

THE HALIFAX FIELD NATURALIST



No. 195
June to August 2024



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Return address: HFN, c/o NS Museum of Natural History, 1747 Summer Street, Halifax, NS, B3H 3A6

HFN is incorporated under the Nova Scotia Societies Act and holds Registered Charity status with the Canada Revenue Agency. Tax-creditable receipts will be issued for individual and corporate gifts. **HFN** is an affiliate of Nature Canada and an organisational member of Nature Nova Scotia, the provincial umbrella association for naturalist groups. **Objectives** are to encourage a greater appreciation and understanding of Nova Scotia's natural history, both within the membership of HFN and in the public at large, and to represent the interests of naturalists by encouraging the conservation of Nova Scotia's natural resources. **Meetings** are held (except for July and August) on the third Tuesday of every month at 7:30 p.m. in the auditorium of the NS Museum of Natural History. **HFN Field Trips** are held at least once a month; it is appreciated if those travelling with someone else share the cost of the gas. **Participants** in HFN activities are responsible for their own safety. **Memberships** are open to anyone interested in the natural history of Nova Scotia. Forms are available at any meeting of the society, or by writing to: Membership Secretary, Halifax Field Naturalists, c/o N.S. Museum of Natural History. Members receive **The Halifax Field Naturalist**, along with its included **Programme**, quarterly. Our membership year is from January 1st to December 31st, and new memberships received from September 1st to December 31st of any year are valid until the end of the following membership year.



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FEES

Student	\$15.00 per year
Individual	\$20.00 per year
Family	\$25.00 per year
Supporting	\$30.00 per year

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HFN NEWS AND NATURE NOTES

! HFN'S 50TH ANNIVERSARY !

Next October 2025 is the 50th anniversary of our inauguration and very first monthly meeting in 1975. Paul Keddy (see 2024's Spring Issue #194) was President, membership fees were \$2.00 per year, and meetings were held every 2nd Tuesday in the 5th floor Biology Lounge of Dalhousie's Life Sciences Centre.

Our first talk was on Arctic Whales by Dr. Paul Brodie. Written up by Marcus Waddington, it's an eye-opener into how much of northern marine mammal research was initiated – and influenced – by the U.S. military industrial complex in the atmosphere of the McCarthy era (see Issue #1 on our website).

On a lighter note, and looking back to our wonderful 40th event at the Ashburn Golf Club with environmentalist Harry Thurston, we are busy devising plans for our 50th Celebration. As a part of this, be 'in with a grin' in a \$15.00 navy blue iconic 'bucket hat' with printed HFN logo – great for hikes and the beach – and the celebration itself. To pre-order and give us an idea of how many we might need, please contact 50th Anniversary Coordinator Janet Dalton, 902-443-7617, or daltonjanet@hotmail.com.

We'll be updating and sharing further events and plans by membership emails, and on our website.



NATURE NOTES

APRIL'S MEETING

On March 24th, Cranberry Lake, Jennifer Hahn spotted **two Beaver**; Bernie McKenna noted he'd seen a **Beaver dam** there as well. In Victoria, with an earlier spring than Halifax, Grace Beazley saw blooming **Trilliums** and **Skunk Cabbage** (now Bog Lantern). Near the Airport Highway, Ron Arsenault heard **Spring Peepers** and saw **18 Spotted Salamanders** and **eight Wood Frogs**; it was +7°C.



Just past Uniacke, Bernie McKenna saw **11 Deer** and **two Turkey Vultures**, also **five Bald Eagles** (**four adults and one young**); he saw his regular back-garden bachelor **male Pheasant** this year escorted by **two females**! Don Flemming reported two confirmed, and one probable repeat, **Barred Owl** entries on a Birds Canada Nocturnal Owl Survey form (see report p.7) along a 20 km stretch of Highway 212 (the Old Guysborough Road).

MAY'S MEETING

Janet Dalton reported a complete **garden tulip wipe-out by Deer** this year. Previously, she'd cleaned out what she thought were rabbit droppings; with the tulips gone, she knew that it had been **Deer scat**, not Hare scat. Lesley Jane Butters saw a **white Porcupine** waddling across the road when visiting Annapolis Royal Gardens via the older route. Arriving home she

noted she'd picked up many **black ticks**. At the Waegwoltic, a **Crow** she was feeding refused all vegetable offerings but eagerly gobbled up granola bar bits. Max Raisie shared the BBC story of the **Orangutan** who had searched and searched for just the right plant to chew and then rub on a wound; in a few days, it did indeed heal. Judy Keating has an **Eastern Kingbird** hanging around and also a **family of Canada Geese** boasting **five goslings**. She reported a first sighting of a **male Ruby-throated Hummingbird** on May 7th (two weeks earlier than usual), and a first **female** last week; she has a total of four around her home now.

Patricia Leader reported **three ducks** paddling on her neighbour's flooded lawn (on a hill in Bedford). Richard Beazley spotted many **Amelanchier blooming** on a railway-cut walk in Halifax. Looking down to where the rails were, he saw a **Coyote** taking advantage of this open trail. Carol Morrison reported a **plethora of chickadees** this year. Lesley Jane finally ID'd the source of a rustling noise at her Albany New cottage – a **waterspout twirling along the Medway River**! (I myself witnessed this years ago there on an HFN camping trip; I've never seen this phenomenon anywhere else since.)

May eNotes In April, Patricia Leader, in Washington D.C. came upon a **pure white squirrel** (**eyes not pink**) interested in her taking a close-up of him; so interested that they ended up being almost nose to nose!

JUNE'S MEETING

On 10th June, Mt. Edward School, Dartmouth, Jennifer Hahn photo'd a delicate, very long-legged slim-bodied **green spider**; biologist Andrew Hebda revealed it to be **Tetragnatha viridis**. Bernie McKenna reported that his hand-dug back garden pond is a great success with all the local birds; and, it attracted two ardent, singing **Spring Peepers**! Next-door, a **pair of Crows** construct a nest in a red **Norway Maple**. Unfortunately, after a few days, strong winds blew it down.

Dennis Hippern showed a photo of an **Indigo Bunting**; one of three he has seen in Cole Harbour in 40 years. Regine Maass saw **12 Nighthawks** circling her home at Parkhill Rd. from about 8:45 - 9:30 p.m. Carolyn Vineau spotted a **wandering Black Bear** during a lakeside lunch in Tantallon. On William's Lake, Sunday June 16th, Ingrid Plache observed a **family of ducks** **being attacked by a Loon**; after the kerfuffle, one dead duckling was spotted.

With a hiking group one month ago, Carol Klar noted a **Barred Owl** near the Brookline Trail. On the June 15th weekend in her Wolfville garden Lesley Jane Butters got 3 quarts of **ripe Haskap berries**. A **flock of Bohemian Waxwings with young** fed on both them and **Fire Ants**. In Albany New, she spotted **2 Eastern Phoebe**s, **2 Canadian Geese** with **2 goslings**, and **2 other goslings**.



SPECIAL REPORTS

Halifax Field Naturalists Balance Sheet December 31st, 2023

Assets

Bank Account	2,055
Accounts Receivable: HST Rebate	309
Investments	8,992
Pins	489
Butterfly & Dragonfly Lists	110
	<u>11,955</u>

Liabilities and Surplus

Liabilities

0

Surplus

Restricted: Endangered Species and Spaces	2,992
Unrestricted (end of year)	<u>8,964</u>
	<u>11,956</u>

Halifax Field Naturalists Statement of Revenue and Expenses January 1st – December 31st, 2023 and Budget for 2024

	2023 Actual	2023 Budget	2024 Budget
Revenues			
Membership Funds	3,990	2,880	3,125
Interest	166	165	0
Donations	690	120	120
Sales (Pins, Lists)	<u>5</u>	<u>5</u>	<u>5</u>
	4,851	3,170	3,250
Expenses			
Meetings	536	305	340
Field Trips	69	0	20
Newsletter Production	1,319	1,540	1,400
Newsletter Distribution/Mailing	482	480	500
Memberships & Fees	167	236	236
Socials	0	0	0
Grants, Donations	0	0	0
Special Projects	145	0	90
Insurance	360	325	380
Internet Service	209	250	250
General Supplies and Expenses	0	0	0
Bank Fees	<u>23</u>	<u>34</u>	<u>34</u>
	3,310	3,170	3,250
Net Income	1,541		
Unrestricted Surplus, beginning of year	7,423		
Unrestricted Surplus, end of year	8,964		

– Respectfully submitted,
Ingrid Plache, Treasurer

2023/24 YEAR END REPORTS

MEMBERSHIP

Sometimes difficult times can interfere with life's activities. Membership Secretary Ron Arsenault has been experiencing this, so Distribution Coordinator Don Flemming provided the following. In 2023 membership collected dues for the Individual, Family, Supporting, and Institutional Categories equalled a total of 139, calculated for December. Don't forget, HFN no longer collects membership funds on behalf of Nature Nova Scotia. HFN thanks Ron Arsenault, Don Flemming, Bernie McKenna, and the late Doug Linzey for all their hard work.

TOTAL MEMBERSHIPS BY YEAR:

2014	/15	/16	/17	/18	/19	/20	/21	/22	/23
114	129	146	115	123	113*	113*	114*	109*	139*

*Based upon memberships received. Years prior to 2017, and also the year 2023, were reported as membership numbers at the end of December. **Note:** Facebook numbers are > 2,000.

– Don Flemming
Distribution Coordinator



SPECIAL ARTICLES

“THE MOTHER OF WATERS”

– Patricia Leader

(Winding almost 3,000 miles from the Tibetan plateau down to the South China Sea, the Mekong River boasts the world's largest inland fishery. It accounts for up to 25 percent of global freshwater catch and provides livelihoods for tens of millions of people. This is the continuation, from our Spring Issue #193, of Patricia Leader's February 2023 riverboat trip along the Mekong River through Thailand and Laos.)

... During the day, one of our activities was to stop and visit various riverside villages with whom the boat company had developed past relationships. For this, participants had been advised beforehand to bring some gifts for the village schools, and also, that donated clothing would be especially appreciated.

It's amazing how much clothing we think we need for a vacation; there were plenty of underused garments to be given. Balls were very popular with the children and there was no squabbling over ownership. The children of Chinese groups wore their traditional scarlet clothes, and the teachers were mostly young adults who were boarded in the village for a certain period of time then replaced by others. Children sat three or four to a bench. I looked askance at a chart which showed that Laotian had twenty-seven basic consonants, six other consonants, and twenty-eight vowels! I would have liked to retire to a smaller area where the younger children were taking a rest period on their mats. A few villages had a small temple and if lucky, a monk. Although Buddhism was predominant, customs were also combined with pagan ideas – not much different from the beginnings of our own major religions.

The city of Luang Prada, some three hundred km from the capital Vientiane, was a great contrast to the villages – it boasted thirty-three temples. In the nineteenth and twentieth centuries, when under French rule, the architecture was European. Now, all was well-blended with local architecture, meriting a UNESCO award. One could use the local tuk-tuks (a small, highly coloured truck) to explore, or just stroll past houses with balconies, shuttered windows, and bright gardens. Outdoor cafes and bakeries were very popular and the overall feeling was of being in a French resort. At night one could walk along the lit-up banks of the Mekong and

Nam Kay Rivers and find a restaurant serving a mixture of European and Asian food. For a view of the city and its two rivers one could walk up a one hundred and forty-nine metre hill, with its irregularly-sized steps, to visit the Wat Chom Si Shrine and its twenty metre high golden stupa built in 1804. It was here that we physically realised why this holiday had been given a higher difficulty rating regarding traveller's walking (and climbing) abilities. That evening we visited the night market which was being set up around five o'clock. As in other markets there were the usual street food, crafts, and clothes. The pattern of a ring of elephants on trousers and shirts was very popular. (To my surprise, when home, I saw the same pattern at a shop in Eastern Passage, Dartmouth!)

