

Teacher Field Guide



A Grade 4 Teacher's Guide to Leading a Field Trip
at the Eramosa Karst Conservation Area

Published by

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Introduction to the Guide

On this field trip, you will see rocks in the environment and make observations about them in order to learn the story behind the Eramosa Karst. Karst landscapes are characterized by caves, sinkholes, sinking streams, and springs. These features act as clues to tell us the story of how rocks and water have interacted here in the past.

This guide describes 12 stations. At each station, you'll get a better sense of what Karst is and how it is formed. Each station is marked on the trail map on page 5.

At the end of the guide you will find some tips for teachers and activities to do while walking with students. There are also two handouts for students found on the USB drive that accompanies this guide.

The USB drive also includes a "What is Karst" background slide show, modeling activities, and a cumulative role play activity. Doing the Pre-Trip Activities before you go on this field trip will help your students understand more of what they see at the Eramosa Karst. They also link to curriculum and help students learn about rocks, minerals, and habitats.

Objectives

Students will be able to

- 1) identify different Karst features
- 2) explain how some sedimentary rocks are dissolved by water
- 3) describe how humans have used rocks in the Eramosa Karst

Materials

- Clipboards
- Worksheets
- Pencils

Work Sheets can be found on the USB Drive accompanying this Guide. Use one or both worksheets at your discretion. Modify them as needed.

Worksheet 1. "Let's Rock and Roll" follows the tour, allowing students to take notes along the way.

Worksheet 2. "Use your Senses" encourages students to pay attention to their surroundings as they walk through the Karst.

Directions

How to get to the Eramosa Karst Conservation Area:

From the Lincoln Alexander Parkway, exit Stone Church Road East

Turn Left onto Stone Church Rd. E.

Turn Right onto Upper Mount Albion Road

The Eramosa Karst will be on your left hand side after the 4 way stop.



How to find your way around the Eramosa Karst:

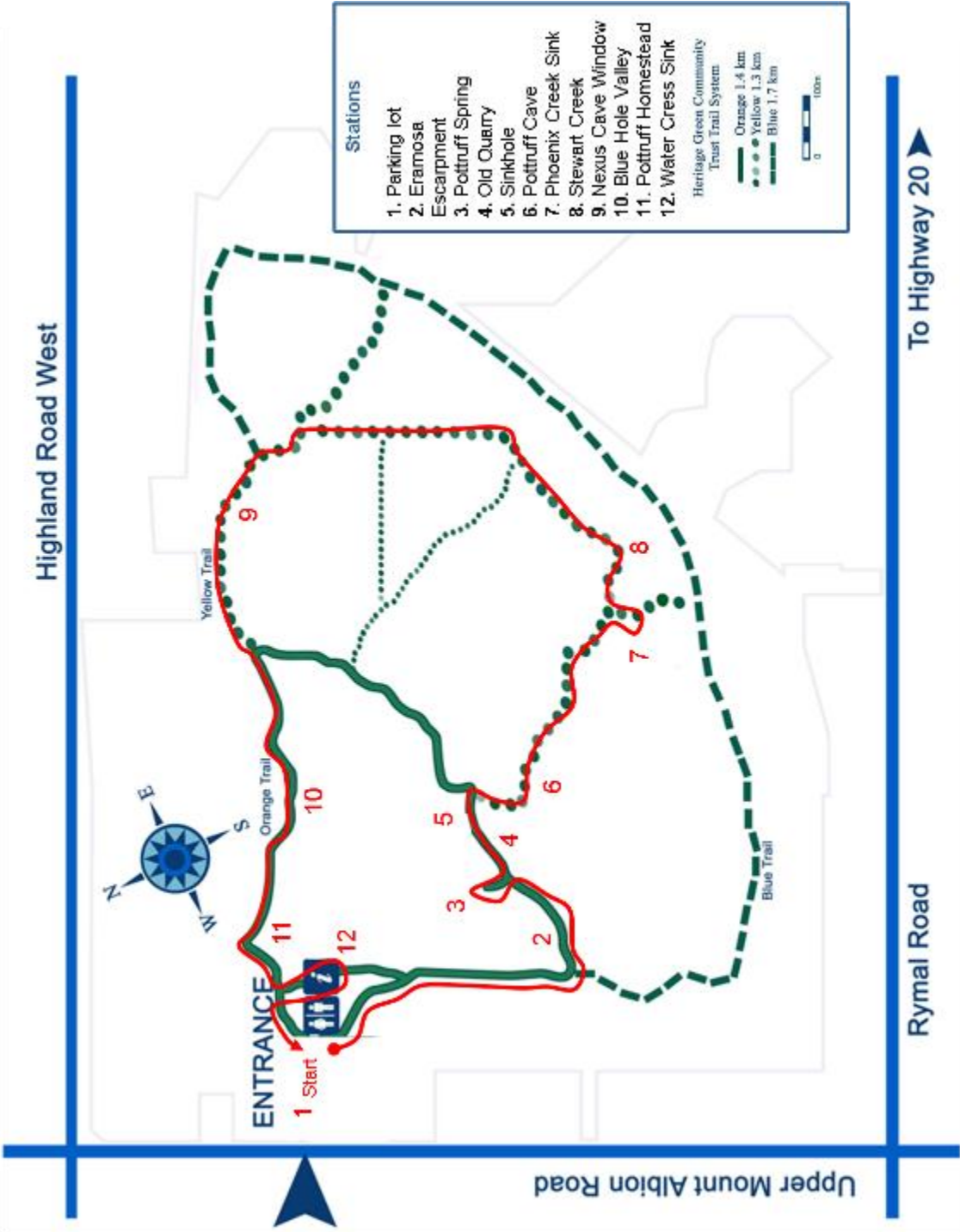
This trail guide contains directions to each station. At the end of each station description, you will find directions to the next station.

