BAYERS LAKE ‘MYSTERY WALLS’

Pooja Vijayaraj

Date	Saturday, September 7, 2026
Place	Walmart Parking Lot, 200 Chain Lake Dr.
Weather	Windy, chilly, and overcast
Leader	Dr. Howard Donohoe
Participants	14

1. Hike Introduction and Field Activities

On September 7, 2026, the Halifax Field Naturalists gathered at Bayers Lake for a fascinating geology walk led by Dr. Howard Donohoe. The hike focused on understanding Halifax’s geological history and exploring the mysterious stone walls hidden in the Bayers Lake woods.

Dr. Donohoe showed us how to observe the landscape like geologists and explained some important field skills and safety practices.

Field Skills We Learned

One safety tip that stood out was the **“two steps looking down, two steps ahead”** rule. This helped us pay attention to where we were stepping while also keeping an eye on what was coming next, especially on the uneven Nova Scotian terrain.

We also learned about some of the basic tools geologists used in the field:

- **Hand lenses (10x and 20x):** These helped us examine small mineral grains and crystal structures.
- **Field hammer:** This was used to break off a fresh piece of rock so we could see its true colour and texture beneath the weathered surface.
- **Steel knife:** This was useful for testing the hardness of minerals.

The knife test was a simple way to identify minerals. Since steel had a hardness of approximately 5 to 5.5 on the Mohs scale, a mineral that could be scratched by the knife was generally softer than steel. Minerals that resisted the knife were harder. This helped us distinguish softer minerals, such as calcite, from harder ones, such as quartz and feldspar.

These simple techniques helped us look at the landscape more carefully and understand the stories recorded in the rocks beneath our feet.

2. Understanding Bedrock and Glacial Erratics

One of the first things we learned was the difference between **bedrock** and **glacial erratics**.

Dr. Donohoe explained that bedrock was the solid rock forming the Earth's crust beneath us. It was continuous and connected to the deeper geological structure of the region.

Glacial erratics, on the other hand, were large rocks or boulders that glaciers had carried from somewhere else and left behind as the ice retreated.

Term	What We Learned	Local Example
Bedrock	Solid, continuous rock beneath the surface.	Granite exposed around Spryfield.
Glacial erratic	A rock transported and deposited by glaciers.	Large boulders scattered around Bayers Lake and Spryfield.

The erratics helped tell the story of the last Ice Age, while the bedrock revealed a much older geological history connected to the Halifax Pluton.

3. The Halifax Pluton and South Mountain Batholith

We learned that approximately **470–475 million years ago**, a huge amount of magma pushed into the Earth's crust and eventually formed the Halifax Pluton. It was part of the South Mountain Batholith, a massive granite formation extending from Halifax toward Yarmouth.

How Did the Magma Rise?

Dr. Donohoe compared the movement of magma to a hot-air balloon. Hot magma was less dense than the surrounding rock, so it tended to rise. As it cooled and crystals began to form, it became thicker and less able to move upward.

This helped us understand how large bodies of granite could form deep within the Earth.

The Three Main Minerals in Granite

We also learned that granite generally contained three important minerals:

Mineral	Typical Colour	What We Learned
Quartz	Grey or glassy	Very hard and resistant to weathering.
Feldspar	White, pink, or salmon-red	Its colour could be influenced by the presence of hematite.

Mineral	Typical Colour	What We Learned
Biotite mica	Black	Usually appeared as thin, shiny flakes or small “books.”

The combination of these minerals gave granite its familiar speckled appearance.

Granite, Trees, and Cooling

One interesting observation was that **White Pines could sometimes help us identify granite landscapes**. As granite weathered, it produced sandy, quartz-rich soil. White Pines often grew well in these well-drained conditions, so their presence could provide a clue about the underlying geology.

We also learned about the **chilled margin** of a pluton. When the hot magma came into contact with the surrounding, cooler rock, the outer edge cooled more quickly and developed smaller crystals. The inside of the pluton cooled much more slowly, allowing larger crystals to form.

This explained why some granite had such large, attractive crystals—the same type of texture often appreciated in granite countertops.

A weathered granite outcrop, showing the jointing and blocky fracturing typical of the Halifax Pluton.

4. The Meguma Supergroup and Acid Rock Drainage

The next part of the hike took us even further back in geological time. We learned about the **Meguma Supergroup**, which included the Goldenville quartzite and Halifax pyritiferous slate.

These rocks were more than **540 million years old**. They originally formed from sediments that had been eroded from what is now associated with West Africa and deposited in an ancient ocean.

One fascinating detail was that fossilized worm trails helped geologists understand the age and origin of some of these ancient rocks.