A short journey outside the city and under a canopy of green jungle led to a series of ascending falls and shallow pools. The top fall was some sixty metres high. A combination of sun shining over the calcium and copper-filled pools gave the water a milky turquoise appearance. It was certainly a cool and idyllic spot for swimming on a hot day. There was a nearby butterfly garden and within the main park an area had been set aside to house some twenty Asian bears rescued from the jungle by an organisation called 'Save the Bears'. Illegal hunting is still prevalent, as the bear's bile and body parts are used for aphrodisiac properties. While walking the trails one could hear, but not always see, kingfishers, woodpeckers, hornbills, and parakeets. Information on clothing required to visit stupas and temples was very explicit.

Visitors were asked to dress respectively and all sexes had a 'No Knees' caution. At the end of the holiday we visited the capital Vientiane and wandered around Patuxai Park where the main attraction, the Victory Monument, is Laos's version of the Arc de Triomphe. It commemorates those who fought for independence from France – thus there is a daily reminder. On the last night we had a BBQ on a sandy bank and celebrated by lighting large paper lanterns. Very common in Asia, they were sent skyward with best wishes. The next day, the boat staff would be cleaning everything then leaving for their homes. For some this meant a two day hike into the mountains unless they were able to get a ride in a passing farm truck!



SOME STRAIGHT FACTS ABOUT CARBON PRICING

– Carl Duivenvoorden

New Brunswick's Carl Duivenvoorden is a longtime environmentalist and speaker who was inspired by Al Gore. In the early 2000's, he presented "An Inconvenient Truth" at one of our monthly meetings. Carl produces a monthly email 'Green Ideas', sharing many ingenious ways individuals can help reduce our negative impacts on the environment in many different areas. Myself having not been cognizant about 'carbon tax' and 'carbon pricing', I felt others might appreciate Carl's explanation of the difference. His April 2024 'Green Ideas' was titled as above, and here it is reproduced below.

"Phew – you'd have to be living under a rock to have missed all the recent hype about carbon pricing. But amid all the chatter, it's not easy to discern truth. I suppose that's because much of the discussion has been politically-driven, not fact-driven; and because much of the discussion is happening online on platforms like Facebook, which tend to be terrible places for truth and honesty. So in the interests of clarity and hopefully enabling more reasoned discussion, here are ten truths (to the best of my knowledge) about carbon pricing.

1. What most call a carbon tax is not actually a 'tax'; it's a carbon 'price', or more accurately – a fee-and-dividend system. 'Taxes' are dollars collected by governments and then used to fund services like roads, schools and hospitals. The carbon price (or fee-and-dividend) is very different; money raised is divided up and rebated back equally to everyone. And it's worth noting that no province is penalized to the benefit of another: "All direct proceeds from the federal pricing system are returned to the province or territory where they were collected."

2. Those who pollute the most will pay the most – a principle I think most Canadians agree with. For example, those who drive huge and inefficient vehicles; live in huge or inefficient homes; travel a lot by air; burn a lot of fuel in boats and other 'toys' – all behaviours that need to be discouraged in the battle against climate change – will pay the most. On the other hand, those who pollute the least will pay the least. For example, those who walk, bike, or take transit; drive fuel-efficient vehicles and try to drive as little as possible; live in efficient homes; generate their own renewable energy – all behaviours that need to be encouraged in the battle against climate change – will pay the least.

3. 80 percent of Canadians will receive more back by rebate than they pay by fee, according to analysis by Canada's Parliamentary Budget Officer. How is that possible? Because those 80 percent are essentially being topped up thanks to the other 20 percent, who pay more fee than they receive back by rebate – and who, coincidentally, are also the wealthiest 20 per cent of our population and thus able to pay without hardship.

4. Carbon pricing maintains freedom of choice but gives everyone an incentive. We are blessed to live in a free country that allows us to make our own choices. However, choices that create more pollution or emissions are clearly detrimental to our society and world. Carbon pricing gives each of us an incentive to change behaviours and reduce our emissions so we come out ahead when the rebate check arrives. Those who don't wish to change can keep

generating all the emissions they want; they'll just find that society is now asking them to pay for the damage those emissions are doing.

5. Carbon pricing is not a major cause of inflation. The Governor of the Bank of Canada has estimated that carbon pricing is responsible for 0.15% inflation in Canada – a pretty small impact, considering our inflation rate has been as high as eight percent in recent years. An economist at the University of Calgary, factoring all impacts on the food supply chain, including transportation, has concluded that the impact of carbon pricing on food prices is less than one percent. If carbon pricing truly were a major cause of inflation, it's logical that I) inflation rates would not be coming down in Canada (they are); and II) inflation would not be a problem in countries without a carbon price (it is).

6. Carbon pricing is the cheapest way to reduce emissions because it puts the choice back to us, and we're very good at being creative and innovative when it's in our interest. That's better – and cheaper – than regulations that tend to be narrow and rigid, and need to be enforced.

7. Economists all over the world agree that carbon pricing is the cheapest, most efficient and best way to reduce emissions: from the prestigious London School of Economics, to The Economist magazine, to the OECD, to the International Monetary Fund, to the World Trade Organization, and – to Canada's EcoFiscal Commission which last month published an open letter in support of Canada's current carbon pricing system signed by more than 300 economists from across the country. The 2018 Nobel Prize for Economics was awarded to William Nordhaus for his work on the effectiveness of carbon pricing!

8. Carbon pricing promotes renewables because every time the cost of fossil fuel energy goes up, the economic case for renewables like wind and solar gets better.

9. Starting small and ramping up slowly makes sense, as it cushions any economic impacts and enables people and businesses to plan ahead – for example, what their next vehicle will be. Canada's carbon price started at \$20 per tonne of emissions in 2019, and will be rising in an established and predictable way to \$170 per tonne in 2030.

10. Doing nothing has an enormous cost too. Here in New Brunswick, a windstorm last December knocked out power for days, wiping out any profit NB Power may have hoped to have for the year; and two torrential downpours of nearly 100 mm in the past month flooded the Town of Sussex and parts of Charlotte County. Unfortunately, we'll be seeing many more such impacts as the effects of climate change intensify. As former Quebec Premier Philippe Couillard said a decade ago, "Nobody talks about the cost of not fighting climate change. This cost is passed to citizens too, whether it's health care, coastal erosion, or spectacular weather events. This is hugely expensive for our society." It's true that carbon pricing isn't a perfect solution – but it's one of the most important tools in the chest of climate change policy solutions. Hopefully the points above help make that clear! Do you have a question not addressed above? Please let me know, and maybe I can help answer it in a future Green Ideas!"



THE ATLANTIC CANADA NOCTURNAL OWL SURVEY

– Don Flemming

Owls are not well-monitored by traditional bird counting programs due to their secretive nature and nocturnal habits. Nonetheless, information on owl distribution and abundance is essential for developing sound conservation strategies and evaluating the effectiveness of forest management programmes.

This is where the Birds Canada Nocturnal Owl Survey comes in. Across the country, teams of dedicated citizen scientists spend an enjoyable spring evening outdoors along rural back roads, counting owls by listening for their signature calls.

A subset of the national programme, the Atlantic Canada Nocturnal Owl Survey includes the provinces of Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland & Labrador.

Participants register online for a roadside route and agree to survey it (once, or adopting it for continuing annual surveys). They pick a single, fair-weather evening between 1st April and 15th May to conduct the survey. Each route consists of 10 stops that are approximately 2 km apart. The survey is carried out using owl call broadcasts to elicit responses from owls at each stop. For 2024, the targeted owl species for Nova Scotia were the Boreal Owl *Aegolius funereus* and the Barred Owl *Strix varia*, although any owl that is heard and can be identified is included in the survey results. Birds Canada provides a province-specific instruction booklet and owl-call training audio file, a broadcast audio file of targeted owl calls, and survey data forms to be filled out by participants.

According to the Maritime Breeding Bird Atlas, the Barred Owl is the most common owl species found in Nova Scotia and previous surveys have shown that this population is relatively stable. Boreal Owls are found throughout the Canadian boreal forest, but this species is sparsely distributed in the Maritimes, primarily in the highlands and along the coast.

I first heard about the Nocturnal Owl Survey while participating in a 'Birds of Newfoundland' webinar. I was curious and so went to the Birds Canada website for more information. This was in mid-March and the online map showed that most of the routes in Nova Scotia had already been spoken for, but there were several in the eastern part of the province that were still unclaimed, including one not too far from Halifax. So I registered with Birds Canada and adopted a 20 km stretch of Highway 212 (the Old Guysborough Road), starting at Devon and heading east. Looking for a partner, I gave Bernie McKenna a call and he was very keen so we teamed up for the survey.

We chose Wednesday, April 10th, which was forecast to be clear and calm, and arrived at our first stop at about 8:30 that evening. True to the forecast, it was a beautiful clear night, with no wind and a sky full of stars and a thin crescent moon low on the horizon. We were in an area of fields and woods near an old driveway that provided a good spot to pull off the highway. This being

our first experience, we took about 10 minutes to set up – placing a portable safety lamp behind the car to fend off approaching vehicles, and setting up our gear on the hood of Bernie's car – a handheld GPS for determining actual position; an iPad connected to a speaker for broadcasting the owl calls; an iPhone with the Merlin app running as a third set of ears; and a clipboard with the survey forms.

The Birds Canada website advertises these routes as 'quiet', but this spot was moderately noisy with seven cars or trucks passing, at speed, while we strained our ears to hear an owl's call. It takes about seven minutes to play the owl-call broadcast. Once the audio file starts, there is a two-minute period of silence and listening. Then the first call is broadcast – a Boreal Owl – followed by a minute's silence for listening, and then the Boreal Owl call is repeated followed by another minute of listening. Next are two more call-and-listen sequences, this time featuring a Barred Owl. After the final listening period, the audio file finishes and participants record what they heard on the survey form.

At this first stop, we did not hear any owls but did hear several American Woodcock *Scolopax minor*. Noting this on the survey form, we packed up and headed down the road to the next stop.

Stop 2 was about 1.7 km further east, in an area of mixed forest with a woods road on the right which provided a good place to park. Our time for setting up here was shorter as we developed a routine and we continued to improve as the evening progressed. This stop, being a bit later, was also a bit quieter – only four vehicles passed during the survey period. It was too early for Spring Peepers but we did hear what we thought might be Wood Frogs. However, no owl or other bird calls were heard, so it was time to pack up and move to the next stop.

And so the evening progressed. Things got a little colder but also a lot quieter. By Stop 7, only one car passed us during the listening period, and after that – zero. But still, no owl calls were heard other than those we were broadcasting.

At Stop 9 we pulled off in an area with a large clearcut on the left and a woodland park entrance on the right. As we got out of the car we clearly heard owl-like noises coming from a spot east of our position and fairly close, no more than 50 yards further down the road. The bird was making cackling sounds which we could not identify. Merlin could make nothing of it, but we were pretty sure it was some kind of an owl. We did our setup and played the owl-call broadcast. After the Boreal Owl calls there was silence, but there was another spate of cackling after the second Barred Owl call. So, we had our suspicions but not a firm identification.

Onwards to Stop 10. It was now about 11:20 and we were in an area with a farm pasture on the right and mixed forest on the left. It was very quiet. We started the owl call broadcast: first two minutes of silent listening – nothing; first Boreal Owl call – nothing; second Boreal Owl call – nothing; first Barred Owl call – a hit! From far away in the west, we could hear the signature call of a Barred Owl: *Who-cooks-for-you / Who-cooks-*



Barred Owl



Boreal Owl

for-you-all. Closer, a responding Barred Owl also gave the signature call. This to and fro calling was repeated after the second Barred Owl broadcast. Looking at the directions and distances, we estimated it as highly likely that the first long-range call heard at Stop 10 was the same owl that we had heard making cackling sounds at Stop 9.

