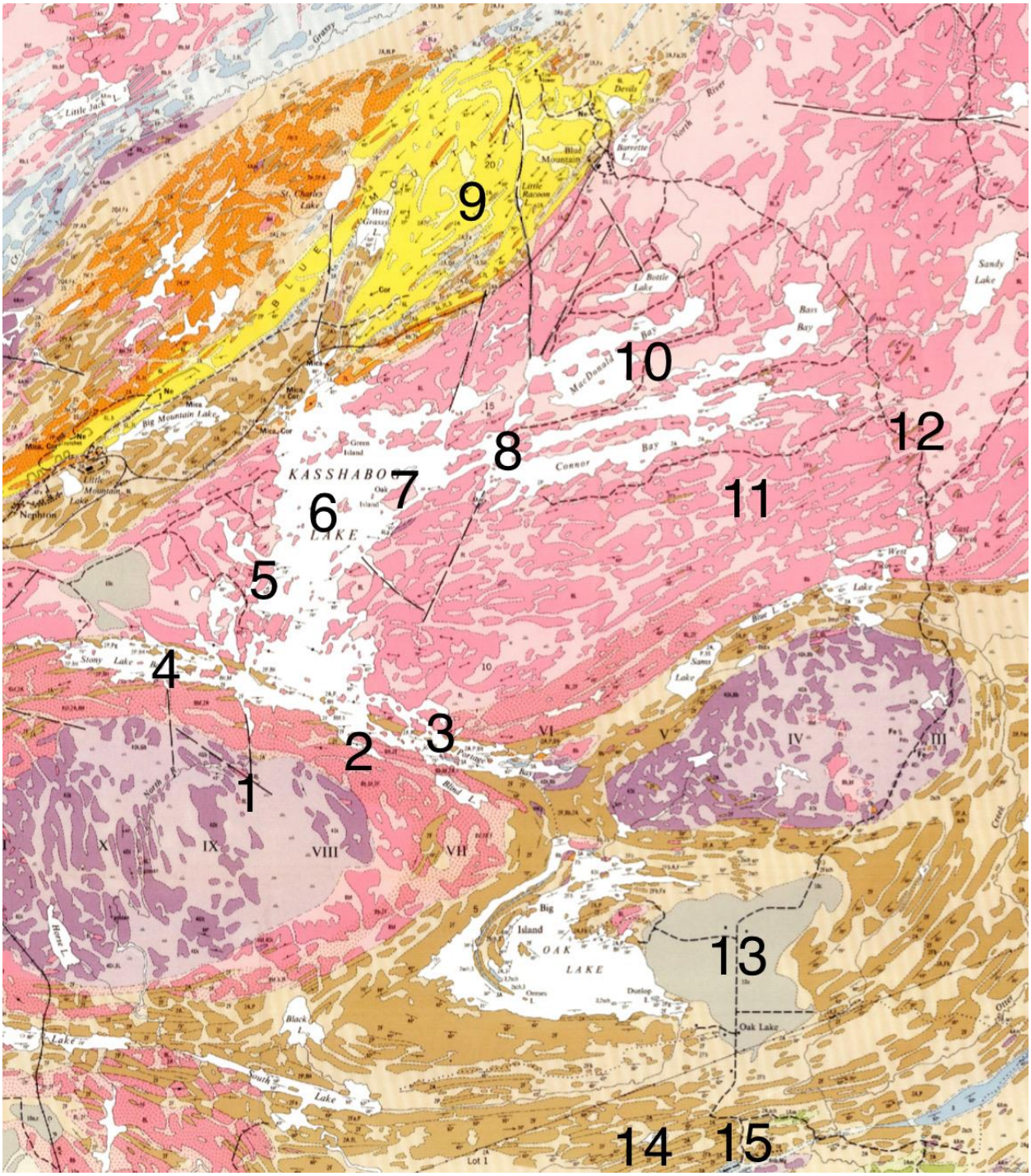
LKRA Website – geology posts



1 - Did you ever wonder why Kosh Lake looks like an upside down "T"? Why do Portage Bay and Stony Lake Bay head off in right angles? It is not because of the rocks in the bay. Instead it is because of the rocks 1km south. See photo. The two purple blobs are rocks that bubbled up from the mantle and melted their way through the crust. Like a lava lamp. They squished the bottom end of the lake flat. This happened billions of years ago back when the earth was like that lava planet (Mustafar) in Star Wars.