There is also a map making each station on the next page. You will start and finish at the Entrance, marked Station 1 Start.

Note: Unless otherwise indicated in this guide, continue straight on gravel paths, ignoring any unmarked forks or grass paths.

Tour Overview

1. Parking Lot and Information Centre
2. Eramosa Escarpment
3. Pottruff Spring
4. Old Quarry
5. Sinkhole
6. Pottruff Cave
7. Phoenix Creek Sink
8. Stewart Creek
9. Nexus Cave Window
10. Blue Hole Spring
11. Pottruff Homestead
12. Watercress Sink



- Stations**
1. Parking lot
 2. Eramosa
 3. Escarpment
 4. Pottruff Spring
 5. Old Quarry
 6. Sinkhole
 7. Pottruff Cave
 8. Phoenix Creek Sink
 9. Stewart Creek
 10. Nexus Cave Window
 11. Blue Hole Valley
 12. Pottruff Homestead
 13. Water Cress Sink
- Heritage Green Community Trust Trail System
- Orange 1.4 km
 - Yellow 1.3 km
 - Blue 1.7 km
- 0 100m

The Tour

Station 1. Getting Started at the Information Centre

Summary: set the tone for the field trip and introduce students to the Eramosa Karst.



If students are rambunctious from the bus ride, have them explore the paved area for a minute or two, looking at information on the panels and trying to find fossils in the seating area.

Information Points

1. A Karst is an area where rocks and water interact in unique ways, making caves, sinkholes, disappearing streams, and other unique features. If we look very closely at these features, they can tell us the story of the Eramosa Karst.
2. Today, you are all explorers, making observations and taking notes in order to learn the story of this park. You all have a handy worksheet on which to record your observations.

Let's get exploring!

Optional Activity

Have your students look for fossils in the limestone seating area. The picture to the right shows one example. There are many more to be found!



Interesting Facts

- “Eramosa” is derived from the native word Un-ne-mo-sah meaning crazy dog
- “Karst” is a Slavic word meaning barren and rocky ground.



Directions:

With your back to the parking lot, take the Orange Trail to the right.
Stay on the Orange Trail ignoring unmarked paths.
At the signpost indicating 2 Orange Trails, keep to the right on the Orange Trail.
At the signpost for the Orange and Blue Trails, keep left on the Orange Trail.