So this very enjoyable spring evening in the outdoors was capped off with two confirmed and one probable repeat Barred Owl entries on the survey form. To cel-

ebate we had a bit of chocolate and a cup of tea and then headed homeward, somewhat tired but very satisfied with our evening's work.

If you are interested in this or other similar citizen science programs, check out the Birds Canada website at <https://www.birdscanada.org/you-can-help/citizen->



HFN TALKS

ROCKS, FOSSILS, AND EVOLUTION: THE MARITIME STORY 16 APRIL

– Stephanie Robertson

Paleontologist Rob Fensome has been with the Bedford Institute of Oceanography since 1984, working for the Geological Survey of Canada for the last 40 years. He earned his degree at the University of Nottingham, England, has worked in Saskatchewan and Toronto, and is a leading expert on single-celled dinoflagellates. (These are publically best known as the source of marine 'red tides', and their toxins can cause dangerous illness. I myself was hospitalised in 1990 after eating infected Digby mussels; it was definitely not a good experience).

Rob and colleague Graham Williams have edited and contributed to their second edition of *The Last Billion Years, A Geological History of the Maritime Provinces of Canada*, Nimbus, 2022. This all-encompassing, eye-opening, and humbling history reveals how earth's geologic timescale was developed almost entirely from plant and animal fossil evidence – absolutely everything regarding earth's beginnings, our maritime region, and of first and further developing life on our planet. For all their diligence and hard work bringing this information-packed tome to fruition, the Atlantic Geoscience Society awarded Rob and Graham the Nelly Koziel prize, an award given to those who have significantly contributed to geoscience, "beyond the call of duty", in the Atlantic Provinces.

Rob's primary focus was on the main rock and fossil finds in Nova Scotia and the Maritimes, and he began with Chapter 3 "Tales of Trails and Ancient Bodies". Fossils are life forms preserved by eons of slow mineralisation or by moulds of them slowly turning into sedimentary rock. Plant fossils can also be preserved by their volatiles being driven off, leaving only a carbon (essentially coal) film imprint behind, or by being petrified such as large tree stumps being 'mineralised' (with mostly silica – 'silicified'). Organic microfossils 100's of millions of years old and with very resistant organic components also have been preserved because of their anoxic (no oxygen) environment. Fossils can also be solidified trackways or burrows. These are called trace fossils – they preserve and reveal behaviour.

Under the Nova Scotia Heritage Act, fossils cannot be collected without a Heritage Permit, but they may be looked at and studied in situ. Fossils are collected as primary evidence of animal/plant evolution and revelations of earth's

geographical past. Without them, such as the trilobite, we would never know about these now extinct life forms. Take also whales. DNA studies show that their closest living relative is the hippopotamus! And, by tracing their fossil record back millions of years, we can see all the different shapes and surprising iterations which led up to their present-day morphology, habitat, and behaviour.

Radiometric rock-dating is also very important for discovering all about earth's biogeographical past. It uses mineral isotopes and their 'half-lives' to determine rocks' ages. For instance, uranium isotopes will, over a known period of time, turn into lead isotopes. This type of knowledge is really important for dating rocks accurately. But radiometric dating can only be done mostly with igneous rocks. For dating sedimentary rocks, fossils are absolutely essential to interpret environments of the past and their place within the timescale of earth. For instance, if there are only pollen spores in ancient sediments, it was a land environment; if pollen spores plus aquatic dinoflagellates, it's a close-to-shore water environment; with only dinoflagellates, it's a deeper water environment, etc. The duration (time ranges) of the existence of different plants and animals are parenthesised with 'events,' sometimes marked by the complete disappearance of certain species and/or the introduction of new ones. Organisms' biological communities often vary in a regular fashion along gradients of latitude, elevation, isolation, and habitat. And this is how the geological time scale was developed, through the use of fossil finds and radiometric dating. For instance, along with other information and long years of accumulated findings and research, it is known that trilobites are only found in the Paleozoic Era, dinosaurs only in the Mesozoic Era, and grasses only in the Cenozoic Era (modern life – 66 Ma to now), etc. Finer tuning can be done with biostratigraphy – the study of the distribution of many different species and ecosystems in geographic space and through geological time.

The Precambrian Era which ended 538.8 Ma (million years ago), and which designates all of earth's time before the life-exploding Cambrian Period, its fossil records and radiometric dating show that the oldest known rocks occurred 4,030 Ma (in the Northwest Territories), 3,800 Ma rocks revealed the first probable prokaryotes (i.e. bacteria and archaea – single-celled but with no nuclei), and 3,500 Ma rocks the first stromatolites. Quite common before the Cambrian Period, stromatolites, which literally mean 'layered rock', existed three-quarters of the way back to



Bacteria



the origins of our Solar System! These stony structures of layered sedimentary formations are created by photosynthetic micro-organisms producing adhesive compounds. This subsequently cements together sand and other rocky materials which, over eons, grow into large mineral 'microbial mats'. Some late Precambrian stromatolite fossils have been found in St. John NB – the first fossil evidence in the maritimes of a Precambrian life form. Living stromatolites still exist today in Shark Lake, Australia.

Moving forward in time, fossils and radiometric dating found 2,700 Ma rocks which revealed chemical traces of eukaryotes (all organisms whose cells contain a nucleus, including us), and 1,900 Ma rocks which gave us the first *confirmed* eukaryotes themselves. 1,500-1,200 Ma was the age of the earliest Maritime rocks, found in the northeastern part of Cape Breton, and at Mistaken Point, Nfld (an 'honorary' maritime find) 635 to 538.8 Ma rocks revealed the earliest invertebrates. This geologically famous UNESCO Heritage Site is an assemblage of the first 'visible' invertebrate fossils – stationary, on-the-sea-floor, plant-like organisms waved about by the ocean's currents and found in very few other places in the world.

The Cambrian Period Explosion Beginning 538.8 Ma, Cambrian invertebrate species evolved rapidly – and very, very many evolved protective shells (an 'arms race'?). These life forms were not stationary but sessile – they moved! A very major step in evolution, these and other first 'bilaterians' (organisms with front and back ends) – from worms to humans – evolved. There are nice examples of Cambrian traces of fossil 'trails' near St. Martins NB and Yarmouth NS which only organisms that move forward can produce. Also, those ubiquitous trilobites, creatures of the Cambrian Explosion and living for 119.8 Ma right through the whole of the Paleozoic Era, were among the first organisms that could see their world as well as move through it. Trilobites' many different species were also very important for providing clues of very ancient continental drift, plate tectonics, and the existence of an ancient lapetus Ocean with its 'microcontinents' (think Indonesia and other extensive oceanic island chains).

470 Ma, close to the south pole, the ancient microcontinental island chains Meguma, Avalonia, and Ganderia slowly moved north with continental drift, became squeezed and twisted together, (closing the lapetus Ocean) and ended up in NS, with Avalonian and Meguma rocks juxtaposed in Northern mainland NS along the Paleozoic Era's Carboniferous Period's (359.3 to 298.9 Ma) Minas fault, and Ganderian rocks in the Chéticamp area of western Cape Breton and NB. Rocks found in Walton NS and Grand Falls NB show the twisted-together evidence of these ancient compressed plates. The fossils from these microcontinents, coming from the low and cold paleolatitudes of the south pole, were not many; some can be seen in the rocks of the Bathurst NB area. In the Paleozoic Era's earlier Silurian and following Devonian Periods, 443.1 to 359.33 Ma, fishes diversify, life consolidates itself on land, land plants diversify, the first wood and trees are seen (in the Devonian), and continents generally move northward, slowly bringing the Maritimes into warmer latitudes. Classic Silurian rocks and their fossils occur in the Antigonish area and Arisaig with strange-looking crinoids (plants), predatory eurypterids, horse-shoe crabs, and brachiopods, etc. In the Silurian most fish were still jawless. In the Dalhousie Junction NB area, rocks of the following Devonian Period revealed the earliest-known shark fossil, a variety of more

modern vascular plant fossils, and also a fossil of one of the earliest-known land animals in North America – a millipede. Later in the Devonian NB fossil records, lobe-finned fish (ancestral to four-limbed tetrapods) were found just across the NB border in Quebec.

Moving up to the Paleozoic's Carboniferous 359.3 to 298.9 Ma and Permian Periods 298.9 to 251.9 Ma, when reptiles were now dominant, fossils were now mostly non-marine in Eastern Canada. The late Carboniferous (with its subperiods Mississippian and later Pennsylvanian) is defined as the 'Coal Age' – the main source of fuel for the Industrial Revolution. Even though glaciers pulsed back and forth in the Southern hemisphere, our Maritimes (still slowly moving toward and through the equator) were by now tropical, and their microcontinents were being squeezed even more by the side-swiping giant landmass Africa. This created a sedimentary maritime basin that was a mixture of highlands (Cobequid, Antigonish, Caledonia, and Cape Breton) and depressions (one of them later becoming the Minas Basin). All of this is still reflected in our modern maritime geography, a sort of 'fossilised Carboniferous landscape'.

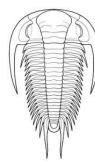
Our Maritime Rock Groups On any Maritime Geological Map, you will find 'rock groups'. There are five Carboniferous Period rock groups in the Maritimes. The Mississippian **Horton Group**, formed around ancient lakes, is the oldest. It is where ray-finned and lobe-finned fish fossils can be found (we are descended from the latter). Horton rocks are found at Blue Beach, the best place in the world for early whole terrestrial-ecosystem fossils (both plants and animals). A little bit younger is the Mississippian **Windsor Group**. This area was flooded by the ancient Windsor Sea, as evidenced by evaporate gypsum cliffs at St. Croix, potash around Sussex NB, salt deposits at Pugwash, and limestones at Newport Landing. The latter contains thousands of fossil brachiopods (2-shelled creatures but not related to clams) and bryozoans (simple aquatic invertebrates). The cliffs of the third, the Mississippian **Mabou Group**, are best seen at Partridge Island, near Parrsboro and East Bay, sporting ancient reptilian footprints and mud cracks from an ancient lakebed.

The later Carboniferous Period Pennsylvanian **Cumberland Group** is represented at Joggins' miles and miles of cliffs which seem to go on forever. This was the 100 Ma-long duration of the great 'coal forests' which over eons and eons of heavier and heavier dead plant deposition, became our greatly compressed depths of coal. Evidence of endless repeated cycles of forests/flooding also can be seen there. We were shown an image of Geologist Don Reid beside a Joggins cliff. Don was instrumental in Joggins being declared a UNESCO World Heritage Site, and his years of collected fossils became the beginnings of the Joggins Museum.

High oxygen levels at this time led to giant millipede-like arthropods such as the two-metre long *Arthropleura*. It's rare to find bits of their fossils but we were shown some of its fossil trackways. We also saw a chunk of 'clam coal', a piece of limestone chock full of bivalves. Back then, 'trees' at Joggins were lycopsids, 10s of metres high, related to modern-day clubmosses (*Lycopodium*s). Lycopsid fossils mostly present as fragments of bark, leaves, cones, and roots. From all those fragments, Rob's colleague Andrew MacCrae was able to put together a full picture of this strange looking tree. We also saw Joggins' fossil ferns and equisetums (related to our modern Horsetails – one of my



Eukaryote



Trilobite



Crinoid

favourite plants as a young child). Also shown was an underwater rendition by geologist Stephen Greb of an amphibian swimming amongst giant Calamites (another clubmoss) stems. Joggins is also famous for the earliest known fossil reptile, found in 1859 by William Dawson who named it *Hylonomus lyelli* after the nineteenth century geologist, Sir Charles Lyell. These reptile fossils were very often found in the remains of ancient hollow tree stumps.