2 - There used to be high mountains over Kosh. How could they possibly erode to what we see today? Two ways: mechanical weathering and chemical weathering. Mechanical weathering is the action you can see. Every winter, a bit of rain gets into cracks and then freezes, which expands the crack. Over the years, the crack turns into a crevasse. There are other types of mechanical weathering: plant roots getting into cracks, animals burrowing, and extreme temperatures of forest fires cracking rocks. Mechanical weathering makes rocks smaller … which makes it easier for chemical weathering to happen. Chemical weathering erodes rock by exposure to air and water. Change is gradual so it is hard to see. Any boulder with smooth edges … that is chemical weathering. Chemical weathering sounds bad, but it is good. It produces sedimentary rock: we need sedimentary rock (for cement for cities and for flat farm fields). The granite around Kosh will weather into sedimentary rocks such as sandstone, shale and limestone.

3 - Have you ever noticed big boulders just lying around in the woods? Geologists call those "erratics". The most spectacular erratic on Kosh is hidden behind island #I8. It is a massive sphere that seems to float on the water. It is worth the kayak to see it. Erratics are boulders that were left behind as the glaciers retreated. Think about how heavy these erratics are and how powerful the glaciers must have been. The glaciers here were about 1km thick. As they moved along, they scraped up a lot of debris underneath them.

4 - Check out the islands in Stony Lake Bay. The rocks are tilted, fractured and metamorphosed.

5 - Have you ever wondered why the bay behind Sock Island is so different from the other back bays? Originally, the cottages were water-access and the water behind them flowed freely. Decades ago, a causeway was built to allow cars (FR97), which trapped the water. The water used up any dissolved oxygen and there is no new oxygen being added. The remains of plants and animals accumulate on the bottom because there is no dissolved oxygen that aerobic bacteria need to break them down and release the carbon (in the form of carbon dioxide) and encourage new plants. Instead it releases acids. Plus, there is insufficient oxygen for scavenging bottom dwellers that might feed on the debris. When things don't rot thoroughly, they don't release good nutrients. Today, most plants that grow there are carnivorous (pitcher plants, sundews, bladderworts) because they can eat bugs without relying on nutrients from the poor acidic soil. Eons from now, all that trapped carbon will turn into a coal bed (given the right temperature and pressure).

6 - Where did the water in Kosh Lake come from? The same place where all water came from on earth. From rocks that sweated out water. When the earth was a baby, vast amounts of water were locked within its minerals. The heat and pressure released the water which collected into oceans. The water was pretty acidic so it dissolved a bunch of elements, including salt. Since then, the earth has been recycling its water for billions of years. The water collects in low points such as Kosh thanks to the hydrologic cycle (evaporation and precipitation). Surface water comprises only about .14% of all the water we have. The Crowe Valley Conservation Authority has a hard job to manage our water levels, given the unpredictability of climate change on the hydrologic cycle of Kosh. Please take care of our water: clean out your septic systems every 3-5 years; don't take unnecessary risks when fuelling your boats; it's time to retire your vintage 2-strokes.

7 - Check out our very own old-growth pine forest on Pine Island. The trees are thick and tall. The ground is soft and pliable from centuries of mosses. It feels like walking on a sponge. The undergrowth is sparse. There are mounds where old trees have fallen and left to rot. No logging. No forest fires.

8 - Have you ever wondered why Bill's Bay is so straight? There is a line heading NE that starts south of FR75, continues underneath Bill's Bay through both narrows and then splits as it continues on north of MacDonald's bay. (See straight dotted line in photo.) It is an ancient fault. Don't worry, it is not active. Most likely the fault was created 1 billion years ago, when the lake was at the bottom of a massive mountain range (which has subsequently eroded). The fault made the rocks on either side more fragile, which allowed them to erode faster and form the river to drain MacDonald's Bay.

9 - Why is the Unimin/Covia mine where it is? See photo for that yellow blob of nepheline syenite. Why is it there? For the same reason that any valuable mineral forms. It's random. Here is an analogy: think baby spit-up. Right after the bottle, any spit up is unchanged (like the volcanoes on Hawaii). After a while, digestive juices alter the consistency of spit up (how granite is made). It also depends on where the spit up lands. Soaking into your sweater is like how gold is made. Spit up that lands on the ground mixes with the soil and becomes something chemically different. 1 billion years ago, the baby earth burped up a unique magma which reacted with the local rocks and solidified into nepheline syenite (the yellow part of the blob) and syenitic rocks (the orange part of the blob). It's the same burping process as the purple blobs below the lake, just the difference between carrots and prunes.