Station 2 is the downward sloping ridge of rocks on your left.

Travel Time: 10 minutes

Station 2. Eramosa Escarpment

Key to the story: dolostone rock is soluble in water.



To the left of the trail, you will see large, cracked boulders and a very small cliff. This cliff is the Eramosa Escarpment (a small escarpment found on top of the Niagara Escarpment).

Information Points

1. Most of the rock in the Eramosa Karst is dolostone, a sedimentary rock very similar to limestone.
2. Dolostone is **soluble**.
What happens when you drop a sugar cube in a glass of water? (it dissolves). The same thing happens to dolostone in water! It dissolves very slowly.
3. Gradually, the water creates interesting patterns in the rocks. They look a little bit like swiss cheese. These patterns are called Karren.

Activity: Looking for Karren



The holes and jagged edges of this rock are typical examples of karren.

Have the students search the rocks at the Eramosa Escarpment looking for examples of Karren. Ask them to sketch a rock that looks like part of it has been dissolved by water.



Directions:

Continue along the Orange Trail.
Look for the Pottruff Spring signpost to the left of the Trail.
Take the side trail down the hill to the spring.

Travel Time: 3 minutes

Station 3. Pottruff Spring

Key to the story: Just as water dissolves rock on the surface, it also dissolves rock underground. Eventually, it makes channels and passageways. Water can then flow underground through the channels it has created.

Information Points



This picture was taken while the photographer was standing at the spring.

1. When water meets dolostone underground, it slowly dissolves part of the rock away, creating an underground channel for the water to run through, like an underground river.
2. The area where water re-appears from underground is called a 'spring'.

Optional Activity: The Source of the Spring

Have students explore the spring and find the source. Remind them to use caution around flowing water!

Optional Discussion

Where does this water come from? (underground stream)

Do you think this water safe to drink? (it is not safe to drink. See below for more information)

We usually think of springs as fresh, pure water, but Karst springs are different.

Would you drink water straight from Hamilton Harbour? (No).

Even if it had flown through a pipe for several meters? (No. It would still be dirty.)

What if that water had been filtered first, would you drink it? (Yes. Our drinking water is actually Hamilton Harbour water that has been filtered.)

In an ordinary water system, soil acts like a filter, making the ground water safe to drink. In Karst, the water travels through open channels in the rock, like water through a pipe. It is not filtered at all.



Directions:

From Pottruff Spring, retrace your steps back up to the Orange Trail
Keep left onto the Orange Trail.
Stop on the board walk bridge just ahead.

Travel Time: 2 minutes

Station 4. The Old Quarry

Key to the story: The Eramosa Karst has been shaped by people and by water.



Information Points

Standing on this bridge, we can see rocks that have been quarried by humans and rocks that are part of the underground water channel.

1. This area is called 'The old quarry' because people used to quarry rocks here. It was really easy for them to chisel out pieces of overhanging rocks and then just let them fall to the ground. They then used these rocks to build houses and barns.

Ask: What other human impacts can you see here? (Prompt students to identify the bridge they are standing on) Why is there a bridge here? There's no water underneath.

2. Water does flow through here some times. It comes out of the escarpment and flows down to Pottruff Spring.

The stream is currently flowing in a channel underground. Imagine the water flowing underground beneath our feet. If it has rained a lot, the channel fills up and the extra water flows above ground .

Activity: Tracking Traces of Humans

Have students sketch a rock showing human impact. Try having them find one that is smooth or shows a straight edge. These rocks were probably quarried.



The sharp edges of this rock were probably created when humans chiseled part of the rock away in the 1800s.



This rock is covered with karren, bumps created as water dissolves rock. As karren takes 100s of years to form, we can guess that this rock was not quarried in the recent past.



Directions:

Continue along the Orange Trail.

You will walk up a slight incline.

When the ground levels out, watch for a large sinkhole to the right of the Trail.

Stop beside the sinkhole.

Travel Time: 2 minutes

Station 5. Sinkhole

Key to the story: sinkholes are clues that tell us there are channels underground. They form when soil sinks into the empty spaces in the bedrock.