To sum up, Joggins is unique and paleontologically important because it preserves an in-place, entire coal-age biome, it boasts the earliest reptile and land snail fossils, and it's the earliest field work site (1842) of the Geological Survey of Canada. It was conducted by William Logan who was instrumental in founding it. His initial impetus was to find coal to power central Canadian industry (and this was one inspiration for Confederation).

The youngest Maritime Rock Group (the late Carboniferous Period up to the Permian Period) is the **Pictou Group**, which extends right up into PEI's iconic sedimentary 'red beds'. Within this Pictou Group and time frame we find the Walchia Forest at Brule NS bearing fossil trackways showing the earliest known evidence of herding. These fossils are on display at The Creamery in Tatamagouche. More rarely, trackways are also found in the red beds of PEI. Also in PEI, down a well in New London, a large skull fragment of the stem mammal Bathynathus was found. With carnivore-like teeth, it was most likely the same genus as Dimetredon.

An Evolutionary Aside Rob showed us a graph of the evolutionary relationships and timings of the first appearances and ranges of the main groups of jawed vertebrates, the known range of each fossil group, and the relationships and possible extended ranges suggested by both molecular studies and fossil finds.

Fish were the earliest vertebrates in marine waters, and by the time we get to the Devonian Carboniferous Period we see tetrapods that walked on all fours, including amphibians. Reptiles and mammals are now known to have completely separate lineages; but reptile-like synapsids are known now as 'stem mammals' so we too are synapsids. (Both reptiles and synapsids are amniotes, animals which produce amniotic eggs.) From Cape Breton a fossil synapsid *Dendromaia unamakiensis* shows the first evidence of parental care – larger skeletal remains along with parts of a very much smaller, but the same species, skeleton.

The Mesozoic Era includes three Periods – The Triassic Period 251.9 to 201.4 Ma with its giant landmass Pangea; the Jurassic Period 201.4 to 143.12 Ma, and the Cretaceous Period 143.1 to 66 Ma. There was no Atlantic Ocean in the Triassic, and Morocco in Northwest Africa was only about 200 km from Nova Scotia! The Maritimes' Triassic conjugate margins were Nova Scotia with Africa, Newfoundland with Iberia (Spain and Portugal), and Labrador and Greenland with Britain and northern Europe.

When Pangea began to break apart, many rift basins were formed. One of those was our Bay of Fundy. A wonderful spot to see the geology of the Noel Shore there is at Rainy Cove near Walton where gently tilted 220 Ma Triassic rocks can be seen lying on top of strongly tilted 350 Ma Carboniferous rocks. The slanted-join formed between them is known geologically as an unconformity. It represents a time gap of about 130 million years!

Back to Maritime rock groups, the **Fundy Basin Group** includes three Rock Formations – one level down from groups. The **Wolfville Formation**, like PEI, has red beds



A Joggins' Denderpetron

but they are much younger. They were laid down in the late Triassic. A painting based on Parrsboro fossil finds showed a stem mammal *Hypsognathus* browsing among ferns hidden from a much larger cocodile-like amphibian *Metoposaurus*, and a long-legged cocodile-like rauisuchian dinosaur drinking in the distance. The rocks of the **Blomidon Formation** red beds, also of the late Triassic, are overlain by darker volcanic eruptions of the North Mountain basalts.

The **McCoy Brook Formation**, also early Triassic, is found at Wasson Bluff near Parrsboro, where we saw their red beds next to darker basaltic lava. Another painting depicted the particular animals extrapolated from fossil finds there – the earliest dinosaurs, and cocodile-like creatures which were soon to die out. Some cliffs include basalt, fossil scree deposits, æolian wind-blown sands, and fossil lake deposits – all in the same area. Wasson Bluff is special because it represents a broad outpouring of basaltic lava in less than one million years. The resulting large volumes of volcanic CO₂ and other released gases led to global warming and other harmful effects to life, and so then to one of the great 'extinctions' at the end of the Triassic – 200 Ma. This cleared the way for the dominance of dinosaurs on into the Jurassic Period, and eventually gave us the birds.

Eighty-five million years ago, during the post-Jurassic Cretaceous Period, the Atlantic Ocean started to open and still continues to do so. In the Maritimes we have very little in the way of late Jurassic and Cretaceous rocks except for a great 20 km thickness of underwater sediment offshore. 50 years ago this was unknown but was revealed with the comparatively recent well-drilling exploration on the Scotia margin. Offshore deposits, two to three km below the modern seafloor, include small amounts of coal and also chalk. The chalk is composed of coccoliths, external skeletal fragments of microscopic algal coccolithophores (millions of years into the future when sea levels lower again, we could have our own 'white cliffs of Dover'!).

The dinosaurs went extinct 66 million years ago at the end of the Mesozoic Era's Cretaceous Period and the beginning of the last Era, the Cenozoic (the last 66 million years) but we have no geological evidence of it in the Maritimes except for offshore dredging finds such as a shark's tooth, a fossil crab, and fossil shells.

Interestingly there was one gap with absolutely no fossil records at all during the time of Rob's particular geological research (a period of about 53 to 48.6 million years ago in the Cenozoic Era). Rob discovered it was due to an ancient astral impact onto the Scotia Margin that had caused the sweeping away into the Atlantic of a huge section of fossil sediments down our continental shelf, one of the largest known debris flows ever.

The **Cenozoic Era**, 2.6 Ma until now, contained a Quaternary Period – the Ice Age – which covered almost all of North America. Along with other Maritimes' areas (such as Point Pleasant Park) glacial erosion evidence is found on the rocks at Clam Harbour beach near Owl's Head – one of the best polished glacial rock surfaces that Rob has come across. The Milford mastodon story is part of the Quaternary; 75,000 year old bones of a mastodon were found in sink holes of the Milford Quarry's gypsum deposits. We were shown some very well-preserved teeth, and a mastodon coprolite (fossil dung). When looked into microscopically, a plethora of plant and beetle bits were found within it. Mastodons are not to be confused with mammoths which are a different animal.



Land Snail

SUMMING UP

Not only is the fossil record of the Maritimes fun and interesting (I'll say!); it is of international significance. The Maritimes boasts the earliest relatively complete shark (Athoville, NB); a diverse Devonian terrestrial biome with lots and lots of plants (Dalhousie Junction); an early (and probably the first) terrestrial ecosystem with tetrapods (Blue Beach); the earliest known confirmed reptiles and land snails (UNESCO site of Joggins); possibly the first record of synapsid mammal lineage parental care (Bras d'Or Lakes); the first evidence for herding (Brule); Canada's earliest dinosaurs (Wasson Bluff); and diverse vertebrate fauna fossils following after the great Triassic Period mass extinction (Wasson bluff).

Importantly, all these maritime fossil finds and rocks are very critical to our understanding of how our planet works over time by integrating evidence from life, plate tectonics, climate, and many other Earth systems.

To read about it in more detail, just go to the library, or ask for it at you favourite bookstore – *The Last Billion Years, a Geological History of the Maritime Provinces of Canada*.



MARITIME WALRUSES 21 MAY – Bernie McKenna

Dr. Brenna Frasier, Curator of Biology at the Nova Scotia Museum of Natural History (NSMNH) gave us this most interesting and informative presentation on both the modern walrus and the now extirpated Maritime Walrus (MW). Obviously very well versed and highly knowledgeable about the animal, her comfort level with the topic shone throughout the entire evening as she covered the two animals. Really, she gave a two-part presentation, the first being on extant walruses, and the second on the now extinct Maritime Walrus *Obodenus rosmarus*.

The Modern Walrus is the only living member of the Odobenidae family, and it is very well equipped for its surroundings in the circumpolar distribution it chooses as its home habitat.

As a species it originated in the Pacific Ocean area and migrated to the Atlantic and Maritimes areas between 5 to 8 million years ago – the late Cenozoic Era. Strangely enough, the Pacific population itself became extinct about 2 million years ago, with the Atlantic population subsequently forming both an east and west population. There are now seven distinct populations scattered across the northern polar regions. All seven have been affected by these five limiting factors – climate change, ecological interactions, physical geography, evolution, and humans (in one or more ways).

The Pacific Walrus is the largest of the species. A modern Pacific bull may weigh as much as 800-1700 kg and have a length of 9-12 feet. The cows are smaller, weighing in at 400-1,250 kg and measuring 7.5-10 feet in length. They can have up to 6 inches of blubber under their tough, thick hides – as insulation from the elements and protection from predators, and in the case of the bulls it adds protection during mating season fights. A bull's neck

skin often has large bumps or lumps called bosses, these start appearing at puberty and increase with age; cows do not have this skin feature and their skin is smoother. Both sexes sport soft, sensitive bristles (vibrissae) on their snouts which aid in the detection of prey. Their skin colour can appear pinkish in warm weather due to dilation of blood vessels in the heat and consequent circulation increase. Bulls and cows have different tusk shapes, in a bull the tusks normally curve outward, while a cow's will curve inward. Bulls have a penis bone, a baculum. Other animals have them as well. Walruses however have the largest in proportion to body size; it's thought it is a help for more successful mating in water.

A normal life span is 40 years, with cows maturing at 10 years or so. When mature, cows have one calf every two or three years. Both sexes are highly gregarious and form herds of hundreds or even thousands of animals. In winter they inhabit pack ice well offshore and in summer they haul out on isolated beaches or on floating pack ice, especially the cows and calves.

Clams, soft invertebrates, sea worms, sea cucumbers, tunicates – all are on their food menu. When feeding on clams, they crush the clam shell in their mouth, then suck the meat out of the shell, discarding the crushed shell bits. Their feeding habits are thought to contribute to two interesting body features. The first is that one tusk is shorter than the other and the second is that one flipper is longer than the other. The animal habitually feeds on one side or the other (handedness); the side they feed on will have the shorter tusk and the longer flipper.

The total world population is north of 280,000 animals, with the Bering Sea population making up over 70 percent. The animals are still hunted in some nations for food, oil from the blubber, and skins for making leather. Being so large and formidable their only predators are Orcas, Polar Bears, and humans.

The Maritime Walrus, now extirpated, has unfortunately not been seen regularly for 250 years, so sadly, there is no hope for population recovery. That said, Brenna did tell us that one was reportedly seen in Halifax Harbour in the 1970's. From evidence derived from 280 recovered skulls, mandibles, and tusks it has been shown to have been a larger animal than our current Canadian walruses.

Physical measurements of 18 specific points of 278 of these walruses' skulls, mandibles and tusks showed no overlap between these and modern walruses.

Measurements of the mandibles of both showed only minimal overlap between the two and tusk measurements also showed the same minimal overlap. These results further indicate the distinct nature of the Maritime Walrus.

At its peak population in the 17th century, it may have numbered as many as 100,000 animals. They were hunted commercially from the 16th to 18th centuries.

Both Sable and Magdalen islands had large populations, with the Magdelens likely hosting larger population of the two.

In 1591, records show that 1500 walruses were killed on Sable Island, and on another hunt in the 16th century – 1,500 to 1,600 were slaughtered in the Magdalen Islands area.

Francis Fay, a world-renowned walrus researcher, studied the Sable Island collection and said they more closely resembled the Pacific walrus rather than the Atlantic. Genetic surveys corroborated these same distinctions. Brenna

thought lower population numbers may have been a factor in the lower genetic diversity of our Maritime species.

They flourished during the last ice age, when the sea levels were much lower, and when even portions of the Grand banks were solid land and Sable Island too was considerably larger than it is today. During this period they inhabited eastern North America as far down as the southern states. Then, about 12 million years ago, glacial ice receded and they migrated slowly north again. Their increased range in the 17th century has resulted in bones and tusks being recovered from many areas – such as the Grand Banks (dredged up by scallop draggers), northern P.E.I., the Magdalen Islands, Baie de Chaleur, Cape Breton, and the Bay of Fundy.