How the Rocks Were Changed

The Meguma rocks had undergone two major periods of transformation:

1. **Continental collision:** Tectonic forces compressed and changed the original sediments, helping form hard quartzite.
2. **Contact metamorphism:** When the Halifax Pluton intruded into the surrounding rocks, its intense heat altered the nearby slate and caused new minerals to form. This helped create the spotted appearance seen in some of the rocks.

Why Was Pyritiferous Slate a Problem?

We learned that some Halifax slate contained **pyrite**, also known as fool's gold. When pyrite was exposed to oxygen and water, it could undergo chemical reactions that produced rust and sulfuric acid.

This process was known as **acid rock drainage (ARD)**.

The iron in the rock could create the rusty red-brown staining often seen in roadcuts, while the sulfur could contribute to the formation of sulfuric acid.

The environmental impact could be serious. If the pH of water dropped below approximately 4, it could create extremely difficult conditions for aquatic life, including fish, frogs, and salamanders.

Rusty red-brown staining on an exposed rock outcrop, a visible sign of pyrite oxidation and acid rock drainage.

Managing Acid Rock Drainage

Dr. Donohoe gave us some local examples of the challenges caused by pyritiferous rock:

- At the **Connaught and Almon Street intersection**, geological conditions reportedly contributed to construction delays and additional management challenges.
- At **Halifax Stanfield International Airport**, limestone was used to help neutralize acidic runoff.
- **Bennery Brook, near Highway 102:** The oxidation of pyrite released large volumes of low-pH water into the brook. This acidity dissolved aluminum into the water, and the combined effect caused fish and other wildlife die-offs over a two-year period.
- In some construction projects, rock was sealed beneath waterproof membranes or kept underwater to limit its exposure to oxygen and reduce acid generation.

We also learned that these local rocks had played an important role in the construction of Halifax's historic buildings.

5. The Stone Legacy of Halifax

Halifax's historic buildings reflected the geological resources available in the region. Early builders selected different types of stone based on their appearance, strength, and how easily they could be shaped.

Some of the examples we discussed included:

1. **Ironstone and slate:** These rocks naturally broke into flat, slab-like pieces, making them useful as building materials. They could be seen in structures such as Dalhousie University and the Spring Garden Basilica.
2. **Red granite:** Some red granite used in Halifax had been imported from St. George, New Brunswick. Its colour was associated with hematite-rich feldspar.
3. **Imported facing stone:** Buildings around the Trade Centre and City Hall included stone brought in from Quebec. Some of this rock was approximately 1.1 billion years old, making it much older than the local Meguma rocks.

It was interesting to see how the geological history of the region had influenced the appearance of Halifax's buildings.

6. Exploring the Bayers Lake Mystery Walls

One of the highlights of the hike was visiting the **Bayers Lake Mystery Walls**, a protected archaeological site under the Nova Scotia Special Places Protection Act.

The walls had a distinctive pentagonal shape and contained several types of rock, including quartzite, pyritiferous slate, and fine-grained granite from the chilled margin of the Halifax Pluton.

The purpose of the structure remained uncertain, and we explored several theories.

A section of the Bayers Lake Mystery Walls, built from stacked quartzite, slate, and granite slabs.

A corner of the mystery wall, showing its distinctive angled, pentagonal construction.

Evidence and Possible Explanations

Evidence or Theory	What We Learned
Lichenometry	Lichen growth patterns on the stones suggested that the walls might date to the 1790s.

Evidence or Theory	What We Learned
XRF testing	Testing of the soil reportedly found no clear chemical evidence of human or animal waste. This raised questions about whether the site had ever been completed or used.
Dr. Donohoe's theory	The location and layout suggested that the structure might have been a livestock outpost or spring house connected to the German Village market.
Military theory	Some people had suggested that it might have been a military blockhouse because of its location and visibility. However, the fact that it was not on the highest nearby ground raised doubts about this explanation.

We also learned about the name **"Dutch Village."** Dr. Donohoe explained that the original settlers were German, or *Deutsch*, and that the name "Dutch" may have resulted from a misunderstanding or mistranslation by English speakers.

This was a good reminder that even place names could sometimes hide or distort historical information.

7. What We Took Away from the Hike

The Bayers Lake hike gave us a wonderful opportunity to connect geology, archaeology, history, and the natural environment.

Dr. Donohoe emphasized that understanding the past required evidence rather than assumptions. Whether we were looking at ancient worm trails, examining mineral grains, or trying to understand the purpose of a 230-year-old stone wall, the process was similar: we had to observe carefully, record what we found, and build our understanding from the available evidence.

We were very grateful to have Dr. Donohoe with us that day, sharing his knowledge and passion for the geology of our region.