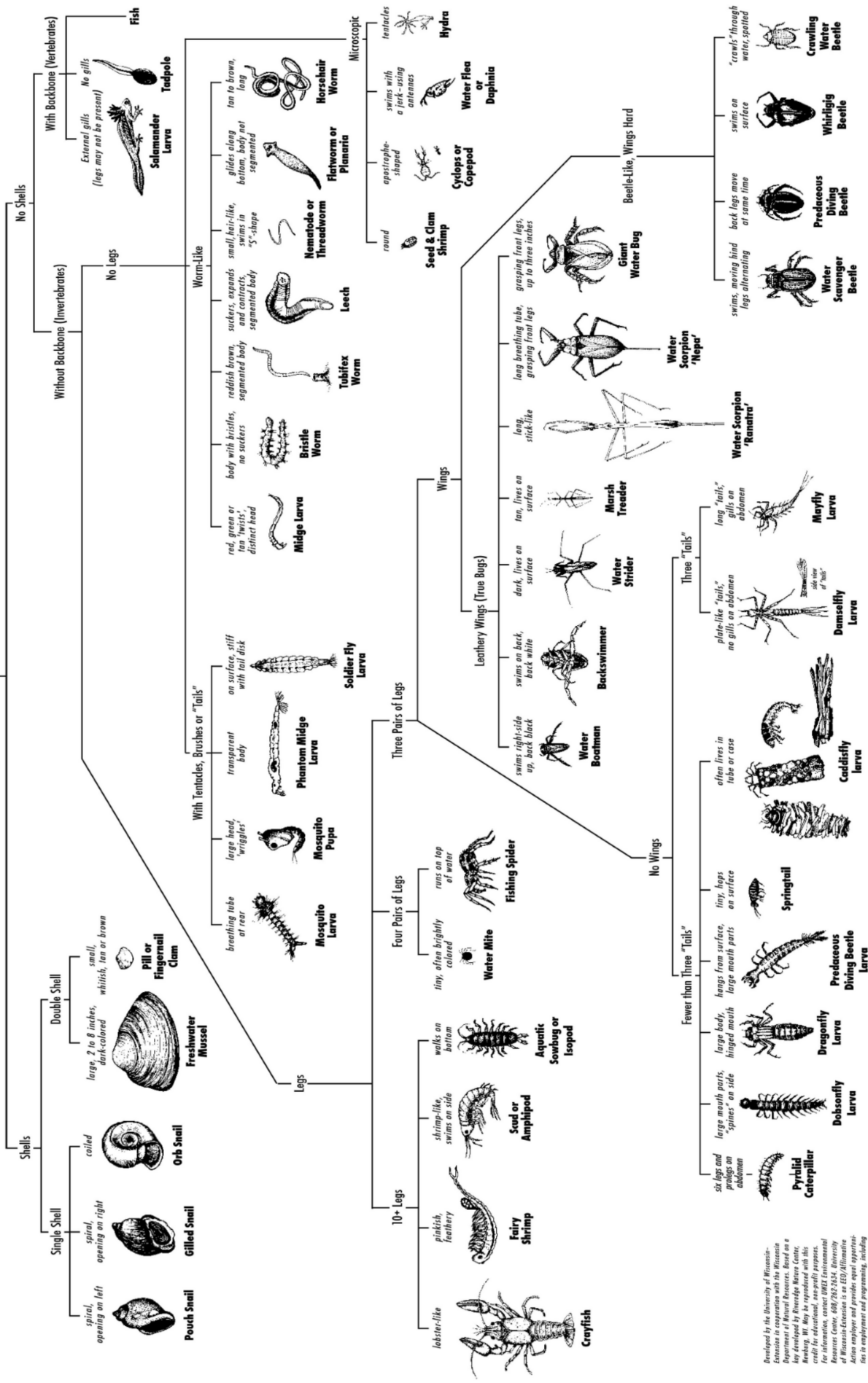
Do you think that railway building had a long lasting impact on wetland macroinvertebrates? What about on wetland health?



A Key to Pond Life

Key to Life in the Pond

(Sizes of illustrations are not proportional.)



Developed by the University of Wisconsin-Extension in cooperation with the Wisconsin Department of Natural Resources. Based on a key developed by Kenneth W. Brinkman, University of Wisconsin-Extension, and the Wisconsin Department of Natural Resources. For information, contact DNR's Environmental Resources Center, 600/761-2624. University of Wisconsin-Extension is an EEO/AAEEO organization. This key and its contents are not to be reproduced without permission. This is not an AEA requirement.

Macroinvertebrate	Pollution Tolerance	Quantity Found
Mayfly Larva	Intolerant	
Stonefly Larva	Intolerant	
Caddisfly Larva	Intolerant	
Dragonfly Nymph	Somewhat Tolerant	
Damselfly Nymph	Somewhat Tolerant	
Water Strider	Somewhat Tolerant	
Giant Water Bug	Somewhat Tolerant	
Backswimmer	Somewhat Tolerant	
Predaceous Diving Beetle	Somewhat Tolerant	
Whirligig Beetle	Somewhat Tolerant	
Sideswimmer	Somewhat Tolerant	
Water Boatman	Somewhat Tolerant	
Mosquito Larva	Tolerant	
Midge Larva	Tolerant	

Other Macroinvertebrates Found	Pollution Tolerance	Quantity Found



Activity #3

Picture of Change

One of the easiest ways to see how an area has been changed by human development is to look at old photographs and to compare to what is seen there today.

As we walk the rest of the trail, take photos of evidence of human change, both past and present to the area of trail. Think about how the rocks, vegetation, and wildlife would have been impacted and changed by the building of the railway, the use of it as a railway, and the present day use of it as a trail.

Homework assignment: Take 3 of your pictures and label evidence of human change. Please email pictures to education@gbbr.ca.



Train Terminal at James Bay Junction - just south of Parry Sound.

What do you notice about the landscape surrounding the railway that is very different than what you would find today?