HFN FIELD TRIPS

HFN WINTER BIRD WALK

– *Fulton Lavender*

Date: Sunday, January 21st

Place: Sullivan's Pond, Dartmouth and beyond

Weather: Calm, clear, -4°C

Leader: Fulton Lavender

Participants: 11



An optimistic group of eleven enthusiastic participants met in Dartmouth at Sullivan's Pond on a calm and cool Sunday morning. Hopes of a good start to our outing were bolstered by close-up sightings of numerous waterfowl species such as Wood Duck, American Widgeon, Greater Scaup, Lesser Scaup, and Ring-necked Duck. Other highlights included Northern Flicker, and Northern Cardinal.

The second stop on our route was Dartmouth Cove where we enjoyed fine views of Common Goldeneye, Red-breasted Mergansers, and distant but satisfactory looks at a juvenile Cooper's Hawk and an adult Bald Eagle.

By the time we reached our next planned location it had become quite windy with a raw, stiff breeze engendering cold noses and watery eyes. Here at McCormack's Beach in Eastern Passage we persisted long enough to add Bufflehead, Surf Scoter, White-winged Scoter, and Black Scoter to our list. Our final point of venture (with only three determined parties left) was Hartlen Point. The wind was even stronger there, but we diligently scanned the golf course and nearby Devil's Island anyway and found three Northern Harriers, one Rough-legged Hawk, a Turkey Vulture, our second Bald Eagle, and a flock of Canada Geese. Despite the decline in the weather it was a good birding day and a good time sharing the gift of nature.



HALIFAX PLANETARIUM

– *Brian Bartlett*

Date: Tuesday, March 5th

Place: Halifax Planetarium, Dunn Bldg., Dalhousie

Leader: Stephen Payne

Participants: 30

The term "field trip" might not fit a visit to a domed theatre. The thirty of us together one winter night, in full darkness most of the time, stayed in our chairs. The evening didn't involve leisurely sauntering, brisk walking, ascents or descents, or unpredictable in-the-field observations. De-



Both the morphological and genetic surveys of bone structure and DNA point to the animal having been distinct from the modern walrus with several differing characteristics, and that it was on a different evolutionary track than either of the current Pacific or Atlantic populations.

This was such an interesting talk, and the more I read up on the animal the more fascinating it became. After a lively Q & A session, we sincerely thanked Brenna for such an enjoyable and interesting evening, and for opening our eyes to this magnificent animal and the reasons for its disappearance.



spite our bodily stasis, however, we travelled imaginatively much farther than we do on most walks and hikes. Though our guide supplied mind-dazzling statistics (for instance, the Orion Nebula is 13,000 light years away), he also used grounded, approachable language: "I'm going to take you on a tour of the night sky.... We'll go briefly to the equator."

While the lights were still on, Stephen Payne had introduced himself as a Senior Instructor in the Dalhousie Department of Physics and Atmospheric Science, as well as "an amateur astronomer." He didn't mention that between 1987 and 2019 he co-authored 51 articles in physics. "When your eyes are old, you can't see as well," Stephen reminded us. "I'm from New Zealand, and you can see the stars much better there. I didn't know that at the time." He added that he regrets not having taken up astronomy until after his relocation to the northern hemisphere.

The Halifax Planetarium is operated by volunteers, many from the Royal Astronomical Society of Canada. Stephen told us that the planetarium is one of the oldest such public facilities in Canada. While much larger ones exist, an advantage of the Dalhousie University one is a kind of relative intimacy; no more than thirty observers can be seated. The Spitz Model A-1 projector (which Stephen simply called "the Box") is on indefinite loan from the Nova Scotia Museum of Natural History. Built gradually in the 1950s, it was initially housed in the museum's first location, but couldn't be moved subsequently into the building on Summer Street. In a city with as much military background as Halifax, not many of us were likely surprised to hear that the twelve-sided Dodecahedron projector was based on wartime inventions used to train night-flying pilots and navigators. To simplify a complex process: through lenses and pin-holes, a device inside the projector emits lights, projecting them onto a fabric dome overhead.

"Light pollution," Stephen said with a disillusioned tone, "has taken over the world, unfortunately... You must leave the city to see." Yet he sounded more positive when explaining that basic astronomical surveys are possible for laypeople without the need for great expense or advanced scientific studies: "The naked eye and binoculars get you most of the way." As for astrology—never to be confused with astronomy—he simply said, "I'm not going to talk about horoscopes," suggesting impatience with a popular way of making characterizations and predictions under the signs of the Zodiac.

A key thought in Stephen's presentation was that no night sky is static: "The stars change as we sit on the earth and

look at the night sky.” He had us readjust our heads and eyes now and then to look north or south, east or west. He pointed out how much astronomical naming has Arabic origins, and drew our attention to the projector’s simulations of many constellations, such as

- *Taurus the Bull*, whose “eye” is the red star Aldebaran (Word spellcheck suggests “Alderman”);
- *Scorpius*, in the middle of the Milky Way, one of the forty-eight constellations i.d.ed by the pioneering astronomer Ptolemy in the second century;
- *Orion*, including the cooling star Betelgeuse;
- the unusually large *Cygnus the Swan*, with the star Draco in its northwest (Stephen alluded to Draco Malfoy, a central character in the Harry Potter books and films, a pale-haired believer in “pure-blood” status);
- *Sagittarius the Archer*, never high in a sky view from northern latitudes (one of its special features is The Teapot);
- *The Herdsman*, a.k.a. *Bootes*, including 29 stars visible to the naked eye;
- *Ursa Major* and *Ursa Minor* (beyond the left foot of The Herdsman).

We heard that young stars emit blue light (was Stephen punning when he referred to “hot young stars”?) and that as stars age they tend to turn red, the colour of hydrogen. Near the end of his hour-long presentation, Stephen took the cliché *a drop in the ocean* and—trying to suggest the vastness of space and time apparent in astronomical studies—he fine-tuned the cliché further: “We’re *not even* a drop in the ocean.” That was a humbling yet enlightening thought to turn over in our minds as we went back out into the winter night.

As HFN volunteer report-writer, I discovered that in the room the surrounding total dark had one disadvantage. Note-taking without being able to see paper, pen or hand was tough going. So my report is less detailed than I’d hoped. Writing in the pitch black felt like a defamiliarising experiment. I concentrated on slightly moving my fingers down the page to avoid writing on top of previous writing, but once the lights were back on I saw that I’d unwittingly made several palimpsests:

Milky Circle = Galaxy (Greek) the white
 (I made two fried eggs together - were in the
 constellations we can't see

Light pollution has taken over
 the world, unfortunately
 - LED lights
 - You must leave the city to see the stars
 - You can't see the stars in the city
 - You can't see the stars in the city

Gazing at the most tangled sections of the notes felt like adjusting eyes to a nebula. Stephen had mentioned that the word *nebula* comes from the Latin for *cloud*. Comparing a cloud of stars to a cloud of words was only one way in which our planetarium hour was eye-opening.

H. IRVING GARDENS/MINER’S MARSH

– Bernie McKenna

Date: Tuesday, April 2nd

Time/Place: Acadia University and Miner’s Marsh

Leader: Samuel Jean

Weather: Clear skies, 7-8 C

Participants: 19



Seventeen of us travelled to Wolfville in seven vehicles (carpooling works!) where we were met by another two attendees. During this whole day we were under the very capable guidance of Samuel Jean. Samuel is a Conservation and Education Technician at these gardens, where his obvious enthusiasm and extensive plant knowledge repeatedly showed itself throughout the entire visit, and his deep passion for native plants in particular was very inspiring. Some of you will remember that this was the same Samuel Jean who gave us the wonderful talk on the superior benefits of native plants at a HFN meeting last April.

This write-up is written in two parts. Once we had considered the closeness of Miner’s Marsh it only made sense to add a second informal walk to the marsh as well. The first segment covers the internal facilities and a brief look at a small portion of the Harriet Irving Botanical (external) Gardens. There is a brief mention of a social aspect of the day where 16 of us gathered at Church Brewing Co. for a welcome and relaxing noon hour lunch thoughtfully arranged by HFN member Judy Keating. The second segment covers the self-directed walk at Miner’s Marsh Park, whose trails border the Cornwallis River and enclose the marsh ponds themselves.

Harriet Irving Botanical Gardens When we initially gathered in the agreed-upon Reading Room, Samuel covered our visit’s layout, telling us we’d be visiting the Herbarium, the Seed Bank, the Research Dept. and the Greenhouse, and what to expect in each. After this brief introduction he led us directly to the Research Department, where manager Sarah Hines told us of the two labs we’d be visiting, what to expect there, and the function of each one.

The first was the Silviculture Laboratory area where tissue culture and cloning were being employed on various plant reproduction projects. Here we were thoroughly briefed in a clear and understandable manner by two very well-versed students, as well as Sarah herself, on the tissue/cloning process of micropropagation for the growing and cultivation of plants. This method of multiplying a single seed’s embryo to the point of virtually unlimited duplication is, at least to me, truly amazing. One current project being worked on is in conjunction with the Christmas Tree Council of Nova Scotia involving the Balsam Fir *Abies balsamea* and how this process can best benefit that industry, both now and in the future. We were told of the extreme importance of controlling light, temperature, sterile conditions and the growing medium itself in every aspect of the process, and how failing to do so can easily be fatal to an entire project. (During all three stops – the two labs and the Seed Bank – the knowledge level of the presenters was clearly evident, many questions were patiently and knowledgeably answered in full.)

The second lab on the list was the Mallory Biology Laboratory where two students detailed their research project of testing two species of northern birds for their diet and plastics ingestion. The two species were the Northern Fulmar *Fulmarus glacialis* and the Thick-billed Murre *Uria lomvia*. The Northern Fulmar is a shallow-feeding bird div-

ing to only 10 feet or less. It feeds primarily on fish, squid, and small crustaceans. On the other hand the Thick-billed Murre, commonly called Turr in Newfoundland, is a deep diver, feeding down to depths of 200 metres. Its diet also contains fish, squid, and small crustaceans but with the delicious addition of octopus. Both inhabit the high arctic and were mainly collected from Baffin Island where they are procured both from native Inuit hunters (shot) and from beach searches (natural death). A few from Sable Island were also included in the research as well as one Petrel from B.C. The food particles themselves are screened by a sieve and any particles 1 millimetre or larger in size are identified by type, fish species, plastics, etc. The different food fish are identified by their ear bones, Otoliths, which are different in each species. The presence of large pieces and/or quantity of plastic in the bird's gastrointestinal tract can give the bird a false sense of satiation and cause it to quit feeding, basically starving itself. There were several Murres on site, divided into those that had been shot and those having died in other ways. Again, this lab also drew such a wide variety of questions that keeping the group on schedule was difficult!

The final internal department toured was the Acadia University Seed Bank where Dr. Alain Belliveau explained in some detail the workings and scope of the department. Started five years ago, it has grown to be the largest seed bank in Atlantic Canada, and houses over 330 species and about 5 million seeds; those numbers may change as some species are depleted and others taken on. The seeds themselves are mainly collected by trained volunteers and staff, and Alain showed us how little space is actually needed to accomplish this quantity of storage. He displayed several samples of stored seeds explaining the process and requirements to maintain the viability of the seeds for an extended number of years. The quantity of seeds is determined by weight. To do so, a set number of seeds are weighed, then the total quantity of seeds get weighed. From there it's just a matter of division to find the total number of seeds of any one species.

He also covered the many genera of stored seed types – lichens, fungi, vascular, etc. All of this works for most types of seeds except for some nut bearing plants, for example acorns. Once acorns dry out they become unviable. As in the other two labs, the Q and A session could easily have carried on for longer if more time had been available. This wrapped up the fascinating internal facility tours.