Information Points

1. This sinkhole formed when ground water dissolved the underground rock.
2. As the water washed away the rock, the soil on the surface slid down into the hole, creating this sinkhole. Imagine/observe sand pouring through an hour glass. This is very similar to what happened here.
3. You will see sinkholes all over the Eramosa Karst. Keep your eyes open as we continue and point out any you see.



Directions:

Continue along the Orange Trail.
At the signpost, keep right onto the Yellow Trail
Station 6, Pottruff Cave, is straight ahead.

Travel Time: 2 minutes

Keep Your Eyes Open For... Seasonal Changes

The Karst changes with every season. In winter, a blanket of snow can make it easier to spot sinkholes and interesting rocks.

If you find yourself here in the snow, make sure to keep your eyes open for interesting rocks, ice sculptures, and animal tracks!



Wild turkey footprints and a wing mark. Keep an eye open for squirrel, rabbit, and raccoon tracks



Ice stalagmites formed by water dripping from a cave ceiling

Station 6. Pottruff Cave

Key to the story: Caves are the result of centuries of rock dissolution. Water slowly enlarges underground passage ways over time. When these passages are large enough for a human to fit through, they are called caves.



Information Points

1. Pottruff Cave used to be an underground water passage (like what we imagined at the old quarry). As water flowed through the channel, it dissolved more of the rock, making the roof thinner. When the roof became too thin, the ceiling collapsed, leaving this big hole in the ground.



Water stills flows through Pottruff Cave making the cave bigger all the time. This picture was taken in winter when the stream had frozen solid.

Activity: Human Cave

Human cave: To help students understand and remember how caves are formed, have them act out the process of cave formation.



Looking out from Pottruff Cave

Ask students to imagine they are sedimentary rocks. Have them stand together in a loose cluster. Explain that you are water, slowly pushing in at one end. The students you touch are 'dissolved' and join hands with you, following you through the group. After you've cleared a path through the "rocks", have the remaining students reach up and join hands, making the cave. The students that were dissolved into water can line up single file and travel back through the cave, pretending to be a stream of water.



Directions:

Continue along the Yellow Trail. You will now be heading into a field.

Walk past the signpost for Pottruff Blind Valley.

Watch for the Phoenix Creek Sink signpost on the right of the trail.

Keep right down the side trail towards Phoenix Creek Sink.

Stop just past the boardwalk.

Have students explore the creek area to the right of the trail

Travel Time: 10 minutes

Keep Your Eyes Open For... Changing Water Levels

Every trip to the Karst is different depending on the time of year and how much it has rained recently. After a large rainfall or snow melt, the underground channels can fill with water and flood entire areas!



Pottruff Cave during a period with little to no rain.



Pottruff Cave after a large rainfall and snow melt. The underground channels are overflowing with water.

Keep Your Eyes Open For... Garlic Mustard

Garlic Mustard is an invasive plant. It was brought to Canada by European settlers who used it to flavor food. It escaped from their herb gardens and now covers much of Ontario's forest floor.

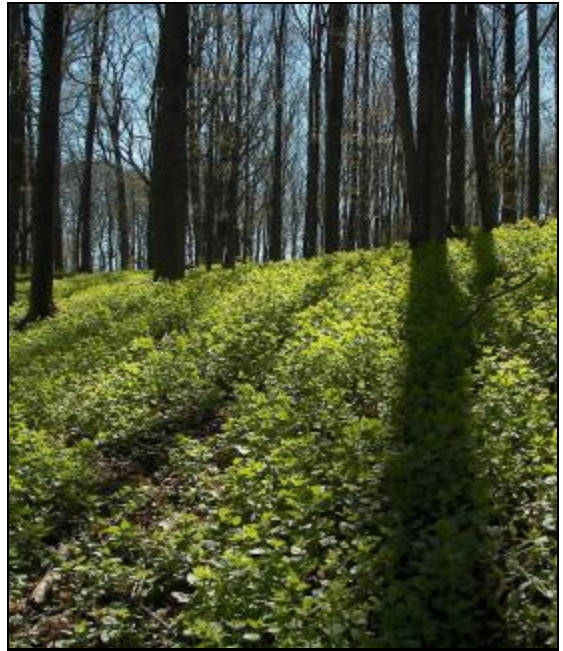
Conservationists are worried about Garlic Mustard because it spreads so quickly. As a result, it threatens Ontario's native forest plants like Trilliums.