10 - Have you ever looked at the sand at the Regatta Beach? Right at the shore, there are black specks and shiny specks floating back and forth. Don't worry, it is not paint flecks from boats. It is mica that has been broken up. Mica is one of the minerals found in granite. Look closely at a piece of granite and you will see black flecks. That is mica. There are 2 kinds of mica: black (biotite) and grey (muscovite). Mica used to be mined a lot, now not so much. BTW, what is the difference between a rock and a mineral? A rock is made up of a bunch of minerals. Granite (rock) is made up of minerals: quartz (white), feldspar (pink) and hornblende (grey), mica (black and grey).

11 - Why are there white veins in rocks around Kosh? If you look at granite close up, you will see flecks of pink, white, grey and black. Back in the day, when Kosh was under a huge mountain range, the temperature was hot and all 4 types of minerals were mixed together as a liquid. As the mountains eroded above us, the rock started to cool. At a temperature of 900C, the black and grey cooled enough to crystallize. At about 800C, the pink crystallized. Eventually the already hardened rock cooled so much that it shrank and cracked. The remaining liquid (white quartz) filled in the cracks and cooled.

12 - Here is an unmarked road leading east to a huge 60m dish. You can briefly see it from the highway. No, it is not an alien landing pad. It is an aircraft radio beacon. It helps pilots line up on their approach to Pearson airport. It is operated by NavCanada, a non-profit company that manages Canada's air space (air traffic control, weather briefings). It is one of 1,000 across Canada. It makes sense why they chose that location: flat bedrock, height of land, easily accessible to a highway. It was a big deal before GPS took over airline navigation.

13 - Check out the tall limestone outcrop. This is the southern edge of the Canadian Shield. North of the outcrop is pink granite; south is farm fields. North the rocks are 1 billion years old; south the rocks are half a billion years old. That outcrop is an island of limestone that was protected from the glaciers as they retreated after the last ice age (12,000 years ago). The top layer of the outcrop is extremely hard, which is the reason why it is there. That hard top layer protected the fragile bottom layers. Really fragile, they crumble in your hand; whereas the top layer can withstand hammer blows by a strong teenage boy. What happened to the other limestone outside the perimeter (eg Steve Martin's farm)? For some reason, its top hard layer was removed, which exposed the bottom layers and eroded away. That limestone outcrop is about 500 million years old, when the earth was 90% of its current age. That sounds relatively young, but that is as old as limestone gets. It was created before animals migrated out of the sea. It was formed at the bottom of a warm, shallow sea like the Bahamas. Walk up the path and you can see fossils.

14 - Geologists say there are 3 types of rocks: igneous, sedimentary and metamorphic. There is rock on highway 46 that is a combination of all three types. There is a 1 km stretch on highway 46 (6km north of the new bridge) where the outcrops on both sides of the highway are pure white. That is quartzite. Stop your car and feel the rock; a powder rubs off on your hand like sand grains fused together.
So how is this the 3 types of rock? Let's start at the beginning. Within the crust, magma slowly cools into granite which contains quartz (eg those white veins). Quartz is igneous. Over time, quartz weathers into fine grains, collects and solidifies in a desert or lake. That is called sandstone, which is sedimentary. Then our area gets squeezed between 2 colliding microcontinents; the heat and pressure change the rock. That is called quartzite, which is metamorphic. Eventually, the mountains erode away to reveal that quartzite we see. In the future, that quartzite will erode back into sandstone (sedimentary).

15 - How to understand the 3 kinds of rock: igneous, sedimentary and metamorphic. (1) Igneous rock is the original rock from underground. For example, the granite underneath all our cottages is igneous. To learn the different types of igneous rocks, you have to understand chemistry because the differences are microscopic. (2) To learn sedimentary rock, you need to understand biology and geography because sedimentary rock tells a story of what the area used to be like. Sedimentary rock covers 75% of the continents. For example, the limestone in Marmora, Kingston and the Escarpment is sedimentary. (3) And then there is metamorphic rock. Metamorphic rock is any rock that has changed because of heat or pressure. There is a metamorphic rock on highway 46 – it's about 7 km north of the new bridge. It is a swirly mess of rock - blobs of pink granite, blobs of some kind of white rock that is not quartz. Beautiful. This rock was altered when Kosh was underneath a tall mountain range.

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