From here we visited next the Greenhouse and two rooms off of the connecting hallway, one of which held tropical plants being grown for various research and display purposes. The other held a large collection of mostly highbush blueberries, the majority from warmer climes, and again used for research and display. Exiting the hallway, we came to the Fern Room, with many species of ferns as well as native berry plants. The many varieties were far advanced in development compared to any exposed to outside weather. In the middle of the room was a large, granite fountain-boulder covered in low-growing native ferns (possibly some Rock Polypody) plus other low growing native plants. There were also several native berry bushes – Serviceberry (or Shadbush, Indian Pear, etc.), Bayberry, Ink Plant, and several others. These also were well ahead of any planted outside.

The next step was the exterior Walled Garden, so named because of its fairly protected micro-climate. It too had a good number of native plants that were benefitting from

this protective wall. One, previously seen inside, was the Ink Plant *Harveya* spp. It makes a very durable and easily trimmed native hedge. Native to Eastern North America, the Ink Plant's seeds are edible for birds but mildly toxic to humans. Other plants here were also Serviceberry, several ferns, Blueberries, Fox Berries, Partridge Berries, plus a number of others.

The final outside area was the Linden Tree Walk – a walk lined on both sides by Lindens (Basswoods) *Tilia americana*. It was a double planting on either side of the walkway – the left (west) has non-natives and the right (east) are all natives. Some of the latter were Joe Pye Weed, Sweet Grass, Cranberries, Blue Flag Iris, Teaberry, Bayberry, several ferns, Wild Lily of the Valley, Bunchberry, and many more. Once again, the same old situation came up, too many plants, too many questions, and not nearly enough time.

Unfortunately, it was time to depart, and we heartily thanked Samuel and really all of the staff – to a person they were knowledgeable, professional, and so very, very welcoming. We lunched before our Miner's Marsh walk which turned out to be a wonderful addition to the day. Being so close to Acadia it only made sense to include it.

Miner's Marsh Initially laid out in conjunction with Ducks Unlimited, Miner's Marsh is now maintained by the town of Kentville and other organisations. Hugging the east bank of the Cornwallis River, it comes complete with benches, viewing platforms, interpretive signs, large, well-vegetated ponds, and 1.7 km of hard and wide well-packed crusher-dust trails. These trails surround the good-sized ponds and a well-treed east border area of mature oaks, willows, and maples. Along the whole trail birdhouses were situated on posts. No doubt the Tree Swallows (yet to arrive) will appreciate this housing. It's all a perfect habitat for songbirds, reptiles, amphibians, and other wildlife. Seen during the walk were one Red-winged Blackbird, one medium size Painted Turtle *Chrysemys picta picta*, (Mi'kmaq Mikjikj), sunning itself on a raft of last year's dead cattail stems, several Canada Geese, three pairs of Mallards, and a couple of Black Ducks. A highlight for me was two Muskrats feeding on the new plant growth along the river bank; I may have been seeing the same one twice, but no matter, I enjoyed both sightings. Along the pond edges the bulrushes and cattails were starting to put on height, many still sporting their seed heads, while those in the shallower, warmer areas were already 8 to 10 inches tall. We also saw the remnants of last year's Wild Cucumber vines *Echinocystis lobata* (all parts of it are poisonous and should not be eaten). There were also areas where the invasive Multiflora Roses were well established, and later in the year there would be some good-sized clumps of native Common Milkweed in evidence. Unfortunately, also present everywhere were large areas of last year's Japanese Knotweed stems.



Japanese Knotweed

HEMLOCK RAVINE PARK

– Mary Kennedy, Bernie McKenna

Date: Saturday, Apr. 27th

Time/Place: 9:00 a.m., Hemlock Ravine, Bedford

Leader: Sean Haughian

Assistant Leader: Sylvia Haughian

Weather: Cool morning, sunshine all morning

Participants: 24 (leaders included)

This walk was conceived, or rather morphed, into two separate walks conducted in support of the 2024 HRM City Nature Challenge, an international iNaturalist event which documents nature statistics and concerns worldwide. The 9:00 a.m. walk was at Hemlock Ravine Park and the 1:00 p.m. walk was at Sandy Lake Park, 110 Smiths Rd. Bedford. Both walks were led by extremely knowledgeable HFN members; the morning walk by Sean Haughian and his assistant Sylvia Haughian, the second by both Sean Haughian and David Patriquin. Both leaders are very well versed in this type of event and are extremely valued because of their proven, nature oriented, expertise. This particular article will only cover, or attempt to cover, the morning Hemlock Ravine Park walk.

We consisted of various age groups and backgrounds – HFN members, iNaturalist enthusiasts, university students, and other interested individuals – a good mix k.

After initial introductions and coverage of a few applicable points we headed out. Almost immediately, at the Heart Shaped Pond, Sean pointed out a large Yellow Birch in close proximity to a couple of large Eastern Hemlocks. He explained how all birches and hemlocks have massive, underground interconnecting roots and fungi connections which form a network which is advantageous for both species. Apparently, when the Birch is not leafed out, the Hemlock's nutrients are used by the Birch to tide it over this dormant period. When the Birch does leaf out and photosynthesis can take place, the Hemlock can use the Birch's nutrients, thus forming a mutually advantageous bond.

Further up the trail we stopped at a large White Pine of approximately 100 years of age ('old' but still 40 years short of the Old Growth designation of 140 years), where Sean outlined the characteristics of both White Pine and the Eastern Hemlock, noting that hemlocks are being attacked by the Hemlock Woolly Adelgid (HWA) insects, which are native to Asia and have no natural predators here. Attacking both hemlock and spruce, it reveals itself as white, fuzzy secretions on the limbs' bark between its needles. Eventually, it kills the tree and also the many others which are infected. Two experimental treatments being tried are natural enemies from other countries, and insecticidal treatments which are injected under the bark; the latter spreads all throughout the trees' tissues and thus to the insects, but time will tell if this will be helpful or not.

Along the way Sean introduced us to forkmoss – Dicranum, of which there are 12 species. Dicranum have an upright growth pattern, while Hypnum (ground moss) grow more laterally. There was discussion on whether fallen leaves covering mosses in the fall is detrimental to their growth. He said a thick covering of leaves *could* do



that, but if it were coniferous needles, it would be much less likely to have any significant effect. He went through some general points about lichens; some of which were:

Lichens, Sean's specialty, are a mutual composite of an algae and a fungus which do not resemble the individual organisms themselves. They can tolerate and flourish in very dry conditions, such as on tree trunks which normally are only 2% H₂O or so, which is often the situation on tree trunks at 12 to 18 inches up. They have a minimal effect on their host trees, as they only use their bark as a substrate upon which to exist. Lichens have an extremely long history on earth; they have been verified as being here for at least 400 million years! In Atlantic Canada there are 160 lichen species (there are 460 species of mosses). Both these numbers are likely to increase in future years as more are discovered.

Here I'd like to mention an unfortunate observance. A trail walker came by with a handful of Mayflowers. Having neither knife nor snips, she had just pulled them out of the earth along with their roots. While picking Mayflowers is certainly legal, to pull them that way is a terrible practice. To me (Bernie) it shows a complete disregard for the plant and very likely nature as a whole.

Our next stop was our first of two off-trail jaunts. We were given an introduction to Red and White Spruce and a means to differentiate them by needle length. Red Spruce have needles 10 to 16 mm long while White Spruce needles are about half that length at 6 mm. (He also mentioned Black Spruce but they'll be further covered in the Tree Swamp info). Sean told us how our native Balsam Fir (the classic aromatic Christmas tree) is easily identified by the splayed form of its branches; because of this form, it's a good tree under which to wait out a rain shower.

There was lots of Sphagnum/Peat Moss here, and by squeezing it he demonstrated how it can hold up to 20 times its weight in water. Nova Scotia boasts 50 species. This very wet area held remnants of last year's Cinnamon Ferns – now dry, brown, and brittle. They're not to be confused with Ostrich Ferns which give us edible fiddleheads in spring. Crossing this wet area he pointed out other items, such as Brown Peat Moss which has a definite brown tint to its top. There were also some of last year's Indian Pipe/Ghost Pipes, their usually white stems now a rusty brown.

Our last stop was the Tree Swamp, and well-named it was! With a mixture of trees in residence it was extremely wet and mossy, requiring high rubber boots. A few of our non-boot wearing walkers left us here, and for good reason – the best walking was if you managed to step/jump from moss-covered hummock to moss-covered hummock, otherwise you suddenly slipped down into five to ten inches of wattery black muck. The dominant conifers were Black Spruce with their 8 to 15 mm long needles and distinctive limb pattern (they're normally lacking any amount of limbs on their lower trunk sections). This swamp turned out to be a treasure trove for iNaturalist purposes; it revealed a couple of bonus plants. A Pitcher Plant just breaking through in two spots, and the real find Sean pointed out – two small Black Spruce with native Mistletoe flowers on them. I'm sure it was a first for many of us. While Black Spruce was the domi-

nant conifer, there were also hardwoods and Red Maples scattered around. As mentioned previously, there were mounds of Spaghnum Moss to step on in order to avoid the mucky depths.

This signalled the end of the walk, both our leader and his assistant had other obligations – Sean to lead another walk in the afternoon at Sandy Lake, Bedford, and Sylvia to attend swimming lessons. For those of us remaining it was out of the swamp and onto higher and firmer walking. This was without doubt one of the most interesting walks I have been on with HFN. No doubt it was due to Sean's obvious in-depth knowledge, passion, and enthusiasm he showed from start to finish. From the reviews I have since received this was the case with all who attended.

HEMOCK RAVINE SPECIES

Trees and Berries

Yellow Birch
Eastern Cedar
Eastern Hemlock
Eastern White Pine
Black Spruce
Red Spruce
Grey Birch
White Birch
Red Maple
Striped maple
Tamarack
Creeping Snowberry
Teaberry
Bunch Berry
Mayflower
Dwarf Mistletoe
Lambkill
Ghost Pipe



Betula alleghaniensis
Thuja occidentalis
Thuja canadensis
Pinus strobus
Picea mariana
Picea glauca
Betula populifolia
Betula papyrifera
Acer rubrum
Acer pensylvanicum
Larix laricina
Gaultheria hispidula
Gaultheria procumbens
Cornus canadensis
Epigaea repens
Arceuthobium pusillum
Kalmia angustifolia
Monotropa uniflora

Lichens and Mosses

Giant Cladonia Lichen
Varied Rag Lichen
Tree Lungwort
Smooth Lungwort
Bottlebrush Shield Lichen
Monk's Hood Lichen
Copper Wire Moss
Common Haircap Moss
Common Fork Moss
Haircap Moss
Red Shank Moss
Cinnamon Fern
Ostrich Fern
Big Red Stem Moss
Stairstep Moss
Whitish Pincushion Moss
Crisped Pincushion Moss
Brown-stemmed Peat Moss
Blunt-leaved Peat Moss
Asa Gray's Scalewort
Flat-leaved Scalewort



Cladonia maxima
Platismatia glauca
Lobaria pulmonaria
Ricasolia quercizans
Parmelia squarrosa
Hypogymnia physodes
Pohlia nutans
Polytrichum commune
Dicranum fuscescens
Polytrichum commune
Ceratodon purpureus
Osmundastrum cinnamomeum
Matteuccia struthiopteris
Pleurozium schreberi
Hylocomium splendens
Leucobryum glaucoma
Ulotia crispata
Spaghnum fuscum
Spaghnum palustre
Frullania asagrayana
Radula complanata

Birds

Blue Jay
Downy Woodpecker
Black Capped Chickadee
Osprey
Pileated Woodpecker



Cyanocitta cristata
Picoides pubescens
Poecile atricapillus
Pandion haliaetus
Dryocopus pileatus

BURNTCOAT HEAD PARK

– Bernie McKenna

Date: Saturday, May 4th

Plasce: Burntcoat Head Provincial Park, Noel Shore

Weather: About perfect, clear and sunny, 14C°

Leaders: Andrew Hebda and his wife Gwyneth Jones

Participants: 35 (leaders included)

This was the second Minas Basin shore walk in the last two years; the first took place at Blue Beach, just past Hantsport. Both were in May, both our leaders were excellent in every way, and the weather was as good as we could ask. We met Andrew and Gwyneth in the parking lot area and after a brief introduction Andrew took over and gave us a complete briefing of things ahead. He covered safety, footing, first aid, ground conditions, etc. – pretty much a do's and don't's session. He also told us how the lighthouse on site is an exact replica of the original and is even built on the original foundation. The only part missing is the light itself – they're now very hard to source.