Try to find some to show your students. It is very easy to find at the Eramosa Karst.

In late spring, look for a knee high plants with light green leaves and small white flowers.

In the fall, look for ground level plants with a few deep green leaves.

If you are not sure you have found the right plant, try smelling it. Garlic Mustard smells exactly like its name suggests.



Garlic Mustard near the Old Quarry. It is easy to find at the Eramosa Karst because it grows everywhere!



Trilliums compete with Garlic Mustard for space to grow



May-apples seem to be able to out-compete Garlic Mustard. Look for these short plants.

Station 7. Phoenix Creek Sink



Key to the story: underground streams start on the surface and sink into underground channels at sink points.

Information Points

1. At this sink point, the stream slips into an underground channel and begins to flow underground.
2. This is the same stream we stood over at the Old Quarry and saw re-emerge at Pottruff Spring.

Optional Activity

If water levels are low and the area is not too wet, you can have students explore the stream area and look for the sink point.



This photo was taken after a heavy rainfall. The sink is overflowing as the extra water fills the underground channel.



Directions:

Return to the Yellow Trail. Keep right and enter the meadow.

Follow the trail past the signpost for Stewart Creek Sink. The trail runs to the right of Stewart Creek for several meters.

Stop at a place you can see the creek through breaks in the vegetation.

Travel Time: 2 minutes

Station 8. Steward Creek



A hydrologist adds a non-toxic dye to Steward Creek. He will monitor nearby streams for the dye to find out where Steward Creek resurfaces

Key to the story: Streams run on the surface before sinking underground

Ask: Is the stream straight or curved?

Information Points

1. Rivers and streams don't flow in straight lines unless humans dig channels to straighten them. The curves are important for creating habitat for different kinds of plants and animals.

Optional Activity: River Walk

While you travel to the next station, move the students along the trail as if they were in a stream. Walking in single file, curve and wind along the path, like a stream does. Have students switch order, taking turns as the lead.



Directions:

Continue along the Yellow Trail

At the fork, keep left to stay on the Yellow Trail.

You will now be passing through a meadow, walking towards a woodlot.

Remain on the gravel trail as it passes through the woodlot.

At the T intersection, keep left to stay on the Yellow Trail

Stop at Nexus Cave Window.

You will see a bench next to a hole in the ground.

Travel Time: 10 minutes

Keeps Your Eyes Open For...

You are now entering part of the Karst that was previously agricultural land. In many years these old fields will become a forest again, but for now, they are a meadow. Try to find meadow flowers like Goldenrod, Queen Anne's Lace, and purple Asters.



Station 9. Nexus Cave Window



Key to the story: Caves and rocks are part of the ecosystem. They create new plant and animal habitat.

Information Points

1. Caves are very important habitats for many animals.

Ask: what kinds of animals live in caves? (bats, bears, etc)

2. There are no bats or bears in these caves. There are some spiders and sometimes raccoons and opossums.

3. Sometimes even people try to live in these caves.

Ask: Would you like to live in the cave? Why or Why not?

Why might an animal want to live here?

Caves offer protection from predators and protection from the sun. Caves are also warm in winter and cool in summer, making them great places to live... for some creatures!

Humans have found shelter in caves for millennia. One human even used this cave recently. When the Conservation Authority first acquired this land, they found a man living in Nexus Cave Entrance! He had chairs, food, and even a stove!



Animal tracks leading up to Nexus Cave Window.



Directions:

Continue along the Yellow Trail

At the signpost for the Yellow and Blue Trails, remain on the Yellow Trail to the left.

At the signpost for the Yellow and Orange Trails, take the Orange Trail to the right.

Stop on the board walk at Blue Hole Spring.

Travel Time: 10 minutes

Keep Your Eyes Open For... Buckthorn Trees

The trail between Nexus Cave Entrance and Blue Hole Valley is surrounded by Buckthorn Trees. These trees are an invasive species that spread quickly to cover entire areas.

Keep your eyes open for these trees and some of the local wildlife that take advantage of them.



A Robin looks for black Buckthorn berries. These berries do not taste very good and offer little nutritional value but birds will eat them if there is nothing else available.

Turkey Tail Fungus grows on a branch of a Buckthorn Tree

Station 10. Blue Hole Spring



Stop on the boardwalk.

Key to the story: Water levels change in Karst. Areas that are usually dry can flood after a heavy rain fall.

Information Points

1. Water channels flow underground, beneath this valley.
2. When the underground water channels are filled, this area floods.
3. During floods, many plants get washed away. As a result, this area will never become a forest. Any tree seedlings that start to grow will get washed away before they are mature. Only fast growing meadow plants can survive here.



Directions:

Continue along the Orange Trail.

Stop at the signpost for Pottruff Homestead

There are 'ruins' located to the left and right of the trail. Students can explore for a few minutes.

Travel Time: 10 minutes

Keep Your Eyes Open For... Dogwood Shrubs

This shrub is easy to spot all year long. Its red branches stand out in winter and in summer.

There is a large cluster of Dogwood in the Blue Hole Spring, so keep your eyes open for them!



Station 11. Pottruff Homestead



Key to the story: humans have lived in the Karst for a long time and have used the rocks to build shelter and the land to grow food.

Information Points

1. The Pottruff family took rocks from the Eramosa Escarpment and used them to build houses and barns.
2. The Pottruff family had a big impact on the Karst when they lived here. They moved rocks, cut down trees to make farm land, and used a lot of water. But they still took good care of the land. They left many areas of the forest to grow and kept the water healthy. They took good care of the land and now we have this conservation area to enjoy today.

Activity: Explore and Sketch

Activity: Have students explore the ruins on both sides of the trail.

Ask: What were these rocks used for? (to make the foundations of barns and houses)

Where did they come from and how did they get here? (from the Eramosa Escarpment. The Pottruff family brought them here to build with in the 1800s)

Have students draw a rock from the ruins. Does this rock show signs of being dissolved by water, quarried by humans, or both?



A student takes a rubbing of rocks at the Pottruff Homestead



Directions:

Continue along the Orange Trail.
The East Mountain Trail Loop connects to the Eramosa Karst here.
Keep left to stay on the Orange Trail.
At the signpost, turn left towards Watercress Sink

Travel Time: 5 minutes

Station 12. Watercress Sink

Key to the story: This is the same stream we saw at Pottruff Spring. From here, the stream travels underground out of the park and into a local suburb.



Watercress Sink as seen from the trail



Watercress Sink as seen from other side of trail

Information Points

This is named Watercress Sink because of the Watercress that grows here.

This is also the last sinkpoint in the Eramosa Karst and the last station in the field trip. Here the stream disappears underground once again, but it does not stop flowing. Eventually, the Creek will flow down the Niagara Escarpment and into Hamilton Harbour.



Directions:

Retrace your steps back to the Orange Trail.
At the fork, keep left to return to the parking lot.

Travel Time: 5 minutes

Education Tips for Teachers

Don't worry if you don't have extensive plant and animal knowledge for your trip to the Karst. A sense of exploration and an desire to see new things is all that is really required for an interesting nature walk. Here are some tips to keep in mind as you lead your students on any nature activities.

1. The process is more important than the product. Thinking about and being in the local environment is more important than finding everything on the Scavenger Hunt or even seeing all the Karst features.
2. Watch out for Teachable Moments, moments when something you didn't expect to happen, happens. For example, you might be telling students about the man who lived in Nexus Cave when a snake slides by, attracting a lot of attention. Don't hesitate to venture from the script and start talking about the snake. For example, would a snake want to live in a cave? Why or Why not?
3. When on a nature hike, it's more important to ask good questions than to have good answers. If a student asks about something, don't worry if you don't know the answer. If all else fails, commend the student on his or her interesting observation, and say you don't know either, but isn't it interesting? You can make a point to do more research once you get back to class.
4. 'Feelings' about nature tend to resonate more than 'facts' about nature. Statements like: "Isn't that tree interesting? I wonder how its branches got like that" are more intriguing than "the scientific name of this tree is... its branches are like this because...)
5. You probably have more natural knowledge than your students. Even if you don't know the names of all the trees or birds, you can still show your students something new about the world around them. You can point out the simple things you do know like an Oak tree or a Pine tree without having to get to specific.