Following this we headed down to the steps leading to the beach. On the way he showed us the stumps of several spruce trees that had been cut when the Brown Spruce Long Horn Beetle was making the news. Later knowledge showed this beetle only attacked already stressed or weakened trees, much as the Bronze Birch Borer does with birch.

Carrying on we came to the cement steps which lead down to a sandstone landing area above the beach proper. As we stood there Andrew talked about the Mi'kmaq's long oral history – going back centuries – and pointed out we were standing on their ancestral lands which they now share with us. The visibility was good and it allowed him to point out several well-known landmarks – Cape Split, Five Islands, Economy Point, and Tenecape. Across the basin there were two lesser islands. The smaller round one is Brick Island (so named because from above it looks like a brick oven), and the other, larger island is Moose Island (whether it does or ever did have a moose population is not known). In front of us was a large stack of striated red sandstone layers, with good-sized conifers on top. Called Flowerpot Island, a participant estimated it to be ± 500 ft. long and 40ft high.

As we descended the hand-carved steps down to the exposed sandstone basin floor, Andrew reminded us that this fairly soft, easily-carved rock is very vulnerable to weather and water erosion. Telling us more about the basin and its water flow and volume, he shared how in one 24-hour day the amount of water moving through here exceeds that of the total flow of all the rivers of the world! The water's speed past Cape Split is about 10 kph, and it naturally follows that this enormous flow affects the entire basin from shore to shore. It also explains how its north and south shores are very different in vegetation, animals, and the shores' make-up themselves. Every complete tide cycle (two per day) sees 100 billion tons of water move in and out. However, despite this monumental water movement, in 1988 the basin froze over for three days – from shore to shore! In Minas Basin the height of the high tide can reach 16 metres (53 feet). Back in 1869, during the Saxby Gale,

high tide was an amazing 21.6 metres!

The entire exposed beach/ocean floor itself was covered with a very fine layer of silt/sediment, although it was only really noticeable to any degree on the solid rock. Other than that solid rock there were spots of loose beach stone and others of coarse sand ridges. These ridges were maybe 10 to 15 cm high, 100 cm wide, and maybe twice that in length. These sandy ridges come and go with the tides and seasons; constant change is the norm. Also, incoming tides push sand and finer particles to the head of the basin, where on a slack tide of to up 1½ hours they settle to the bottom and add another layer to the basin floor.

Commencing our walk counter clockwise around that imposing low-tide-stranded Flowerpot Island, we came to the first tidal pool. Measuring the water temperature, Andrew read 22°C. In mid-summer, he said it can reach 35° or 40°C. In this pool he showed us the true 'stars' of our trip (well, at least their holes and syphons). These are molluscs that live *in* rock, reasonably soft rock, yes, but rock none the less. There are two species here – the first is the Atlantic Mud-piddock or Fallen Angel *Barnea truncata* which use these Triassic/Jurassic mudstones to live in – a truly unique animal. In Nova Scotia it lives only here plus a few other locations. The second is the False Angelwing *Petricolaria pholadi-formis*. It's more robust than the Mud-piddock and may inhabit coarser and harder substrates. There is a third and larger species which lives at Blomidon but not at Burntcoat Head.

The best way to differentiate the two species is that one has two parallel syphons while the other has V-shaped ones. Like some other molluscs, they reproduce by external fertilization – the female releases eggs into the water and these are fertilized by released male sperm outside of the female's body; from thereon in they're at the mercy of the tides and predators. Mollusc fertilization varies by species and may be internal or external. *Barnea truncata* is the only one of the previous two that is listed in SARA (Society for Artistic Research Announcements).

Walking on, Gwyneth's trusty reference book regularly came into play as specimens were found and puzzled over. The first was Baltic Macoma *Macoma balthica*. It's a small saltwater clam, a bivalve in the Tellinidae family. Living in the northern Pacific and Atlantic oceans, it was first found in Pictou Harbour in 1854 (a ship Hector connection perhaps?). Another was the edible European Periwinkle or common periwinkle *Littorina littorea*; there were thousands upon *thousands* of these. We also saw predatory Dog whelks *Nucella lapillus*. They sport a 'boring tool' with which they drill through prey shells then injecting a paralyzing/digestive enzyme which enables them to suck out the animal in juice form. One tidal pool had a small, reddish-brown marine worm swimming with side-to-side undulations; there are others that have up-and-down undulations. A few tidal pools sported small scuttling arthropods. Small invertebrates, they scurried from one hiding spot to another. Virtually every tidal pool was crisscrossed with the trails of various little animals as they went about their day.



Moving on to larger animals, there are five species of crabs in the basin – Lady Crabs *Ovalipes ocellatus*, Rock Crabs *Cancer irroratus*, Hermit Crabs *Pagurus pollicaris*, Toad Crabs *Hyas coarctatus*, and the European Green Crab *Carcinus maenas*. This latter one is the notorious invasive which is causing an enormous amount of damage to our marine environment – both its plants and its animals. Its habit of digging in the sand for prey uproots marine vegetation as it hunts and eats. Now believed to have been distributed in five locations it has spread rapidly in Nova Scotian waters. A single female can lay up to 185,000 eggs as often as twice a year, and this makes for a very rapid range expansion. Between 2010 and 2012, 926,574 Green Crabs were trapped in the Kejimikujik estuary on the Atlantic coast. Currently it has neither commercial use nor, disastrously, native enemies. On the other hand, native bivalve species found in the basin have both a significant commercial and recreational value and as such are very important to the economy and ecosystem. These commercial and recreational species are Soft Shell Clams *Mya arenaria*, Razor Clams *Ensis leei*, Blue Mussels *Mytilus edulis*, Horse Mussels *Modiolus modiolus*, and Bar Clams/Atlantic Surf Clams *Spisula solidissima*. The latter are not found in any great quantity.

As the walk wound down there was much discussion at a place where both the bivalves Fallen Angels and False Angels were present together. This allowed for closer hands-on examination of both along with their substrata habitat. Broken rock segments allowed for even closer inspection of the animals, holes, and/or tunnels.

Following this and the active discussion it engendered, everyone eventually found their way back to the steps. Further along the walk back up from the beach Andrew covered and elaborated upon other points.

This walk was so very interesting and entertaining, as all Andrew's events are; HFN is so fortunate to have people such as Andrew and Gwyneth and many others who share their knowledge and experience with us – both at our meetings and on these walks. I received countless remarks of appreciation for this amazing trip which Andrew and Gwyneth had provided – it was truly wonderful.

Razor Clam



BURNTCOAT PARK SPECIES

Fallen Angel/Atlantic Mud Piddock
False Angelwing
Baltic macoma
European Periwinkle
Dog Whelk
Lady Crab
Rock Crab
Hermit Crab
Toad Crab
European Green Crab
Soft Shell Clam
Razor Clam
Blue Mussel
Horse Mussel
Bar/Surf Clam



Barnea truncata
Petricolaria pholadiiformis
Macoma balthica
Littorina littorea
Nucella lapillus
Ovalipes ocellatus
Cancer irroratus
Pagurus pollicaris
Hyas coarctatus
Carcinus maenas
Mya arenaria
Ensis leei
Mytilus edulis
Modiolus modiolus
Spisula solidissima



"Rich fresh wine / of June, we stagger into you smeared / with pollen, overcome as the turtle / laying her eggs in the roadside sand."

From "More Than Enough", by Marge Piercy

NATURAL EVENTS

- 10 Mar.** New Moon. Start of Mi'kmaw moon cycle Siwkewiku's (Maple Sugar)
- 6 Jun.** New Moon. Mi'kmaw moon cycle Nipniku's (Trees Fully Leafed)
- 9 Jun.** to **20 Jun.** Earliest mornings of the year in Halifax area (sunrise at 05:28 ADT)
- 20 Jun.** Summer Solstice (first day of summer in the Northern Hemisphere) occurs at 17:46 ADT)
- 20 Jun.** to **1 Jul.** Latest evenings of the year in Halifax area (sunset at 21:03 ADT)
- 22 Jun.** Full Moon
- 5 Jul.** New Moon. Mi'kmaw moon cycle Peskewiku's (Birds Shedding Feathers)
- 21 Jul.** Full Moon
- 22 Jul.** Delta Aquarids Meteor Shower (meteors radiate from the constellation Aquarius)
- 4 Aug.** New Moon. Mi'kmaw moon cycle Kisikewiku's (Berry Ripening)
- 12 Aug.** - **13 Aug.** Perseids Meteor Shower (meteors radiate from constellation Perseus)
- 19 Aug.** Full Moon (Blue Moon - 3rd of 4 full moons this season)
- 3 Sep.** New Moon. Mi'kmaw moon cycle Wikumkewiku's (Mate Calling)
- 5 Sep.** Mercury at Greatest Western Elongation (low in the eastern sky just before sunrise)
- 8 Sep.** Saturn at Opposition (closest approach to the Earth and face fully illuminated)
- 18 Sep.** Full Moon (Supermoon - 1st of 3 for 2024), and Harvest Moon - closest to equinox)
- 18 Sep.** Partial Lunar Eclipse
- 20 Sep.** Neptune at Opposition
- 22 Sep.** Autumnal Equinox (first day of Fall in Northern Hemisphere) occurs at 09:39 ADT



- Sources: *Sea and Sky Astronomy Calendar*; *SkyNews: Mi'kmaw Moons (Brunjes 2021)*

SUNRISE/SUNSET - HFX SUMMER & EARLY FALL SATURDAYS, 44 39 N, 063 36 W 063 36 W (ADT)



1 Jun.	05:31	20:53	6 Jul.	05:36	21:01
8 Jun.	05:29	20:58	13 Jul.	05:41	20:57
15 Jun.	05:28	21:01	20 Jul.	05:48	20:52
22 Jun.	05:29	21:03	27 Jul.	05:55	20:45
29 Jun.	05:32	21:03			
3 Aug.	06:03	20:36	7 Sep.	06:44	19:38
10 Aug.	06:11	20:26	14 Sep.	06:52	19:25
17 Aug.	06:19	20:15	21 Sep.	07:00	19:12
24 Aug.	06:27	20:04	28 Sep.	07:09	18:59
31 Aug.	06:36	19:51			

- Source: www.timeanddate.com

ORGANISATIONAL EVENTS

Friends of Blue Mountain & Birch Cove <https://bluemountainfriends.ca> Guided Hikes (for those who might want to explore the woods, but would feel more comfortable in a group with others leading the way. Spaces are limited and registration is required).

5 Jun. Susie's Lake Flagpole Hill; 3 km; 6:30 p.m

Friends of McNabs Island Society, <https://mcnabsisland.ca/>

9 Jun. (rain date **16 Jun.**) McNabs Island Beach Cleanup! Celebrate Environment Week and Oceans Week by helping the Friends of McNabs Island Society clean up McNabs Island Provincial Park. For tickets follow this link to Eventbrite - <https://www.eventbrite.com/o/friends-of-mcnabs-island-society-10724104906>

Jul./Aug. Sundays - McNabs Island Guided Tours. Tickets via Eventbrite. See FOMIS website for more information.

The Nova Scotia Bird Society, <https://nsbirdsociety.ca> Presentations are via Zoom, 7:00 p.m. to 8:30 p.m.

8-9 Jun. Out of Town Meeting: Wolfville. The first in-person out-of-town weekend for several years; two field trips each day plus a Saturday evening event. For more info go to the NSBS website.

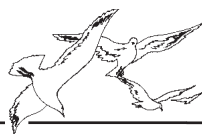
3 Aug. Mahone Bay Bird Walk. 08:30 a.m. to 3:00 p.m. Meet at 8:30 at the three churches parking lot, Mahone Bay. Drive and walk to explore a variety of habitats. Bring lunch. **Pre-register (see website for details).**

Miscellaneous

8 Jul. World Ocean Day, for more information go to: <https://worldoceanday.org>

21 Jul. Canada Parks Day, look for events at local parks: <https://parks.canada.ca>

HALIFAX TIDE TABLE



July-juillet

August-août

September-septembre

Day	Time	Metres	Feet	jour	heure	mètres	pieds	Day	Time	Metres	Feet	jour	heure	mètres	pieds	Day	Time	Metres	Feet	jour	heure	mètres	pieds
1	0327	1.5	4.9	16	0330	1.4	4.6	1	0534	1.5	4.9	16	0503	1.4	4.6	1	0102	0.3	1.0	16	0006	0.2	0.7
	1005	0.4	1.3		0931	0.7	2.3		1157	0.5	1.6		1057	0.7	2.3		0702	1.6	5.2		0617	1.7	5.6
MO	1548	1.7	5.6	TU	1537	1.6	5.2	TH	1735	1.7	5.6	FR	1655	1.7	5.6	SU	1322	0.5	1.6	MO	1226	0.4	1.3
LU	2254	0.2	0.7	MA	2231	0.5	1.6	JE				VE	2346	0.3	1.0	DI	1903	1.7	5.6	LU	1822	1.9	6.2
2	0438	1.5	4.9	17	0438	1.4	4.6	2	0031	0.3	1.0	17	0559	1.5	4.9	2	0144	0.3	1.0	17	0055	0.1	0.3
	1106	0.5	1.6		1030	0.7	2.3		0631	1.6	5.2		1152	0.6	2.0		0739	1.7	5.6		0702	1.9	6.2
TU	1648	1.8	5.9	WE	1631	1.6	5.2	FR	1252	0.5	1.6	SA	1752	1.8	5.9	MO	1400	0.5	1.6	TU	1321	0.2	0.7
MA	2351	0.2	0.7	ME	2323	0.4	1.3	VE	1830	1.7	5.6	SA				LU	1943	1.8	5.9	MA	1913	1.9	6.2
3	0542	1.6	5.2	18	0535	1.4	4.6	3	0122	0.2	0.7	18	0039	0.2	0.7	3	0220	0.3	1.0	18	0142	0.0	0.0
	1206	0.5	1.6		1127	0.7	2.3		0720	1.6	5.2		0647	1.6	5.2		0814	1.7	5.6		0747	2.0	6.6
WE	1744	1.8	5.9	TH	1724	1.7	5.6	SA	1341	0.5	1.6	SU	1246	0.5	1.6	TU	1434	0.5	1.6	WE	1414	0.1	0.3
ME				JE				SA	1918	1.8	5.9	DI	1844	1.9	6.2	MA	2021	1.8	5.9	ME	2003	1.9	6.2
4	0046	0.2	0.7	19	0015	0.3	1.0	4	0207	0.2	0.7	19	0128	0.1	0.3	4	0250	0.3	1.0	19	0228	0.0	0.0
	0638	1.6	5.2		0625	1.5	4.9		0803	1.7	5.6		0732	1.7	5.6		0847	1.7	5.6		0831	2.1	6.9
TH	1303	0.5	1.6	FR	1219	0.6	2.0	SU	1424	0.5	1.6	MO	1339	0.4	1.3	WE	1504	0.5	1.6	TH	1507	0.0	0.0
JE	1838	1.8	5.9	VE	1815	1.8	5.9	DI	2003	1.8	5.9	LU	1934	1.9	6.2	ME	2058	1.8	5.9	JE	2053	1.9	6.2
5	0137	0.2	0.7	20	0106	0.2	0.7	5	0247	0.2	0.7	20	0213	0.0	0.0	5	0315	0.4	1.3	20	0316	0.0	0.0
	0730	1.7	5.6		0711	1.6	5.2		0843	1.7	5.6		0817	1.8	5.9		0919	1.8	5.9		0916	2.1	6.9
FR	1355	0.5	1.6	SA	1309	0.5	1.6	MO	1502	0.6	2.0	TU	1432	0.3	1.0	TH	1534	0.4	1.3	FR	1601	0.0	0.0
VE	1928	1.8	5.9	SA	1904	1.8	5.9	LU	2044	1.8	5.9	MA	2022	1.9	6.2	JE	2134	1.7	5.6	VE	2142	1.8	5.9
6	0224	0.2	0.7	21	0154	0.1	0.3	6	0322	0.3	1.0	21	0258	-0.1	-0.3	6	0337	0.4	1.3	21	0408	0.1	0.3
	0819	1.7	5.6		0757	1.6	5.2		0920	1.7	5.6		0902	1.9	6.2		0950	1.8	5.9		1001	2.0	6.6
SA	1443	0.5	1.6	SU	1358	0.5	1.6	TU	1537	0.6	2.0	WE	1525	0.2	0.7	FR	1606	0.5	1.6	SA	1656	0.1	0.3
SA	2017	1.8	5.9	DI	1953	1.9	6.2	MA	2124	1.8	5.9	ME	2111	1.9	6.2	VE	2209	1.6	5.2	SA	2231	1.8	5.9
7	0308	0.2	0.7	22	0241	0.0	0.0	7	0352	0.3	1.0	22	0344	0.0	0.0	7	0401	0.5	1.6	22	0506	0.3	1.0
	0904	1.7	5.6		0842	1.7	5.6		0955	1.8	5.9		0946	2.0	6.6		1021	1.7	5.6		1047	1.9	6.2
SU	1528	0.6	2.0	MO	1449	0.4	1.3	WE	1611	0.6	2.0	TH	1621	0.2	0.7	SA	1641	0.5	1.6	SU	1754	0.1	0.3
DI	2103	1.8	5.9	LU	2040	1.9	6.2	ME	2202	1.7	5.6	JE	2159	1.9	6.2	SA	2244	1.6	5.2	DI	2321	1.7	5.6
8	0350	0.3	1.0	23	0326	0.0	0.0	8	0419	0.4	1.3	23	0433	0.0	0.0	8	0431	0.6	2.0	23	0611	0.4	1.3
	0946	1.7	5.6		0927	1.8	5.9		1029	1.8	5.9		1030	2.0	6.6		1053	1.7	5.6		1134	1.8	5.9
MO	1611	0.6	2.0	TU	1542	0.4	1.3	TH	1647	0.6	2.0	FR	1718	0.2	0.7	SU	1723	0.5	1.6	MO	1855	0.2	0.7
LU	2147	1.8	5.9	MA	2128	1.9	6.2	JE	2239	1.7	5.6	VE	2249	1.8	5.9	DI	2321	1.5	4.9	LU			
9	0428	0.3	1.0	24	0412	0.0	0.0	9	0445	0.5	1.6	24	0527	0.2	0.7	9	0512	0.7	2.3	24	0012	1.6	5.2
	1026	1.7	5.6		1012	1.8	5.9		1103	1.7	5.6		1114	1.9	6.2		1127	1.7	5.6		0719	0.5	1.6
TU	1653	0.7	2.3	WE	1639	0.4	1.3	FR	1727	0.6	2.0	SA	1816	0.2	0.7	MO	1813	0.5	1.6	TU	1225	1.7	5.6
MA	2229	1.7	5.6	ME	2216	1.9	6.2	VE	2316	1.6	5.2	SA	2338	1.7	5.6	LU	2359	1.5	4.9	MA	1956	0.3	1.0
10	0503	0.4	1.3	25	0501	0.0	0.0	10	0515	0.5	1.6	25	0628	0.3	1.0	10	0610	0.7	2.3	25	0111	1.5	4.9
	1105	1.7	5.6		1057	1.9	6.2		1138	1.7	5.6		1159	1.8	5.9		1206	1.6	5.2		0825	0.6	2.0
WE	1737	0.7	2.3	TH	1738	0.4	1.3	SA	1813	0.6	2.0	SU	1917	0.2	0.7	TU	1911	0.6	2.0	WE	1324	1.5	4.9
ME	2310	1.7	5.6	JE	2305	1.8	5.9	SA	2354	1.5	4.9	DI				MA			ME	2057	0.4	1.3	
11	0537	0.5	1.6	26	0553	0.1	0.3	11	0554	0.6	2.0	26	0031	1.6	5.2	11	0046	1.5	4.9	26	0227	1.4	4.6
	1144	1.7	5.6		1142	1.8	5.9		1214	1.7	5.6		0732	0.4	1.3		0720	0.8	2.6		0929	0.6	2.0
TH	1824	0.7	2.3	FR	1838	0.3	1.0	SU	1902	0.6	2.0	MO	1250	1.7	5.6	WE	1253	1.6	5.2	TH	1440	1.5	4.9
JE	2351	1.6	5.2	VE	2356	1.7	5.6	DI				LU	2018	0.3	1.0	ME	2014	0.6	2.0	JE	2157	0.4	1.3
12	0611	0.6	2.0	27	0649	0.2	0.7	12	0037	1.4	4.6	27	0129	1.5	4.9	12	0145	1.4	4.6	27	0405	1.4	4.6
	1224	1.7	5.6		1228	1.8	5.9		0646	0.7	2.3		0838	0.5	1.6		0828	0.8	2.6		1030	0.6	2.0
FR	1913	0.7	2.3	SA	1938	0.3	1.0	MO	1253	1.6	5.2	TU	1347	1.6	5.2	TH	1352	1.6	5.2	FR	1608	1.5	4.9
VE				SA				LU	1956	0.6	2.0	MA	2119	0.3	1.0	JE	2116	0.5	1.6	VE	2254	0.4	1.3
13	0035	1.5	4.9	28	0051	1.6	5.2	13	0127	1.4	4.6	28	0243	1.4	4.6	13	0306	1.4	4.6	28	0511	1.5	4.9
	0651	0.6	2.0		0748	0.4	1.3		0749	0.7	2.3		0943	0.6	2.0		0931	0.8	2.6		1126	0.6	2.0
SA	1307	1.7	5.6	SU	1318	1.7	5.6	TU	1340	1.6	5.2	WE	1459	1.5	4.9	FR	1508	1.6	5.2	SA	1712	1.6	5.2
SA	2002	0.7	2.3	DI	2038	0.3	1.0	MA	2052	0.6	2.0	ME	2220	0.4	1.3	VE	2217	0.4	1.3	SA	2347	0.4	1.3
14	0123	1.4	4.6	29	0152	1.5	4.9	14	0231	1.4	4.6	29	0417	1.4	4.6	14	0430	1.5	4.9	29	0555	1.6	5.2
	0738	0.7	2.3		0850	0.4	1.3		0855	0.8	2.6		1045	0.6	2.0		1030	0.7	2.3		1215	0.6	2.0
SU	1353	1.6	5.2	MO	1415	1.7	5.6	WE	1439	1.6	5.2	TH	1622	1.5	4.9	SA	1625	1.7	5.6	SU	1759	1.6	5.2
DI	2051	0.6	2.0	LU	2138	0.3	1.0	ME	2150	0.5	1.6	JE	2319	0.4	1.3	SA	2314	0.3	1.0				



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