Mobile Activities

These games can make walking longer distances more enjoyable. They help students pay attention to what is around them and reinforce information from the program.

Count the Sounds

Objective: Shows how close this conservation area is to the city and developed areas. Also gives students practice using all of their senses when outdoors.

Tell the students they will have to be very quiet and use their listening skills for the next part of the walk. Have them make both hands into fists. When they hear a 'nature' sound, have them put up a finger on their left hand. When they hear a 'human' sound, have them put up a finger on their right hand. After 2-3 minutes, see who as heard the most of each kind of sound.

Colour Hike

Objective: Shows how much variety and colour there is in the natural world. Lets students develop observation skills and opens them up to looking more closely at the areas around them.

Give each student a square of coloured paper (paint samples work well) and have them find something from nature that matches their square. Remind them to leave the object in place and just write down or remember what it was.

Water Walk

Objective: review the water cycle

Remind students of the three forms of water on earth. Ice, water, gas. Let's pretend we're ice; how would we move? Very slowly... then, as the sun starts to heat us up, we start to flow a little faster, then much faster. (The group first walks slowly and then begins to run.) When the sun has heated us up even more, we evaporate and begin to float; moving very quickly, but bouncing or skipping, not running. (adapted from Reaching for Connections by David W. Stokes).

Random Walking

To keep things interesting during long walks, you can also change the pace you're moving at. Change to a quick trot, a skip, or a snail's pace at random intervals, as feels appropriate. The students will follow your lead if they're feeling engaged. If they aren't keeping up, you'll know you need to stop and get their attention again.

Flood!

Objective: reinforces how water flows in the Karst.

Explain to the students that the path they are walking on is a dry creek bed that only floods when it rains and the underground channels have filled up. Select a student or an adult to walk at the front of the group and be the Rain Forecaster. When the Rain Forecaster calls out "Flood" the rest of the students have to get off the trail before the forecaster turns around. Any student that gets caught on the trail is carried away by the flood. To keep things in suspense, the forecaster can also call out things like "Looks like rain... Oh wait, never mind. There's not enough". Switch forecasters as feels appropriate.

Rock and Walk

Objective: Reinforce the rock cycle and the formation of different rock types.
Students will act out the rock cycle as they move along the trail.

Pretend you are igneous rocks; how would you form? (explode out of a volcano and run down the trail, moving more slowly as you start to harden, finally, freeze in place). Then, the igneous rock erodes and the sediments are washed away in water (move down the trail quickly and randomly, as if being carried in a river). The sediment collects and is pressurized into a sedimentary rock. (have the students clump together, or join hands, link elbows, etc, and freeze in place). Then, great pressure and heat transform the rock into a metamorphic rock (staying connected, move closer together and freeze in place).

Going on a Bear Hunt

Disclaimer: There are no bears in the Eramosa Karst, you may need to reassure your students of this fact.

An echo to be chanted as you walk along the trail

Leader: Going on a bear hunt

Students repeat: Going on a bear hunt

Going to catch a big one (Going to catch a big one)

I'm not scared (I'm not scared)

Oh no! (Oh no!)

What's that ahead?! (What's that ahead?!)

It's a, ... it's a ... (it's a,... it's a....)

Swamp!/Stream/ Sinkhole!/ Cave!/ or *whatever actually is ahead* (Students repeat!)

Can't go over it (Can't go over it)

Can't go under it (Can't go under it)

Can't go around it (Can't go around it)

We'll have to go through it (We'll have to go through it)

(make appropriate noise and actions as you move through).

Repeat verses as desired, coming to a different obstacle every round.

Field Notes:

