THE HALIFAX FIELD NATURALIST

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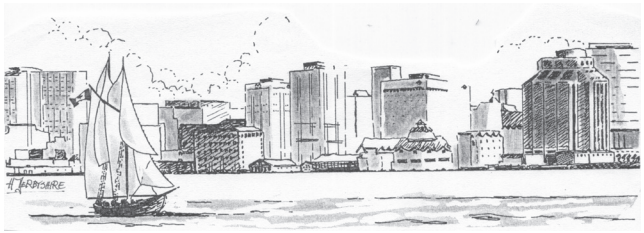

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GRAPHICS All uncredited illustrations are by H. Derbyshire or from copyright-free sources. **Front Cover** - Chicken of the Woods bracket fungus, *Lætiporus sulphureus*, Stephanie Robertson; **p.4** - Beaver, Geoffrey Goss; **p.15** - Sandpipers, Avery Tillmore; **Back Cover** - Parasol Mushroom *Lepiota* sp., Rebecca Robertson; p.19 - **Tide Table** - Canadian. Hydrographic Service, Fisheries & Oceans Canada.

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HFN NEWS AND NATURE NOTES

THE HALIFAX FIELD NATURALIST

– Stephanie Robertson

This Fall Issue and Programme, #196, will be the very last. It is also the 141st that I will have put together since Spring 1989's issue #54. After 35 years, it is time for someone else to take the reins!

In the Fall of 1989 Editor Doris Butters asked if biologist Ursula Grigg would become Editor, and if I myself would take over production. I jumped at the chance. With a love of English, biology, and sketching, I was eager to 'get to it' – this would be my volunteer contribution to HFN. At that time, the Nova Scotia Museum of Natural History had its own printing department. Being under the ægis of the NS Department of Education, and with HFN's mandate to share knowledge about Nova Scotia's natural history, they were printing our newsletter for free – we were conducting and recording important 'citizen science', and the Museum's biologists were only to happy to be consulted and also take part. Doris had used a typewriter for her 'master copies'. I inaugurated computer generation of them with my MacIntosh Plus and Adobe Pagemaker. Working at a print shop at the time, I had first used Pagemaker there. Fortuitously, I was able to buy it for a song, as it was being offered by Dal's computer store to students for use for two people. So, I and my Dalhouse journalism student niece shared the cost – a 'win-win'. I have been using this wonderful programme ever since, updating it all along the way (it's now Adobe InDesign).

Fall's 1982 Issue #29 was the first without staples holding the letter-sized pages together on the left. Instead, Doris took her 8 1/2"x11" pages, aligned them meticulously by hand in a seemingly strange page order, then scotch-taped together very carefully to make a 11"x17" sheet. When copied, double-sided, they were folded and collated into one multi-paged booklet, with the pages miraculously sequential. Sketches were direct on the page or copied and then 'cut-and-taped' to fit their alloted places by reducing or enlarging on a printer, then taping in the best size. (There was lots of scotch tape back then.) I carried on like this until new capabilities of importing digitally scanned sketches negated all this copying, cutting, taping, and fitting by hand.

From 1990-1994 I continued producing it from Barbados, sending it by email to be printed and distributed in Halifax. In the later mid-1990s, the Museum switched from the Dept. of Education to the Dept. of Tourism. Entry fees were inaugurated, and they could no longer do our printing. Now paying, we went with Kinko's Print. Then, HFNer Biology Professor Dr. David Patriquin enabled us to use DalPrint at a reduced rate. With Summer 1999's Issue #95, their multiple-ability giant printers only required the letter-sized pages (no more scotch-taping) and out they came on 11"x17" sheets, all folded and collated in proper order. June 1997's #87 inaugurated our HFN Logo (designed in Spring 1988) on the front cover. From 2000 to 2004, I produced the newsletter from our posting in Bangladesh.

Our very first coloured covers were Spring's 2006 Issue #122, our 30th Anniversary Issue. Our largest ever – comprising 28 pages of End-of-Year reports, HFN Talks, HFN Trips, and the 30th Anniversary reminiscences of founding members (cont'd in Issue #123) – it boasted a magnificent Susie's Lake at dawn on the front. It was such a beautiful photo, so skillfully taken by Chris Miller, that readers thought i had 'PhotoShopped' it. I hadn't.

In the Summer of 2010, we went back to black and white until Summer 2012, #147, with a front cover of Bon Portage deep purple Blue Flags (from a 'won' trip there offered by Nova Scotia Nature Trust). From then on, colour covers continued uninterrupted. In 2015, David Patriquin completed the digital archiving of past issues as a contribution to the celebration of HFN's 40th Anniversary in October of 2015. People could consult and use them, only for non-commercial use, and had to attribute any used material to HFN. This will be onging to 2027, as there is three-year wait before each one is uploaded.

COVID. In 2020, Summer and Fall were combined into one, #179/180, due to reduced and cancelled trips and talks. Normality returned with Winter's Issue #181. Dal's costs increased and we went with ePrintit for awhile; then back to DalPrint with UPS doing the colour covers; then to MinuteManPress, where I could no longer add my extra ink sketches to the finished master paper copies. Minuteman Press would only print from digitally sent PDFs – no paper changed hands except for their finished product to us.

So many memories – fun, laughter and deadline angst; mistakes by printers affecting timeliness; keeping an eye out always for higher than normal charges; aiming always for scientific and editorial accuracy but also easy but informative reading. I won't forget the wonderful people I worked with and consulted over these past 35 years; Fred Scott, John Gilhen, Alex Wilson, Andrew Hebda, and lots more. Ursula and Pat Chalmers and I were the informal 'Editorial Board' for a long while, meeting quarterly at the Coburg Coffee Shop.

Over the last four issues, no eager and willing volunteers presented themselves. Since 1989, changing interests and ideas of what is important to include, and different means of communication and recording, have contributed to that lack of response. With no one coming forward to carry on in a similar vein, we'll be replacing the newsletter with a monthly web offering, possibly in print as well. The eager and willing volunteer who has come forward for this, and who has indeed devised and suggested the replacement, is Jennifer Hahn, our very able and energetic Secretary – new blood!

I will both greatly miss getting it all together into what I hope was an as accurate as possible, clearly explained, favourably looking finished newsletter. However, the time it took was gradually interfering with gardening, Christmas dinners (that seemed to be the worst, fitting it in to that biggest and busiest celebration), and preventing the beginnings of other interests which am going to start to pursue, so there will also be a sigh of relief. And – another very Good Thing – HFN will save a lot of money!

! HFN'S 50TH ANNIVERSARY !

HFN 50th Anniversary Chair Janet Dalton has been receiving orders for our 50th Anniversary Commemorative bucket hat. They come in two sizes – 60cm (23.6") and 57cm (22.45"). Contact Janet at 902-443-7617, or **daltonjanet@hotmail.com**.

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NATURE NOTES

SEPTEMBER'S MEETING

Stephanie Robertson shared seeing in September a novel, majestic **flotilla of Red-breasted Mergansers** at Melmerby Beach. Jennifer Hahn spotted **two Great Blue Herons** on Cranberry Lake in Dartmouth. Regine reported (an out-of-season?) **Spring Peeper on her property**. Marion Sensen noted that her seed-eating **Song Sparrows**, who feed their fledglings with insects, were still hunting for them, but for themselves! Her Onion Flowers' *Allium sphæroscephalum* seed heads were sporting **2 or 3 tiny pollinator bees** on their outsides, while providing residence for 5-7 on the inside.

Robert Réjeanne spotted a seemingly blasé **family of Foxes** at Martinique Beach. Their two little kits were seen nursing.

SPECIAL ARTICLES

E-BIKING

– Grace Beazley

APPRECIATING NATURE ON AN E-BIKE

The cycling plan: my husband Richard mapped an age-appropriate 30km-cycling-loop, starting and ending at Port William's in Nova Scotia's beautiful Annapolis Valley. On 27th July 2024, we started early – at 9 o'clock – because a warm day was predicted, and the temperature was already 21°C. We finished around 12 noon and by then it was 26°C. Not quite ideal, but manageable. Thankfully there was some breeze and, of course, you create air movement when you cycle!

We found there was a reasonable amount of traffic on these rural roads for a Saturday morning. Most drivers were used to bikers, so passed carefully and safely. The road conditions were very good for the most part, and the hills were acceptable for us. We saw only a few other bikers; and one younger biker yelled out, "Good for you two" (because of our age, we think).

What did we see during the 30 km ride? We enjoyed the beautiful and peaceful pastoral scenery, large vistas, and we could often see Blomidon in the distance. We crossed the Canning dykes twice. The purpose of these dykes, built in the early 1800s, was to protect the farmland. We saw areas where the Fundy tides were causing erosion of the shoreline/banks.

There was an abundance of prime farmland, with July crops in different stages of growth or harvesting. In some giant fields, corn crops are rotated with soybeans to replenish the land and not overburden it. One of the most spectacular sights was riding by an orchard that was in the process of being removed, the wood from the trees was already gone, and the trees' stumps were lying upended waiting for the next step(s). Adjacent to it a new orchard was already planted! What a great sign of the future, the succession of orchards, and maybe, as we surmised, even tree species suitable for climate change.

Also, we enjoyed passing by many homes which were very well cared for and beautifully landscaped. Some owners had gardens, and not only flowers but vegetables. There were quite a few types of wildflowers growing along the sides of the roads we travelled. They seemed to have grown to the maximum or beyond this year!

In conclusion, I wanted to share how riding an electric bicycle, well, any bicycle, is such a perfect way to see and appreciate NATURE.

NATURE AT ALBANY NEW

– Lesley Jane Butters

> "It is good to be alone in a forest at dawn or dark so that all its shy presences may haunt you and possess you in a reverie of suspended thought." "In a true sense the forests are sacred as if they were God's first temples".

During the second week of April I visited my cabin deep in the woods of Albany New on the upper Medway River. The forest was teeming with a chorus of nature's cheery spring sounds, with a pleasing deep blue sky enhancing the very low water levels in the river. Airplane contrails, very many of them, had quicky dissipated so the beauty of that cloudless sky was not flawed.

Every year at approximately the same time of day (11:30 ish) and date (April 11/12), Tree Swallows swoop in over the river displaying their eye-catching aerial acrobatics as they show off their arrival. (Forty years ago, the sky over the river seemed to be inundated with various species of Swallows, Purple Martin, Chimney Swifts, Nightjars, Killdeer, Osprey, Eagles, and many other beautiful species of birds. It is so sad to see the skies much emptier now.)

This spring, only eight pairs of Tree Swallows came back to the river to nest and raise their young. It was lovely to observe the swallows checking out my colourful bird boxes, hoping at least one pair would take up residence and raise a large family of acrobatic beauties. A few days later, a few Barn Swallows made a brief appearance then disappeared to the big barn up on a neighbouring drumlin. One pair of Cliff Swallows were observed, though I was saddened not to have observed more. The pair made their new home in a gravel pit across the road from my cabin. Unfortunately, the gravel pit is well used by its owner. I spoke to the owner and managed to convince him not to dig while the birds were nesting. Happily the owner agreed, with glee!

Two pairs of very rattling/chatty Belted Kingfisher's also took advantage of the gravel pit to raise their chatty brood. One American Robin was observed in my laneway busily poking around on the ground not at least disturbed by my presence. In the evenings I gathered that the same Robin was singing a sweet spring tune ushering in springtime.

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Down along the river's water-deprived edge, masses of Leatherleaf were in full bloom on April 10th. A variety of small, early pollinators took advantage of an early spring sweet treat. The cabin owners next door are not fond of Canada Geese defecating on their lush 'green lawn' and try all sorts of scare tactics to keep them off their property, so the Geese then make their way to *my* mossy wildflower lawn. They definitely leave their 'trademark' behind though they do not seem to like my rougher lawn as much as the lush green grass next door. (I benefit though by getting free organic fertiliser!)

Sauntering around the upper property, I observed inconspicuous tiny red stigma blossoms on the Beaked Hazelnut bushes. Male catkins hung heavily like beautiful, swaying, pale-golden candles. The bushes were laden with blossoms, more so than in previous years. Provided the Chipmunks, Squirrels, and Blue Jays don't stash away too many of these tasty wild filberts, I ought to be able to harvest a few nuts for myself as a Christmas treat. Below the bushes matting the ground, beautiful Mayflowers/Trailing Arbutus were in bloom, mostly all buzzing with early pollinators, especially by those orange-yellow/black Bumblebees. There was a bit of a temptation to pick a bouquet of this early, sweet smelling beauty but I thought twice. I could visualise the late, keen HFNer Mary Primrose pointing her finger at me then ticking me off stating that "Wildflowers deserve to be left where they grow"!

Just before sunset each night, a pair of Yellow Bellied Sapsuckers came knocking – rat-a-tatting on my wooden woodshed. From the cabin, I tapped on my door and they corresponded. If I stopped tapping, so would they. Was this a game or did they think there was a single, sweet female mate close by? Over the years, many of my deciduous trees have been 'visited' by Yellow Bellied Sapsuckers, especially the Butternut/Walnut, American Mountain Ash, and Red Oak. These birds drill parallel rows of small holes in live trees, then return to feed on the consequent running sap and the small insects it attracts.

On May 11th, before retiring, a male Ruby-Throated Hummingbird buzzed past me. He was the first to be seen in the neighbourhood and upon his arrival out came my hummingbird feeders. The abundant White-tailed Deer in Albany New have dined on most people's gardens, cutting off a good supply of early flowering plants necessary for incoming migratory hummingbirds and butterflies; bird feeders are a godsend when natural food is in very short supply.

Amazingly, early spring in Albany New was pretty near Blackfly and Mayfly hatch-free, as well as tick-free. Usually by mid-May the Blackflies are unbearable at certain times of the day and almost drive a person insane! Perhaps because this year the lakes, rivers, and ponds were so low in early spring, the Blackfly larvae and Mayfly nymphs did not hatch. They need running water to go through their life cycle. Ticks need mammals. With the abundance of deer roaming the woods and grasslands perhaps the ticks were well satisfied. Most wetland areas are awoken by a chorus of Spring Peepers and Wood Frogs. This spring, Albany Newers heard very few Spring Peepers even well into the spring nights, though it was noted that there was an abundance of 'clucking' Wood Frogs in the surrounding wetland; they seemed to dominate the chorus. A solo Eastern Ribbon Snake slithered past my feet near my back porch. It entered into a hole in the green indoor/outdoor carpeting where the sun had been heating up the area for most of the day. Weeks earlier, I had seen a mid-size Garter Snake enter the same hole in the carpet. From then on a detour around the back deck was implemented.

At dusk a very large lone Beaver swims downriver to his lodge on the other side of the rapids. Sometimes he diverts and swims ashore to grab a bite to eat. Usually, twigs and smaller sapling bark are eaten at the river's edge rather than taken to the lodge – the discarded, debarked wood sticks are left for *me* to pick up! After the ice leaves the river in early spring, often my entrance to the river is laden, if not stacked, with beaver sticks. Actually, it makes for good dry kindling though it's disheartening to see so many trees chopped down.

Also by mid-May the Wild Strawberries growing in the wildflower lawn were heavily in blossom this year. The local Robins would have had a feast come ripening season in early June, but I rarely at my cabin when these berries are perfect for picking. Amazingly, one tiny wild strawberry seems to pack more flavour than a larger cultivated one. Fluttering from one strawberry flower to another were two Northern Azure butterflies. Unfortunately they were camera shy, fluttering off before I could capture their beauty.

On the bottom half of the property is a solo clump of Northern Pitcher Plant which has lived in the same spot for 43 plus years! Despite being mistakenly run over by the mower on several occasions, chewed by our local deer herd, drowned in flood water or thick pans of winter ice, and even baked in the recent intense heat of this past summer – this Pitcher Plant continues to bounce back. The strange thing is I have never seen this particular clump ever bloom or grow in size. I often will see bugs in their hairy 'pitchers' so it must be getting adequate nutrients.

May 13th was a beautiful, clear, cirrus-clouded calm and warm day. I was having a bite to eat out on the porch at noon when I heard what sounded like rustling leaves. Looking up the river I saw the water become quite rough, even forming white caps followed by good-sized waves which quickly grew in size. The whooshing sound got louder, then I realised it must be a mini water tornado or waterspout. The swirling mass picked up water from the turbulent river below and then swiftly swooshed downriver towards the rapids where it eventually died out.

At the crack of dawn on June 6th I was awoken by loud honking and eerie wailing sounds. Once there was enough light in the sky to see, I observed two families of Canada Geese with their young standing at the river's edge on my neighbour's property. One couple had 11 young goslings that looked to be 2-3 weeks old. The other pair only had three goslings who looked to be only a week old. It seemed as if the mamas were showing the kids how to enjoy lush, green, domestic grass while

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the owners were away. The eerie wailing sounds were coming from a Common Loon. They eventually faded off into the distance though it would have been wonderful to actually have seen the Loon up close.

Despite the sweltering heat and humidity in early June, much of nature seemed to be flourishing. During the first week, I was entertained for many nights by a spectacular showing of flickering 'glows' from Fireflies. On those nights, the air was soft and still, the sky was clear, and the Milky Way and other stars and planets were visible – seen with great clarity. Periodically, a shooting star would race across the night sky adding to nature's spectacular light show. Oh, to be so lucky as to see a night sky without interference from artificial light!

By mid-June I spotted a few butterflies/moths on the property. Years ago, there would be many more species, and in larger numbers. Sadly, I only observed two individual Canadian Tiger Swallowtail butterflies this season, puddling down by the river. Other butterflies observed were a White Admiral on the bi-coloured Privet Bush flowers, a few Victory enjoying the Daisies and Joe Pyeweed, a Mourning Cloak resting on the Boxwood hedge, one Atlantis Fritillary in flight, and a Black Swallowtail. A few other butterfly species had been observed but they fluttered away before I could identify or capture a photo of them.

Years ago, female Snapping Turtles *Chelydra serpentina* frequently used my property as their nesting grounds; this spring season there was not one. Though a solo female Painted Turtle uses the gravel laneway for her nesting site each year, this year even though the ground was so hard and dry, she was finally successful. Unfortunately, I was too late in discovering her nest and a wretched Racoon got to them before I could protect her site**.** There were 11 eggs – a fine nutritious meal for a hungry racoon! On The Albany New Road not far from my cabin is a Blanding's Turtle nest. It was discovered and has since been protected under wire caging. Hopefully, the roughneck young ATV drivers will respect this site and leave it alone.

By early July, there were a few heavy rain showers which were very much welcome. Ponds, puddles, lakes and rivers gradually began to fill up again. Unfortunately, the Cranberries were just in bloom when the flood waters rose. Most blossoms were damaged and the pollinators were not able to pollinate. Cranberries prefer mossy wet bogs or damp acidic places to grow, but this early flooding caused a very small crop.

For the first time in a very long time (mid-August) I observed a thick mat of Round Leaf Sundews in flower growing in the diatomaceous earth lining the river's embankment. Looking closely when the sun is at a certain angle, rainbow-coloured prisms form on its hairs which secrete a sticky mucilage. This makes for a beautifully glistening and unique sighting.

It is now early September and noticeably the Red Maples up river are showing signs of turning colour. Are the trees stressed from our peculiar weather these past few years or is this a normal time for Red Maples to show their autumn colours? Autumn was still a couple of weeks away! Many species of dragonflies, more than in previous years, bombarded the garden an hour before sunset, hopefully aiming for mosquitoes which make staring into the night sky after dark miserable unless fully decked out in a 'knights of armour suit'.

My little property on the Medway River is gradually maturing with each passing year. Forty-three years ago, it was nothing more than an old woodsy dance hall in the middle of the woods standing on an acre of barren ground. Approximately eighty years ago, a young lad who worked at the Bowater Paper Mill in Liverpool NS decided to build a gathering/dance hall near the Bowater lumbering camps. Land was very cheap back then and he went to work clearing then erecting a solid wooden building. His hope was to bring the gals up from the booming village of Caledonia and to bring the boys down from the lumber camps, to set up hooch stills, and to party the nights away! When management at the Bowater plant finally heard of this ploy, they immediately put a stop to this young man's dream; the building and land were sold. Numerous people purchased it over the years but never did anything to enhance the cabin nor the land.

The first thing I did when I took ownership was to plant a Lilac. There wasn't any good growing soil there – no doubt it was scraped away when made into a parking lot for the dance hall and perhaps by previous owners. I brought seaweed up from the coast and leaf mold from the forest, each and every time I planted. This mixture was the plant's nutrients. Back then, the farmer who lived across the river up on the drumlin mentioned to me that nothing would ever grow on the rock and rubble.

Today, I have a mature mixed forest with 'overgrown' perennial gardens. Both fauna and flora love my Piilomajia!! (Finnish for 'little-hide-a-way'.)

ALBANY NEW SPECIES (no proper taxonomic order)

Birds	
Tree Swallows	*Tachycineta bicolor*
Barn Swallows	*Hirundo rustica*
Cliff Swallows	*Hirundo pyrrhonota*
Belted Kingfishers	*Ceryle alcyon*
American Robin	*Turdus migratorius*
Canada Geese	*Branta canadensis*
Yellow Bellied Sapsucker	*Sphyrapicus varius*
Ruby-Throated Hummingbird	*Archilochus colubris*
Common Loon	*Gavia immer*
Plants	
Leatherleaf	*Chamaedaphne calyculata*
Hazelnut	*Corylus cornuta*

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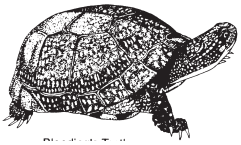
Mayflowers/Trailing Arbutus	*Epigaea repens*
Butternut/Walnut	*Juglans cinerea*
American Mountain Ash	*Sorbus americana*
Red Oak	*Quercus rubra*
Red Maple	*Acer rubrum*
Wild Strawberries	*Fragaria vesca*
Northern Pitcher Plant	*Sarracenia purpurea*
Round Leaf Sundews	*Drosera rotundifolia*
Joe-Pyeweed	*Eutrochium purpureum*
Cranberries	*Vaccinium* sp
Insects	
Bumblebees	*Bombus ternarius*
Blackfly	*Simuliidae* spp.
Mayfly	*Ephemeroptera* spp.
Northern Azure butterflies	*Celastrina lucia*
Fireflies	*Lampyridae* sp
Canadian Tiger Swallowtails	*Papilio canadensis*
White Admiral	*Limenitis arthemis*
Victory Butterfly	*Archippus* sp.
Mourning Cloak	*Nymphalis antiopa*
Atlantis Fritillary	*Speyeria atlantis*
Black Swallowtail	*Papilio polyxenes*
Mammals	
White-tailed Deer	*Odocoileus virginianus*
Beaver	*Castor canadensis*
Reptiles	
Spring Peepers	*Pseudacris crucifer*
Snapping Turtles	*Chelydra serpentina*
Painted Turtle	*Chrysemys picta*
Blanding's Turtle	Emydoidea blandingii
Wood Frogs	*Lithobates sylvaticus*
Eastern Ribbon Snake	*Thamnophis sauritus*
Garter Snake	*T. sirtalis*



NORTH SHORE OBSERVATIONS

– Stephanie Robertson

This summer, at Melmerby Beach next to Melmerby Provincial Park, the temperatures and the balance of sun, rain, and wind, were perfect. The wild roses, wildflowers, grasses, Sumac, Bayberry and all things green seemed bursting with bloom and increased growth from last year. In our area, thick, well-established Bayberry is the prime plant holding the banks firm, while the Park's primary bulwarks against storms are Marram Grass and other sea grasses),

The Albino Red Squirrels that had been posted on HFN's website chasing each other up, down, and around a conifer were spotted again in different areas, and one narrowly escaped consumption by a Bald Eagle. Sighted near our cottage in the bird's beak, somehow it managed to escape, safely landing on the ground. Later on the same day it was spotted again merrily frolicking on the rocks near our beach stairs. If they survive the Fall, we hope winter's snows will help camougflage them.

In September, a sight never before seen in all the 23 summers we have been there was a flotilla of about 30 Red-breasted Mergansers – majestically and slowly paddling east to west about five feet from shore. The group was about 10 feet wide by 20 feet long. One or two gulls had successfully joined the group; the Mergansers ignored them. No diving was observed at all, but instead there was much occasional rising up and shaking of feathers along with some preening. They disappeared from sight as they all progressed at the same stateliness, so we don't know what they did when they reached the small isthmus of Roy's Island; we imagined they might have gone around it. Melmerby Beach is about 1.5 miles long from the lighthouse at the west end to the promontory of Roy's Island at the east end (which is not an island).

In late June, a very large and beautiful spider's web had been constructed from the corner of our back cottage's front door overhang to the small hedge to one side. In a small indent in this overhang was an extremely large spider. It boasted a 'face' very much resembling some small strange mammal. Consulting Andrew Hebda, we found it was the Giant Lichen Orbweaver *Araneus bicentenarius*. Days would find it hunkering down in it's corner; nights found it in the centre of its web. One morning we saw that it had caught and wound up a very large dragonfly. It slowly consumed it over a few days. Amazingly, one morning it had entirely disappeared, with no visible place in the web where it had been. Later on it caught a much smaller dragonfly. This one we observed it eating. When it was almost done, it took the small remnant up to it's 'corner' and finished it there. Around the last week of September it had gone, along with it's beautiful web, leaving no trace.

Orbweaver with the large, wrapped dragonfly. *R. Robertson*

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HFN TALKS

CARBON RUN carbon dioxide O=C=O – *Jane Flemming*

Dr. Eddie Halfyard, a co-founder of Carbon Run, introduced himself as a fisherman first, and scientist second. He was drawn to the river as a young child and from that grew a love of the water and the places where fish live. He is a freshwater and estuarine ecologist working on species that go back and forth between fresh and salt water, and has spent most of his career working on Atlantic Salmon, Brook Trout, Striped Bass, American Eel, and also more broadly with the Ocean Tracking Network (OTN) at Dalhousie. He always tries to use a 'practical lens' on everything he does, not just research for the sake of research, but also how it applies to practitioners.

In response to a question from an audience member, Dr. Halfyard explained that he and his colleague Bob Rutherford, who is now an advisor to the NS Salmon Association, had worked on an artificial reef programme tracking the movement of salmon and trout in the estuary in Sheet Harbour. Over 200 holed, artificial concrete reef balls were put out, in addition to other structures, giving salmon a place to hide from predators.

Acid rain has been one of the core themes of Dr. Halfyard's career so far. It is unfortunate that in Nova Scotia, as elsewhere, acid rain is a silent killer. In the 70's and 80's it was realised that acid rain was becoming a real problem – killing forests, defacing buildings, and reducing crop productivity. His particular concern has been its deleterious impact on rivers and their resident fish.

Acid rain is caused by the burning of fossil fuels. In the early days, most of the problems were caused by industrial emissions that went straight into the atmosphere. The 1990 Clean Air Act, signed by Canada and the United States, was instrumental in addressing this cause of acid rain and a shining example of how, when nations work together, they are able to successfully address big issues. He presented a series of graphs showing significant reductions in emissions of nitrate and sulfate between 1990 and 2010. Legislation led to change and innovation in the form of smoke stack scrubbers. However, this is not the whole story because, while many areas recovered from the onslaught of acid rain pollution over two or three decades, Nova Scotia is one of the areas that did not.

We were shown a map, produced from data from the Nova Scotia Salmon Association and some other publicly available sources, illustrating acidity levels in Nova Scotia watersheds. It contained many red areas, indicating acid levels so high that it is difficult for them to support life. Large yellow portions indicated areas which are impacted by high acid levels but where life is still able to persist. Green areas are healthy watersheds, but the map showed no green areas draining into the Atlantic. Therefore, Nova Scotia's rivers have not recovered from the impact of acid rain more than thirty years after the Clean Air Act. What does this mean for the fish?

Dr. Halfyard presented a graph based on data collected in 1989 by Federal Fisheries and Oceans researchers showing that the survival of Atlantic Salmon, from when their eggs hatch to when they go into the ocean, was only 0.3% to 0.4%, compared to a healthy survival rate of 4%: – a ten fold decrease. It is particularly concerning as the salmon are not thriving in the ocean either.

So people decided to do something about this, specifically anglers, who could see the effects with their own eyes when fishing. Leading that charge was the Nova Scotia Salmon Association (NSSA) founded in 1963. During that time they have evolved from being anglers concerned about rivers and conservation in the name of saving salmon, to largely, now, a conservation group, who also happen to fish. In the early 2000's, the NSSA created business cases and fund-raising strategies, and also hired experts from Norway (where there was acid rain work already underway) to come over and offer advice on how to get started. An acid rain mitigation committee, formed by nonprofits, academics, government and industry, supported this undertaking. They started with a ten-year demonstration project to show that Nova Scotia *can* do something about the acidification, save salmon, and provide leadership on improving water quality. In September 2005, North America's first 'lime doser' was installed on a salmon river.

A lime doser is a relatively simple design – a silo containing crushed limestone powder, the same as used in agricultural applications and that people put on their lawns. Limestone is a natural material composed of calcium carbonate and magnesium carbonate (basically TUMS for the river). The silo puts measured doses, based on water sampling, directly into the river. The adding calcium, which is important for bones and aquatic life, and thereby increasing the pH which reduces acidity, creates conditions in which fish can again survive. This is the core of the NSSA's acid rain mitigation programme.

CO2

CO2

Although silo dosers are the core of the programme, this is not the only way to lime. Dr. Halfyard presented a video of the 2017 West River Sheet Harbour Experimental Watershed Liming Project, which used helicopters to deliver the lime. The premise of the project was that we know we can change the pH of water with lime, but what if the lime was applied into the forest where the source of the problem really lies, where the soils have been stripped and acidified? If the soil is treated, rain falling on it is also be treated, and therefore acidified rain water is prevented from flowing into the rivers. A side benefit of this are beneficial consequences as well for terrestrial ecosystems which have been degraded by acid rain.

The logistics associated with this project were significant, and its success was a result of an excellent partnership with the Province of Nova Scotia. Fire suppression helicopter crews worked with the NSSA during their downtime to deliver this programme. It was really quite remarkable -- a great example of what can be done when the right people sit around the table. Between 2016 and 2022, 1750 acres of land were treated with 17,000 tonnes of dolomite limestone.

NSSA and academics worked together to evaluate the success of the programme, looking at the chemistry of the water flowing through the treated soils, and studying the response of plants, trees, and other organisms. These

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groups of anglers and academics understood that everything is connected, and results had to be measured on an ecological scale.

Dr. Halfyard presented research from Dalhousie University that looked at the response to acid mitigation of a variety of trees, looking at both conifers (mainly spruce and firs) and hardwoods (focusing on Sugar Maple and Red Maple). The results showed that these trees responded very favourably to the lime amendment. Survival rates were improved, particularly for the Sugar Maple. They also worked with provincial soil scientists to put the data they gathered into the provincial forestry model, discovering that the cost of the project could be recouped through increased production of timber. This is in addition to the environmental benefits they were looking for in the first place. In the rivers where this project was carried out, production of wild Atlantic salmon tripled! Locals also reported that trout fishing in the area improved greatly. Aquatic insects, the base of the food web, doubled in biomass, and insects such as Stonefly, Mayfly and Caddis Fly, which are really good indicators of water quality, increased.

Dr. Halfyard noted anecdotally that he has also observed a noticeable increase in Nighthawk populations over his career. Overall, rivers associated with the amended areas have shown increased wildlife supported by the new abundance of insects and fish. It's a good story, but despite this success continuing work was limited by funding. To its credit, in 2016 the government did step up the helicopter liming program with funding from the province and the Department of Fisheries and Oceans, and through programmes like the Canada Nature Fund for Aquatic Species at Risk, to the point where NSSA was receiving some of the largest grants nationally to do this work, and their success was being recognised across the country.

Unfortunately, NSSA could still look around Nova Scotia and see how great was the continuing need for this work. They could identify 72 rivers that they knew could benefit from liming, and they could only do one river in spite of all this success.

Now, in addition to the problems caused by acidification, we are seeing the adverse effects of climate change. Fish such as salmon require cold water and cannot survive heat waves very well. We have changed the way water moves through a watershed by cutting forests and straightening rivers, making them more vulnerable to changing climate. The climate crisis is very real when it comes to fish and very real in Nova Scotia. We are in the transition zone between north and south, where we can expect to see major shifts because of climate change. Many of Dr. Halfyard's colleagues have shifted away from natural sciences and into climate science, trying to deal with this issue in an impactful way.

He also emphasised that climate scientists all agree we need to do two things immediately: a) stop emitting carbon dioxide into the atmosphere; and, b) clean up the pollution already in the atmosphere.

We have already blown past 1.5˚C of warming. Last year was the warmest year on record and this year is shaping up to be warmer still. The problem is daunting. We know it is difficult to decarbonise but nonetheless necessary to buy us enough time to transition to clean fuels. The Kyoto protocol in 1992 set targets for carbon emissions but no Canadian province has met its Kyoto targets (the closest is Quebec). It was hoped that after the Kyoto Protocol global emissions would go down; instead, they have continued to trend upwards. Canada pulled out of the Kyoto Accord when it realised it couldn't meet its targets. Then we agreed to cut emissions in 2015 as a signatory to the Paris Accord. Progress has been made and some of our targets have been met, but Canada still has a long way to go. This is the greatest challenge of our time. Billions of tons of CO_2 must be removed form the atmosphere every year. There are currently only a few verified safe, permanent, and scaleable solutions available. Reforestation and preventing deforestation are two of these.

Dr. Halfyard and Carbon Run co-founder Shannon Sterling discovered that if liming is done in the right place and at the right time, CO_2 can be drawn down from the atmosphere. This is how Carbon Run was formed. These two scientists, with the financial support of two philanthropists, started this business because they saw it as a way to tap into this rolling ball that was gaining momentum – CO_2 removal. The only way to take advantage of the carbon credit markets was as a business. It is a new, built-in-Nova Scotia solution for capturing carbon. It is based on the use of limestone silo dosers, described above. There is already a lot of natural CO_2 in rivers, coming out of the rocks, the soils, and decomposing trees, etc. CO_2 leaks out of water, especially acidic water. By adding limestone, the CO_2 can be captured and turned into a large molecule called bicarbonate (HCO_3). Bicarbonate produces the alkalinity needed to balance the acidification and carries captured carbon to the ocean through the rivers.

CO_2

Dr. Halfyard presented a slide of the long-term Carbonate-Silicate Cycle, which he explained is distinguished by the exchange of carbon between rocks and the ocean, atmosphere, biosphere, and soils. This long-term carbon cycle is the main controller of the concentration of atmospheric CO_2 and (along with the sulphur cycle) atmospheric O_2 over a much longer geological timescale. We have pumped so much CO_2 into the atmosphere that we have thrown this natural process out of whack. Our mountains don't erode fast enough to keep up with the ocean's need for more carbon in order to balance all the acid that we have put into the atmosphere. We need to add in more alkalinity via rivers to rebalance the process. Carbon Run's River Alkalinity Enhancement (RAE) mobilises a natural process, using safe alkaline materials that dissolve quickly in rivers. The rivers all come to one point before they enter the ocean. Using simple sensors that sample the water chemistry every ten minutes at the point where a river enters the ocean, they are able to measure how much CO_2 is being captured and delivered to it. Carbon Run is the only organisation in the world using rivers to capture carbon in this way.

CO_2

We were shown another slide that asks, "How do we Know it Works?" The project is well established with over 20 years of river restoration work by NSSA in Nova Scotia. Carbon Run is an industry leader, the first in the world to use river restoration for CO_2 removal. It is third party

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certified, open, and International Standards Organisation (ISO) compliant. They acquire carbon credits through this work which they can then sell to enable others to reduce their carbon footprint. Last year, they made their first pre-purchase agreement, and that project is now almost complete. Pictou County will have the world's first river-based carbon capture. Groups like Google, Microsoft, Shopify, and Stripe are now buying these credits. Frontier Climate, a group of companies that banded together to accelerate permanent carbon removal, pledged a billion dollars to support these types of projects.

It's bigger than Nova Scotia and Canada. Carbon Run has mapped 122,000 rivers around the world that could be good candidates for a program like this. Concentrating on the top ten rivers would offer scaling of more than a gigatonne of carbon from the atmosphere. Carbon Run's RAE could therefore be a major player in the fight against climate change. Not all rivers are suitable for carbon dioxide removal (CDR). Acidic rivers are generally good candidates and so are those that are periodically acidic, for example during certain storm events (this is the case for the rivers in Pictou County). Other rivers are not suffering from acidification or a lack of alkaline materials, but adding alkalinity would not harm the ecosystem and will benefit the ocean. However, some rivers are not suitable for river-based CDR because: a) the chemical conditions preclude genuine CDR; b) there is reason to be extra cautious due to sensitive species-at-risk, naturally acidic conditions or other conservation concerns; or, c) there is a social or cultural justification.

There are numerous reasons why RAE makes sense, but most notably it is safe, measurable, scalable, and provides all the benefits of liming rivers previously discussed. Economically, projects such as the Pictou County RAE provide blue-collar employment for workers in rural areas that desperately need to transition from traditional sectors, such as forestry and mining, that are no longer the major economic players they once were. In addition to providing skilled trade jobs, RAE projects also support Fisheries and Aquaculture by de-acidifying critical coastal ocean regions, and leverage high social acceptance, providing a soft entry to ocean CDR using what is fast becoming a familiar approach.

Environmentally, the foot-print required to set up a liming silo is quite small. Benefits include: river restoration, boosting fish populations, rebalancing coastal ocean acidification, and increasing biodiversity. Carbon Run's roll-out plan targets small and midsize projects in areas with a demonstrated social acceptance, a distinct environmental impact and a demonstrated regulatory pathway. Areas identified so far include Canada (East and West), the United States (Northwest and Northeast), and Scandinavia (Sweden and Norway). In Nova Scotia, the targeted areas include some of the most iconic rivers in the province, including the Le Have, Medway, St. Marys and Mosher Rivers -- but this is just the beginning.

At this point, Dr. Halfyard concluded his formal presentation and opened the floor to questions from the audience.

Q&A SESSION

Where does the lime comes from that is being used in the projects and is the supply is finite? Dr. Halfyard stated that, fortunately, there is enough lime in the world to do what we need to do. Limestone is one of the most widely distributed rocks on the surface of the planet. It is not everywhere, but in pockets. Within Nova Scotia, the Mosher Limestone mine in Upper Musquodoboit is a good example. They are one of the longest running family-run mines and have been in operation for over 100 years. The Nova Scotia Archives has a fabulous 1947 video on lime called "For the Land's Sake" (it can be found on YouTube – check it out). It features Mosher Limestone and makes the case, way back then, that the Nova Scotia government should be supporting the liming of farmers' fields, forests, rivers, and lakes. This was long before we understood about acid rain.

Does helicopter liming require the crews to be cautious of the wind? Yes, caution is needed, not just of wind but also of a warming morning that creates upwelling wind vectors which would carry the lime back up toward the helicopter. They first noticed this when they realized the lime was eating away at its rotors.

Where and when is the liming happening in Pictou? Carbon Run is working with various groups such as The Pictou County Rivers Association, Pictou Landing First Nation, and the NSSA. They are still in development, but they are holding a public open house at the West River Fire Hall this month and hope to have a grand opening, if all goes well, in October 2024.

CO2

Why not just dump millions of tons of lime directly into the ocean? This is being investigated, and its not just limestone – scientists are looking at other materials such as brucite, a mineral form of magnesium hydroxide. The problem is that these materials don't dissolve as easily in the ocean as they do in rivers. Rivers are more acidic and have less of that material in the first place, so readily dissolve it whereas the ocean water takes much longer. Rivers also bring all the treated water to one place where it can be easily measured. In the ocean, it spreads out in three dimensions and becomes difficult to measure, requiring accurate oceanographic circulation models. There is some great work being done at Dalhousie University on this; in fact, they are a world leader in these studies and received a Transforming Climate Action Grant that is being used to look at ocean-based solutions. A company called Planetary Hydrogen dumps alkaline material directly into the ocean. It's a different approach, but what we need is all hands on deck so that every method counts.

CO2

Why not just apply the lime to forests? This is basically what is being done with helicopter liming, and is also known as enhanced rock weathering – attempting to change acidic soils and at the same time capture carbon at that location. The problem is that it is really complicated. Soils are very diverse and dynamic and change as they become wet or dry. In some cases, it can cause carbon to be emitted and in other cases it captures it. It is also difficult to measure and ensure that it's been captured for the long term. In the best cases, it *is* captured and rivers carry it out of those forests to the ocean. There are people doing that now, for instance a group from Sheffield University in England, among others, are

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working on this.

Why not use plants to address the problem? There isn't enough room in rivers, and it wouldn't benefit a river's ecosystem to fill it with aquatic plants, but this *is* being done in the ocean; they are called 'macro algae-based solutions'. Unfortunately, one of the leaders in this area just went out of business. People are also looking at 'blue carbon', such as restoring mangrove forests and sea grass beds which capture carbon. It's a matter of determining a) can it be done; and, b) can we verify that it will stay there for a long time. Also, the results have to be high quality and the process relatively cheap to make it a viable option.

Are larger rivers the best place to focus efforts and is there the potential to have international cooperation around this? Yes and no. Although larger river systems produce a greater benefit, they also require greater investment and are more difficult to monitor.

Is the focus mainly on rivers or are lakes also being considered? Yes. In fact in Nova Scotia the history of adding limestone to watersheds started on lakes in winter, where the limestone was placed on the lake ice. It is less efficient to lime lakes due to sedimentation, but they are definitely part of the long term plan.

What progress is being made to improve the health of salmon populations? Indications so far are promising. Limed rivers have seen up to a three-fold increase in the number of salmon they contain compared to nearby rivers that were not limed. There are other factors at play, especially in the oceans, but liming rivers is one thing that can be done to give the native salmon population a fighting chance at recovery.

The federal DFO was, at one time, carrying out a similar liming process to combat the effects of acid rain. Is that still the case? This DFO program and related research has pretty well gone away, even though the need is still there. DFO conducted some good research but liming was not carried out on a large scale until the NSSA stepped up.

Is the decline of coral reefs associated with acidification? The problem is related to acidification but also increased ocean temperatures. Dr. Halfyard cited a recent experiment using liming to increase the alkalinity of a portion of the Great Barrier Reef. Local application is not efficient due to ocean currents but the indication is that the chance of resuscitating coral reefs can be increased by combating ocean acidification.

Some years ago, the Upper Medway River was clear and healthy with trout and eels. Sadly, this is no longer the case and there is some kind of macro-plant/algae that is choking the water. Could this be associated with acidification and/or climate change?
This is an example of an environment that has been perturbed, and living organisms that were there before are being replaced by others that can tolerate the new conditions. For example, in the Sheet Harbour area, insects such as Mayfly have been replaced by increasing populations of biting midges and blackflies which tolerate acidic conditions. It is known that the Medway River is heavily acidified, so it is likely that the changes mentioned are related to that fact.

Could liming a forest area harm plants that do well in an acidic environment? This is taken into consideration when determining where and how much to line. For example, peat bogs are normally acidic but the environment has become so acidified that many areas that are acidic now were less so in the past and could benefit from liming.

Do the lime dosing silos operate year-round? Yes, unless there is a major freeze-up of the river in the winter (this is happening less and less due to climate change) or if there is a summer drought that reduces the amount of water in the river below a pre-determined threshold. However, in the latter case the liming is not needed as much since most of the remaining water is groundwater and therefore less acidic.

Is it possible to over-dose? Yes, it is possible to over-dose with lime, in which case the surplus would fall out as sediment. Therefore, water samples are continually being taken to measure water temperature and acidity in order to determine the correct dosing level. Newer dosing systems have a sensor network that enables this determination to be made automatically.

Can the carbon credits bought by a company be used as a permit to pollute? This is a concern but Carbon Run is able to act as a gatekeeper to prevent the abuse of RAE in this manner.

Should healthy rivers be limed? Liming of otherwise healthy rivers could provide benefits since it would increase the ability of the water to act as a carbon sink. Also, studies have shown that Nova Scotia's rivers are naturally acidic, and increasing alkalinity can also increase fish stocks in both the rivers and adjoining coastal waters. Nonetheless, there are rivers that should not be limed; for example, the Petite Rivière system is the only habitat where Atlantic Whitefish is still found, and it would be risky to lime this river without knowing the effect it might have on this endangered species.

CO_2

HFN member David Patriquin noted that studies have shown that many or our acid-loving species are so calcium deficient that they would benefit from the effects of liming.

Has the Scandinavian RAE program been successful? Yes, it has been very successful. In Sweden, some rivers that had completely lost their salmon populations have been restored so that recreational, and in some cases even commercial, fishing has resumed.

CO_2

In his closing remarks, Dr. Halfyard pointed out that the Carbon Run RAE program has shown that there is hope for the future, and that it is personally rewarding for him to be able to discuss the positive effects of the liming process with his young daughters, who are very concerned about climate change and the environmental impact it is having on their world. Dr. Halfyard was heartily thanked by HFN President Bernie McKenna for his excellent presentation, and this was roundly supported by all in attendance.

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HFN FIELD TRIPS

CARIBOU BOG

– Bernie McKenna

Date: Saturday, June 8th
Place: Waverley (44.741483 – 63.536086)
Weather: Overcast, very slight mist, 14 C°
Leader: Sean Haughian, assisted by Sylvia Haughian
Participants: 12 (leaders included)

Caribou Bog is impressive in both physical size and in its many varieties of plants we were introduced to along the way. Located within the Halifax Regional Municipality watershed, it is primarily fed by the Spider Lake Brook and eventually empties its filtered waters into Lake Major. We accessed it from Bunchberry Lane, which in turn is off Waverley Road, (Hwy 318). As a straight hike it's maybe a touch over 30 minutes, however adding Sean's information briefings and our questions it got stretched out to just over an hour. His wealth of plant and terrain info led to a much slower pace. In the programme lead we had been cautioned about Blackflies, Wood Ticks, mosquitoes, and Deerflies; happily, there were very few of any of them. The bog itself being open and with the slight breeze it made many of these a non-issue. We were also told to expect some wet and muddy walking; this proved entirely true and two participants may even have thought it was an understatement. Several ended up with wet feet, one almost to their waist!

After the crew met, and having walked the route with a friend beforehand, Sean gave us an accurate outline of what to expect as to hiking conditions, likely vegetation to be seen, and other firsthand information. The initial path through a few brambles and waist-high plants was maybe 20 metres before we entered a more open Red Spruce area with a few hardwoods mixed in. The most plentiful ferns here were Bracken and Cinnamon Ferns. The former loses out to winter elements and dies back to a withered shell of itself, while the Cinnamon fern's fertile fronds appear early and are initially bright green, they then turn the familiar cinnamon brown. Sean identified Big Red Stem Moss along with a few others, and detailed how moss species have different preferences of underlying soil and light conditions. There were white Northern Starflowers in bloom there as well. He also had us taste the new Red Spruce tips – they had a mild and pleasant aftertaste.

Bog Laurel

This led us to the first of two ridges where we followed along an old ATV trail, which made for fairly open walking conditions. This ridge trail was about 100 metres in length through the same Red Spruce wooded area, and took us to a 90 degree turn that led down to the 'water trap'. With very questionable footing and an unknown depth it was the only real hazard in the whole walk. One had to step lightly on the firmer looking vegetated mounds and pay attention to the next step before making the first. Once across, there were 4 feet tall Rhodoras that were doing well on both sides of the swamp, and not lacking moisture. Leaving the swamp we veered right uphill and connected with a powerline for a short distance. It was drier walking and made for good conditions for both Blueberries and Pink Lady's Slippers. The latter are very particular as to growing conditions and need a specific mycorrhizal association in order for its seeds to germinate. After this short section of powerline we hit the second ridge and its ATV trail which took us the remainder of the way to the bog proper. He showed us both Wild Lily of the Valley, (definitely not edible) and the Canada Mayflower, not to be confused with the Trailing Arbutus. In the same area was the False Lily of the Valley, again not edible, with toxic compounds similar to the true Lily of the Valley. Both are understory plants preferring the same growing conditions and have pretty much the same emergence and flowering time frames. On the edible list we had Blue Bead Lilies whose leaves, when young, are fine to eat and tasted like mild cucumber. On the other hand, the berries themselves are poisonous and not pleasant-tasting. In this same stretch were Creeping Snowberry with their small, pleasantly mint tasting leaves. Hair Cap Moss was along here too with both the male and female parts showing. Sean said the female releases the eggs, and the male sperm, when splashed by rain, hits the eggs and the fertilization process happens. There were two large White Pines, one still living and the other containing many holes and openings for nests, dens, and hopefully – a spot for Little Black Bats to overwinter.

This took us to the bog itself and the fascinating display of plants it held – flowers, mosses, fruiting plants, lichens, and trees – this little portion of the bog revealed so much in the short period of time we were there. The most eye-catching of all for me were the numerous Dragon's Mouth Orchids, which held their bright pink flowers with the whitish pink labellum 25 cm high. There were two species of carnivorous plants, the Northern Pitcher Plant and the Round Leaved Sundew. The Sundew exudes a sticky substance on their leaves to catch and hold their victims. Sean explained that the pitcher plant exudes a sweet smelling attractant to lure its prey and has inward-protruding pointy hairs in its 'vase' which further hamper any escape efforts. He also said although they do digest the prey's nutrients – they also absorb CO_2 and nitrogen to augment them.

Sean noted while the bog looks like flat terrain, it's actually a continual progression of hollows and mounds and these make for many micro-terrain conditions. He showed us how the various plants have definite preferences for these very conditions, the Reinder Lichens and peat mosses being a good example of this. Scattered about were dwarf Larch (also know in Canada as Tamarack or Juniper), all seemingly doing well here. They were dressed in new, blue-green needles which fairly shone against the mossy background; with the misty droplets on them, they reminded me of cultured bonsai plants. Two of the berries here were Cloudberries or Bakeapples, your choice, most only showing two leaves but one had a flowerbud that showed promise of the single orange berry to follow. Black Chokeberries were in good supply and although eaten by wildlife you

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and I would fine them acidic and bitter. Beside them were Huckleberries growing in good numbers with their delicious black berries that would ripen later on.

There were two species of Cotton Grasses and Magellan's Sedge spread about along with low growing Bog Cranberries of the heath family. The bog has a very diverse population of plants which we were fortunate enough to be introduced to. Sean showed us a visual demonstration of the moisture-holding and filtering abilities of peat moss which was everywhere under our feet. The amount and clearness of the water he squeezed out of just a handful of moss was most impressive. There was a smattering of short dead coniferous trees spread around, and Sean showed us the lichens on them. He suggested the lichens got there by birds using the trees as vantage points and leaving small lichen deposits as they alight and perch.

All too soon it was time to start back. Still in the bog but lining both sides of the trail were Mountain Holly. Right in the middle of the trail was a calling card of Coyote scat which it had left as communication for other Coyotes and wildlife. It was 10-15 cm's long and the normal cylindrical shape – a mixed grey, brown, and white colour, no doubt indicating a Varying Hare as its last meal.

A much faster trek out got us back to the cars in 30 minutes, right on schedule. At this point I want to mention something some participants may not fully appreciate, and that is the amount of time a leader puts into each event. Invariably they do a reconnaissance prior to walk day to ensure the walk is a success, and I have even heard a leader say they had 17 items they would be pointing out. With this in mind please remember and appreciate all the work our leaders put into a walk for our benefit. As well, if you ever have the opportunity to attend a Sean Haughian walk (I've had two) by all means do so, they're wonderfully informative and revealing, as one walker said we were a privileged group to be there.

CARIBOU BOG TOUR SPECIES LIST

Birds

Common Yellowthroat	*Geothlypis trichas*
Canada Warbler	*Cardellina canadensis*
Palm Warbler	*Setophaga palmarum*
Yellow Throated Warbler	*S.dominica*
Blackburnian Warbler	*S. fusca*
Black-Capped Chickadee	*Poecile atricapillus*
American Robin	*Turdus migratorius*
American Crow	*Corvus brachyrhynchos*
Blue Jay	*Cyanocitta cristat*
Red-Breasted Nuthatch	*Sitta canadensis*
Mourning Dove	*Zenaida macroura*
Olive Sided Flycatcher	*Contopus cooperi*

Trees

Larch/Tamarack	*Larix larcinia*
Black Spruce	*Picea mariana*
Red Spruce	*P. rubens*
Red Maple	*Acer rubrum*
Balsam Fir	*Abies balsamea*

Shrubs

Leatherleaf	Chamædaphne calyculata
Wild Raisin	*Viburnum nudum*
Rhodora	*Rhodendron canadensis*
Labrador Tea	*Ledum groenlandicum*
Lambkill/Sheep Laurel	*Kalmia augustifolia*
Common Juniper	*Juniperus communis*
False Holly	*Osmanthus heterophyllus*
Alder	*Alnus glutinosa*
Black Crowberry	*Empetrum nigrum*
Mountain Holly	*Ilex mucronate*
Huckleberry	*Gaylussacia baccata*

Sub-shrubs

Bog Cranberry	*Vaccinium oxycoccos*
Cloudberry/Bakeapple	*Rubus chamaemorus*
Creeping Snowberry	*Gaultheria hispidula*
Teaberry/Winterberry	*G. procumbens*
Bunchberry	*Cornus canadensis*
Mayflower/Creeping Arbutus	*Epigaea repens*
Bog Laurel	*Kalmia polifolia*
Wood Sorrel	*Oxalis montana*

Herbs

Three-leaved False Solomon's Seal	*Maianthemum trifolia*
Wild Lily of the Valley	*M. canadensis*
Northern Starflower	*Lysimachia borealis*
Three-leafed Goldthread	*Coptis trifolia*
Rose Pogonia	*Pogonia ophioglossides*
Tuberous Grass pink	*Calopogon tuberosus*
Bluebead Lily	*Clintonia borealis*
Dragons Mouth Orchid	*Arethusa bulbosa*
Pink Lady's Slipper Orchid	*Cypriedium acaule*

Carnivorous Plants

Round-leaved Sundew	*Drosera rotundifolia*
Pitcher Plant	*Sarracenia purpurea*

Graminoids (the grasses)

Magellan's Sedge	*Carex magellanica*
Cotton Grasses	*Eriophorum* spp.
Manna Grass	*Glyceria canadensis*

Ferns

Cinnamon Fern	*Osmunda cinnamomea*
Sensitive Fern	*Onoclea sensibilis*
Bracken	*Pteridium aquilinum*

Mosses

Broom Forkmoss	*Dicranum scoparium*
	D. undulatum
Plait Mosses	*Hypnum* spp.
Big Red Stems	*Pleurozium schreberi*
Juniper Haircap	*Polytrichum juniperinum*
Bog Haircap Moss	*P. strictum*
Hair Moss	*P. commune*

Sphaghnums

Compact Bog Boss	*Spaghnum compactum*
Feathery Bog Moss	*S. cuspidatum*
Rusty Bog Moss	*S. fuscum*
	S. girgensonii
	S. magellanicum complex
	S. palustre
	S. papillosum
Red Peat Moss	*S. rubellum*

Liverworts

Bozzania trilobata
Kurzia pauciflora
Mylia anomala
Odontoschisma fluitons

Lichens

Witch's Hair Lichen	*Bryoria* spp.
a Lichen	*Cladonia arbuscula*
British Soldiers	*C. cristatella*
Reindeer Cup Lichen	*C. rangifernia*
Star-tipped Cup Lichen	*C. Stellaris*
	C. stygia

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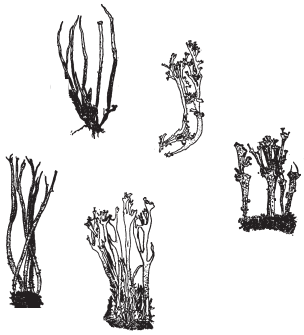
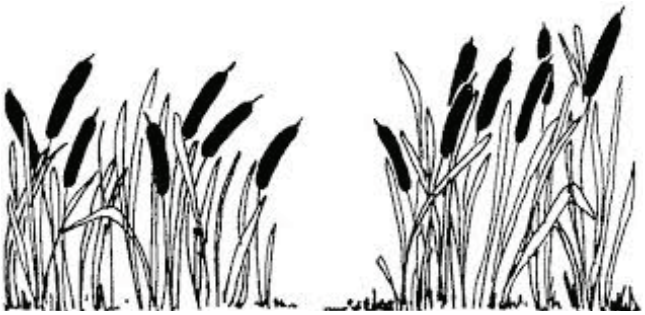


Old Man's Beard Lichen

C. uncialis
C. verticillata
C. subflaccidium
Evernia mesomorpha
Hypogymnia physodes
Hypogymnia tubulosa
Labaria pulmonaria
Parmelia sulcata
Parmelia squarrosa
Parmeliopsis capiatat
Plastimatia glauca
Plastimatia tuckermannii
Ramalina roesleri
Tuckermannopsis americana
Usnea spp.



STEWIACKE CANOE TRIP

– Gareth Harding

D**ate:** Saturday, June 13th
Place: Upper Stewiacke
Wearther: Sunny, slight breeze
Leader: Gareth Harding
Participants: 11, plus Jack Russell Terrier Millie, our mascot!!

We assembled around noon at the lower, single-lane bridge at Upper Stewiacke, (after positioning three cars at the churchyard in Middle Stewiacke) and set off on our paddling adventure. The sun was warm, the Shubenacadie river cool, and there was enough water for our canoes and kayaks to clear the rocky bottom on the fast-flowing runs. There were a number of semi-submerged trees left over from the spring runoff but we had enough warning to easily avoid them. The Merlin App on Renée's phone picked up numerous Redstarts, Parula and Yellow Warblers, and Red-eyed Vireos to add to the Song Sparrows, Redwings, Grackles, Crows, and Spotted Sandpipers seen. We didn't see any Bobolinks, which were once common birds that bubbled song over the fields on their way to the next hedgerow. Unfortunately, the new farming technique of harvesting the hay twice each year has been the demise of grassland nesting species. But, there are surviving populations in the Stewiacke Valley in the upper reaches of the river, including a pair opposite our launch site. Early on, on our paddle, we noticed Bank Swallow nesting holes in the steep mud bank, just below the sod level. There were much larger burrows at various levels of the mud banks that could be Muskrat or Beaver but were possibly also adopted by Mink. Also, along here on the south bank, were three separate clumps of Common Milkweed, very nice to see, especially so if you're a Monarch Butterfly.

We landed for lunch at a beautiful sandy-banked pool of the river after its second oxbow and most everyone went in for a swim to cool off. One of our more attentive swimmers found a flat-shaped, water nymph which turned out to be an early developmental stage of dragonfly. We headed out on the river again in a relatively open farming area. The river's edge greenery varied from grasses to shrubs such as Alder, Chokecherry, Shadbush, Canadian Elderberry, and Hawthorns, all dotted by healthy, umbrella-shaped Elms. Of particular interest was the small, tree-sized Indian Plum, which is a close relative of the Shadbush. Even more pleasing was the occasional presence of Black Ash along the river bank. This is a small species of ash, reaching under 20m tall, which was restricted in the past to the river's edge due to higher light levels and perhaps nutrients. The Mi'kmaq used it to make thin, long slivers of wood as a very flexible material for basketry.

The first couple of hours past Reynold's Bridge was slow flowing with many oxbow turns. The surrounding terrain changed from farm fields to marsh land which is flooded every spring, and this year in summer! Both Tree Swallows and Barn Swallows were occasionally observed. We frightened a Black Duck with her family of six unfledged ducklings and had to paddle hard to overtake them so they wouldn't become totally exhausted avoiding us. The mother realised the dilemma and flew down the river which caused the ducklings to shelter on the bank. A mature Bald Eagle flew over, emphasising the danger we had put these little ducklings in. Bernie reported that they had run across a young family of mergansers further down the river. There were Beaver signs along this marshy section in the form of both muddy tracks into the Alders and small lodges built on the edge of mud banks, presumably covering their burrows. We came across what appeared to be a family of Solitary Sandpipers that we spooked into the air as we paddled by. I've never seen so many together, contrary to their name. Their breeding range is north of Hudson Bay so they definitely must have been on their way south at this time of the year. Nobody would know that families of these secretive Sandpipers stayed together unless naturalists, such as ourselves, were paddling down an uninhabited Nova Scotian River!

The last stretch of our paddle was straight, and confined by a high hill to the north and high land to the south. The banks were forested by predominantly ancient Hemlock trees with a sprinkling of both Yellow- and Paper Birch and Red Maple. Summer camps of various ages were scattered in this cathedral of Hemlocks and the presence of these summer camps, in turn, protect the forest. This section is a Nova Scotia treasure and let's hope that the Hemlock Woolly Adelgid is less deadly here than presently predicted. Perhaps the Adelgid threat will pass as did the Dutch Elm disease of thirty years ago which left resistant trees. One of our members commented that not so many decades past it would have been Mi'kmaq doing this run, in canoes of birchbark, instead of our more modern materials. Possibly on their way to the Bakudabakek (Mi'kmaq for the Bay of Fundy), or to ascend the Shubenaciadie River

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instead of traveling by foot across country.

Seven of us arrived at our pullout location at the Middle Stewiacke Bridge. It boasted local teenagers swinging like orangutans from this trestle bridge. (If only their mothers could have seen their years of effort and investment dangling 30 feet above the river!)

It had taken us around four hours to drift and paddle down this stretch of the river. And then we had some anxious hours waiting for the others to arrive. There apparently was a misunderstanding and the laggards hadn't noticed that we were ahead of them! A very kind man and his wife, from the first camp we had passed on the river, drove down to tell us that they were on the way. We had an altogether most perfect day to discover the secret world of the Upper Shubenacadie River with just enough water to float us above the shallower runs.

MOIRS MILL TRAIL

– Eve Williams

Date: Sunday, Aug. 4th
Place: Mill Cove, Bedford
Weather: Sunny and pleasant
Leader: Patricia Leader
Participants: 12

This trail begins at a small park/car park just beside Tim Hortons' at the Village Plaza, Mill Cove, where Hammond's Plains Road meets the Bedford Highway. Longtime HFNer Pat Leader led the hike, donning her Scott Manor House hat to share stories about the trail's local history.

One is immediately fascinated by the small and sturdy 1930s building that was once Moirs Mill Power House, built to generate electricity for both the chocolate mill and its concomitant box mill. It's a beautiful little industrial building still boasting its iconic Moirs sign, and up to about 20 years ago, it was perhaps the 'sweetest' tourist bureau in Nova Scotia. (It's across the highway from Mill Cove, Sobey's, Lawton's, etc.) Pot of Gold Moirs chocolates were not made there; instead, it only processed the raw cocoa beans into large blocks. (The husks and other waste from the processed cocoa beans were used to spread over local Bedford gardens as a form of fertiliser and, anecdotally – performed really well!) These blocks were then shipped off to Dartmouth where they were transformed into the famous and delectable Pot of Gold treats.

Immediately by the Power House, and all the way up the trail, are squared-off pyramids of concrete that were once supports for the huge conduit that came from the dam and down the little Nine Mile River valley. It's named the Nine Mile river not because it is 9 miles long, but because it is 9 miles exactly on the old Pisiquid road from today's Windsor interchange downtown to Bedford. Local historians will recall that there were inns for changing horses along this old highway, such as Four Mile House, Ten Mile House, and I believe the original Fultz House was Twelve Mile House.

We walked up the trail – with sun dappling through the trees, the little river singing over its rocks, and a summer breeze rustling the eaves – to Fenerty Beach on Lake Drive. The river flows through the lake here, and Pat told us that 22 lakes and many streams eventually all feed into the Paper Mill dam. The not-very-deep Paper Mill lake is mainly man-made. Just beyond the orange blow-up raft and steps are remnants of the original dam.

This area was once the site of Holland's Acadian Mill. The trees in the left background are on Holland Island, and the site of Acadian Mill. Antony Holland made paper there from rags, and perhaps more importantly, produced The Acadian Recorder for sale as a newspaper. (There was never an Acadian connection, it was just that Holland liked the name.) A man not afraid to speak his mind, this occasionally meant that Mr. Holland got into trouble for his controversial views. He had taken over Holland Island and built The Acadian Mill in 1818, but he did not live long, as he was tragically killed in 1830, when his carriage overturned on a trip back from Halifax somewhere along the Pisaquid-Hammond's Plains roads. After Anthony Holland's death, his son and wife continued to sell off their thousand acres, and the mill became a cord and twine mill.

Enter the Moirs family. Their German engineer built a long causeway/dam just beyond where the Fenerty Beach access steps enter the water today. Below Fenerty Beach and on the other arm of the trail with access from Mill Run Drive, Moirs also built a new slipway and dam and raised the level of water up to 15 feet higher, which is about its present level. Here there is another shallow and supervised beach (Scott Saunders Memorial Park) on the other side of the slipway.

In the early 1830s, the Moirs Company built a massive conduit and powerhouse. The conduit went from the dam at the slipway to the powerhouse on Bedford Highway. The electricity generated went into the two mills on the site of our present day Mill Cove. The Millpond was carved out and a sma**ll** railway served the industrial complex. By 1904, the causeway around the cove was finished and Dominion Atlantic Railway trains were puffing by, connecting Halifax to Truro and western Canada. Now, Sobey's and other businesses in the Village Plaza occupy those old mill sites.

At the top of the trail, we continued on to Fenerty Beach on Lake Drive. This beach is extremely popular with the local inhabitants and it has been improved over the last 20 years. It has man-made steps leading down into the water and is busy with swimmers and paddleboarders, etc.

Who was Fenerty? Charles Fenerty of Upper Sackville was an inventor. In the early 1840, inspired by how wasps built their nests, he came up with a process for making paper out of woodpulp. Sadly he failed to take

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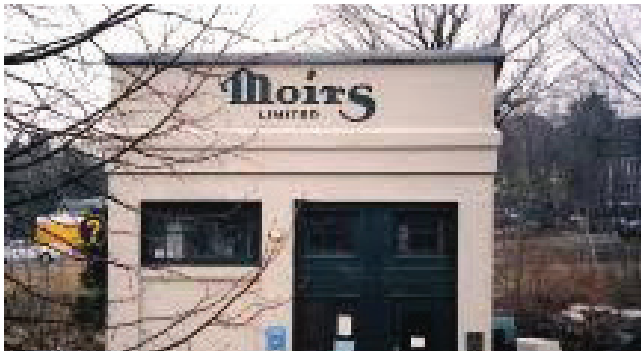
out a patent, so he did not profit from it, nor did he go down in history as the inventor of paper manufacture from wood pulp!

Some years ago, Paper Mill lake was totally drained so the slipway could be replaced, and the remains of the old road, several houses, and bits of the the old dam became visible – a delight to archaeologists, but dangerous for swimmers. This is why it is adviseable not to jump into the water at either beach, nor to swim beyond the limits. Fencing is there to prevent the impulsive and thoughtless from taking risks.

There is a pathway close by Fenerty Beach, also known as Papermill Lake Park, which used to be open to the public. It's now been taken over by the condominiums at Lane Drive. Terry Choyce, a resident, said that they usually turn a blind eye to non-residents walking along the pathway. She added that there are plans for a trail connecting Nine Mile Drive to Hammond's Plains Road one day.

We backtracked down to the dam and the newish slipway to watch the water. It's a slipway for all seasons. Today the water is smoothly sliding down, on some days it roars, and in winter when the shallow lake is sometimes frozen, the children still skate there. Other times it's just a mere trickle.

Pat made no claims to be a naturalist, but we did so enjoy those glimpses into the past offered to us on a summer's afternoon by she and other volunteers from Scott Manor shared stories of the lake. Walk the Moir's Mill trail up to the quiet suburb around the lake. En-route, on your own, you the field naturalist will surely find nature's treasures, including a small grove of Hemlocks near the dam.



CLAM HARBOUR

– Bernie McKenna

Date: Sunday, August 11th
Place: Clam Harbour Beach Provincial Park
Weather: Sunny, gentle breeze, 26 C – about perfect
Leader: Group led
Participants: 13

What a difference a day of 24 hours can make. Saturday the 10th was wet, windy, following the Weather Network exactly as predicted. Sunday was the exact opposite – we couldn't have asked for a better day. On the downside however, we were regrettably deprived of our scheduled leader, the Backlands Coalition's Joshua Barrs Dunham, and all due to the interference of a Black-legged Tick *Ixodes scapulari*, its feeding habits, and the accompanying bacterial diseases they can carry.

Our Clam Harbour Coastal Trail walk consisted of a shoreline route of 5.5 kms with a planned 1 to 1.5 hour duration. However it turned out to be over 2.5 hours (closer to 3 hours in total), but it was worth every minute and more. The park has good parking and washroom facilities, however on a past visit I was sure it had had a stand alone wash station; I did not see one this time around. In light of that I'd recommend you bring your own sanitizer if you visit.

The path down to the beach is very good, it has a hard earthen or crusher dust surface at least 6 feet wide. On the beach itself it is several hundred metres of an inviting sandy walk to the actual trailhead. The trail is well marked with directional signs conveniently posted as it closely hugs the shoreline the whole way. During this complete walk, you are never out of the sights and sounds of the waves as they come in to break on the shore. This day there was a good surf on and the constant sound of the breakers was a pleasure to hear. Offshore we could see the spray fly as whitecaps crashed over the reefs and rocky outcroppings. Between all these sounds, sights, and the smell of the ocean air it was an easy walk location to enjoy.

The trail itself winds through several different terrains. We had windswept White Spruce groves, thick Bayberry patches a half-metre in height – boggy sites that after the previous day's rain still had standing water of an inch or more – and dryer areas where Creeping Junipers and Crowberry dominated all others. From the healthy growth of the various vegetations we passed through it was most obvious they're well suited to the terrain and conditions. The small coves had shelves of weathered beach rock to contend with, as not all beach rock makes for stable footing. On top of all this the trail was often slightly wet in stretches, no doubt a result of the previous day's drenching. There were three smallish ponds inland from the trail, of which only one has a discernable trickle leading to the beach and the ocean beyond. The coves mentioned earlier all had a small sandy beach nestled in between the rocky reefs that sheltered each of their beaches perfectly. In general, the trail from cove-to-cove or headland-to-headland was well marked by signs and made for easily located walking.

These small coves provided excellent photo opportunities for the birders amongst us to get good shots of the Yellowlegs and a single Willet. Both species seemed to prefer this to the more open sand beach and its accompanying increase in people. Undoubtedly our most interesting find was the skull and twisted spine of a seal, laying about halfway between the high and low water lines. The teeth definitely indicated a carnivore of one type or other, and no doubt made the animal fully capable of handling its normal prey of molluscs, squid, crustaceans, shellfish, and finned fish. From photos of the skull sent to a former museum curator, he deduced it was most likely a small, female Grey Seal. He thought the teeth too worn for a juvenile, and coupled with its other skull features, it made his suggestion most prob-

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able. Another item of note here is the yellow-flowered Wild Mustard that grew along the high tide lines of the coves. Its developing seed pods made for an interesting taste, a little sharp with a definite mustard flavour for the taste buds, they'd do well in any salad. They were about the only plant to sample; we were too early for the Huckleberries, and the Cranberries had just started to show colour, best left until after a frost, assuming the geese and ducks don't get them first. The Bayberries had little to show for fruit either, although later in the year several species of birds find their waxen berries just fine for a meal, especially when pickings get scarce.

We never did make it all the way to the trail end. We got close – but – no ribbon. We decided to turn back at a very large headland which was covered in Creeping Juniper, Black Crowberry, and any number of other interesting plants, some in flower, some past flower, and others somewhere in between. Once back on the main sand beach we found 15 or more Semipalmated Plovers scurrying along at the water's edge feeding on whatever the preceding wave had laid bare. For ease of walking most of us preferred the wetter sand but a few braved the drier, looser stuff. As we neared the end where most beach and sun worshipers were, there were six or seven gulls of varying ages and species that obviously knew an easy meal or two was to be had.

All in all, this was a truly interesting and informative hike, and despite having lost our walk leader we did have a skilled assortment of knowledgeable walkers (myself excluded) who, between iNaturalist, field books, and educated minds, were able to identify almost all plants found. I have to emphasise that this entire write-up, species list included is the result of input from a number of people, without whose knowledge this would be a very diminished article. I gratefully thank each of them for their valued assistance.

Bladderwrack

CLAM HARBOUR COASTAL SPECIES

Plants

American Searocket	*Cakile edentula*
Bayberry	*Myrica pensylvania*
Beach / Seaside Pea	*Lathyrus japonica*
Bunchberry	*Cornus canadensis*
Black Crowberry	*Empetrum nigrum*
Bladder Wrack	*Focus vesiculosus*
Black Huckleberry	*Gaylussacia baccata*
Bog Aster	*Aster borealis*
Bind Weed	*Fallopia convolusus*
Cloudberry/Bake Apple	*Rubus chamaemorus*
Cranberry	*Vaccinum macrocarpon*
Creeping Snowberry	*Gaultheria hispidula*

Common Yarrow	*Erigeron strigosus*
Curled Dock	*Rumex crispus*
Common Ragweed	*Aralia ambrosia*
Eyebright	*Euphrasia americana*
Flag Iris	*Iris versicolor*
Hemp Nettle	*Galeopsis tetrahit*
Hay Scented Fern	*Sitobolium punctilobulum*
Irish Moss	*Chondrus crispus*
Lingonberry, Partridgeberry	*Vaccinium vitis-idaea*
Lamb's Quarters	*Chenopodium album*
New York Fern	*Amauropelta noveboracensis*
Northern Seaside Goldenrod	*Solidago* sp.
New York Aster	*Symphyotrichum nove-belgii*
Purple Pitcher Plant	*Sarracenia purporea*
Rattlesnake Root	*Prenanthes alba*
Round leaf Sundew	*Drosera rotundifolia*
Red Clover	*Trifolium pratense*
Sea Lavender	*Limonium caroliniana*
Silver Cinquefoil	*Palenteentilla* sp.
Sea Beach Sandwort	*Honckenya peploides*
Speckled Alder	*Alnus rugosa*
Scotch Lovage	*Ligusticum scoticum*
Sheep Sorrel	*Rumex acetosella*
Sow Thistle	*Sorchus arvensis*
Three-leaved False Solomon's Seal	*Maianthemum trifolium*
Toad Rush	*Juncus bufonius*
Wild Radish	*Raphanus raphanistrum*
Wild Mustard	*Sinapis arvensis*
White Dead Nettle	*Lamium album*
White Spruce	*Picea glauca*
Wood Nymph	*Moneses uniflora*

Birds

Bald Eagle	*Haliæetus leucocephalus* (immature; head was white tail was not)
Double-crested Cormorant	*Phalacrocorax ouritus*
Herring Gull	*Larus argentatus*
Ring-necked Pheasant	*Phasianus colchicus*
Willet	*Tringa semipalmata*
Lesser Yellowlegs	*T. flavipes*
Sanderling	*Calidris alba*
Semipalmated Sandpiper	*C. pusilla*
American Crow	*Corvus brachyrhynchos*

Flies

Horse Fly	*Tabanus trimaculatus*
Moose Fly	*Hæmatobosca alcis*

Horse Flies can really bite; one bit me and of this writing my arm was still swollen and itchy!

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ALMANAC

"O, it sets my hart a-clickin' like the tickin' of a clock, / When the frost is on the punkin and the fodder's in the stock!"

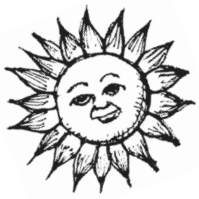
– From "When the Frost is on the Punkin", by James Whitcomb Riley

NATURAL EVENTS

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
2 Oct. New Moon
7 Oct. Draconids Meteor Shower (meteors radiate from constellation Draco)
17 Oct. Full (Super) Moon (2nd of 3 for 2024)
21-22 Oct. Orionids Meteor Shower (meteors -- dust from comet Halley -- radiate from Orion)
1 Nov. New Moon
3 Nov. Atlantic Daylight Time ends at 14:00; clocks set back 1 hour to Atlantic Standard Time
4-5 Nov. Taurids Meteor Shower (meteors radiate from constellation Taurus)
15 Nov. Full (Super) Moon (3rd of 3 for 2024)
16 Nov. Mercury at Greatest Eastern Elongation (view low in western sky just after sunset)
17 Nov. Uranus at Opposition
17-18 Nov. Leonids Meteor Shower (meteors radiate from constellation Leo)
1 Dec. New Moon
7 Dec. Jupiter at Opposition
13-14 Dec. Geminids Meteor Shower (meteors radiate from constellation Gemini)
15 Dec. Full Moon
21 Dec. Winter Solstice (first day of winter in the Northern Hemisphere) occurs at 05:17 AST
21-22 Dec. Ursids Meteor Shower (meteors radiate from constellation Ursa Minor)
25 Dec. Mercury at Greatest Western Elongation (view low in eastern sky just before sunrise)
30 Dec. New Moon

- 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 UNTIL 2 NOV., THEREAFTER AST !



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14	**Sep.**	06:52	19:25	**12**	**Oct.**	07:26	18:34
21	**Sep.**	07:00	19:12	**19**	**Oct.**	07:35	18:22
28	**Sep.**	07:09	18:59	**26**	**Oct.**	07:44	18:11
2	**Nov.**	07:54	18:00	**7**	**Dec.**	07:37	16:33
9	**Nov.**	07:03	16:52	**13**	**Dec.**	07:43	16:34
16	**Nov.**	07:13	16:44	**20**	**Dec.**	07:47	16:36
23	**Nov.**	07:22	16:39	**27**	**Dec.**	07:50	16:40
30	**Nov.**	07:30	16:35				

– Source: www.timeanddate.com

ORGANISATIONAL EVENTS

Atlantic Rhododendron & Horticultural Society, **https://atlanticrhodo.org.** ARHS meetings and presentations are held at the NS Museum of Natural History Auditorium starting at 7:30 p.m. (Zoom + Live).

3 Sep. **"**Rhododendron 101", an introduction with Ruth Jackson
6 Oct. "Climate Change and the Future of Gardening", a Captain Steele Lecture
7 Oct. "The Arts and Crafts Garden", with Dr. Sarah Rutherford
5 Nov. Overview of the American Rhododendron Society Spring 2025 Convention in Wolfville
3 Dec. Annual Garden Slides and Seasonal Reception

Friends of Blue Mountain & Birch Cove, https://bluemountainfriends.ca.

10 Sep. "Enjoy Nature/Leave No Trace". 6:30-8:30 p.m., Bedford, Registration is required.
14 Sep. Blue Mountain Summit, 2km, 10:00 a.m.
28 Sep. Lakeshore to Hobson's Lake; 6 km; 09:30
19 Oct. Three Lakes Loop (Hobson's Loop); 5.2 km; 09:00
26 Oct. Charlies Lake; 2 km; 10:00
2 Nov. Susies Lake West; 9 km; 09:00
16 Nov. Ash Lake; 7 km; 09:00

(Continued on back Cover)

– Compiled by Don Flemming

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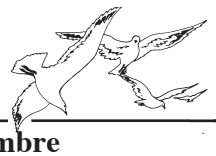
HALIFAX TIDE TABLE



October-octobre

Day	Time	Metres	Feet	jour	heure	mètres	pieds
1	0113	**0.4**	1.3	**16**	0022	**0.2**	0.7
	0707	**1.7**	5.6		0629	**2.0**	6.6
TU	1333	**0.5**	1.6	WE	1303	**0.1**	0.3
MA	1918	**1.7**	5.6	ME	1853	**1.8**	5.9
2	0147	**0.4**	1.3	**17**	0112	**0.1**	0.3
	0739	**1.7**	5.6		0715	**2.1**	6.9
WE	1405	**0.4**	1.3	TH	1356	**0.0**	0.0
ME	1955	**1.7**	5.6	JE	1944	**1.8**	5.9
3	0214	**0.4**	1.3	**18**	0203	**0.1**	0.3
	0810	**1.7**	5.6		0801	**2.1**	6.9
TH	1434	**0.4**	1.3	FR	1448	**0.0**	0.0
JE	2032	**1.7**	5.6	VE	2035	**1.8**	5.9
4	0238	**0.4**	1.3	**19**	0255	**0.2**	0.7
	0840	**1.7**	5.6		0848	**2.1**	6.9
FR	1503	**0.3**	1.0	SA	1541	**0.0**	0.0
VE	2108	**1.7**	5.6	SA	2125	**1.8**	5.9
5	0302	**0.5**	1.6	**20**	0350	**0.3**	1.0
	0910	**1.7**	5.6		0935	**2.0**	6.6
SA	1534	**0.3**	1.0	SU	1635	**0.1**	0.3
SA	2143	**1.6**	5.2	DI	2215	**1.7**	5.6
6	0330	**0.6**	2.0	**21**	0451	**0.4**	1.3
	0942	**1.7**	5.6		1023	**1.9**	6.2
SU	1610	**0.4**	1.3	MO	1732	**0.2**	0.7
DI	2218	**1.6**	5.2	LU	2305	**1.7**	5.6
7	0404	**0.6**	2.0	**22**	0557	**0.5**	1.6
	1015	**1.7**	5.6		1112	**1.8**	5.9
MO	1652	**0.4**	1.3	TU	1831	**0.3**	1.0
LU	2254	**1.6**	5.2	MA	2357	**1.6**	5.2
8	0449	**0.7**	2.3	**23**	0703	**0.6**	2.0
	1052	**1.7**	5.6		1204	**1.6**	5.2
TU	1743	**0.5**	1.6	WE	1930	**0.4**	1.3
MA	2334	**1.5**	4.9	ME			
9	0552	**0.8**	2.6	**24**	0055	**1.5**	4.9
	1134	**1.6**	5.2		0808	**0.7**	2.3
WE	1844	**0.5**	1.6	TH	1303	**1.5**	4.9
ME				JE	2029	**0.5**	1.6
10	0019	**1.5**	4.9	**25**	0205	**1.5**	4.9
	0703	**0.8**	2.6		0909	**0.7**	2.3
TH	1222	**1.6**	5.2	FR	1416	**1.5**	4.9
JE	1947	**0.5**	1.6	VE	2125	**0.5**	1.6
11	0117	**1.5**	4.9	**26**	0328	**1.5**	4.9
	0808	**0.8**	2.6		1006	**0.7**	2.3
FR	1321	**1.6**	5.2	SA	1537	**1.5**	4.9
VE	2047	**0.5**	1.6	SA	2218	**0.5**	1.6
12	0234	**1.5**	4.9	**27**	0431	**1.6**	5.2
	0910	**0.8**	2.6		1059	**0.6**	2.0
SA	1436	**1.6**	5.2	SU	1640	**1.5**	4.9
SA	2145	**0.4**	1.3	DI	2308	**0.5**	1.6
13	0355	**1.5**	4.9	**28**	0516	**1.6**	5.2
	1010	**0.6**	2.0		1147	**0.6**	2.0
SU	1555	**1.7**	5.6	MO	1729	**1.5**	4.9
DI	2239	**0.3**	1.0	LU	2354	**0.5**	1.6
14	0455	**1.7**	5.6	**29**	0554	**1.7**	5.6
	1110	**0.5**	1.6		1228	**0.5**	1.6
MO	1703	**1.7**	5.6	TU	1811	**1.6**	5.2
LU	2331	**0.2**	0.7	MA			
15	0543	**1.8**	5.9	**30**	0034	**0.5**	1.6
	1208	**0.3**	1.0		0628	**1.7**	5.6
TU	1759	**1.8**	5.9	WE	1303	**0.4**	1.3
MA				ME	1851	**1.6**	5.2
				31	0108	**0.5**	1.6
					0659	**1.7**	5.6
				TH	1335	**0.3**	1.0
				JE	1930	**1.6**	5.2

ALL TIMES ARE AST

November-novembre

Day	Time	Metres	Feet	jour	heure	mètres	pieds
1	0139	**0.5**	1.6	**16**	0146	**0.3**	1.0
	0731	**1.7**	5.6		0735	**2.0**	6.6
FR	1406	**0.3**	1.0	SA	1431	**0.0**	0.0
VE	2008	**1.6**	5.2	SA	2019	**1.8**	5.9
2	0208	**0.5**	1.6	**17**	0241	**0.3**	1.0
	0802	**1.7**	5.6		0825	**2.0**	6.6
SA	1438	**0.2**	0.7	SU	1523	**0.0**	0.0
SA	2045	**1.6**	5.2	DI	2111	**1.8**	5.9
3	0238	**0.6**	2.0	**18**	0338	**0.4**	1.3
	0836	**1.7**	5.6		0915	**1.9**	6.2
SU	1513	**0.3**	1.0	MO	1615	**0.1**	0.3
DI	2122	**1.6**	5.2	LU	2201	**1.7**	5.6
4	0313	**0.6**	2.0	**19**	0437	**0.5**	1.6
	0911	**1.7**	5.6		1004	**1.8**	5.9
MO	1552	**0.3**	1.0	TU	1709	**0.2**	0.7
LU	2158	**1.6**	5.2	MA	2251	**1.7**	5.6
5	0353	**0.7**	2.3	**20**	0539	**0.6**	2.0
	0950	**1.7**	5.6		1054	**1.7**	5.6
TU	1637	**0.4**	1.3	WE	1803	**0.3**	1.0
MA	2236	**1.6**	5.2	ME	2341	**1.7**	5.6
6	0443	**0.7**	2.3	**21**	0641	**0.7**	2.3
	1030	**1.7**	5.6		1145	**1.6**	5.2
WE	1729	**0.4**	1.3	TH	1857	**0.4**	1.3
ME	2318	**1.6**	5.2	JE			
7	0544	**0.8**	2.6	**22**	0033	**1.6**	5.2
	1114	**1.7**	5.6		0741	**0.7**	2.3
TH	1826	**0.4**	1.3	FR	1239	**1.5**	4.9
JE				VE	1950	**0.5**	1.6
8	0005	**1.5**	4.9	**23**	0131	**1.6**	5.2
	0650	**0.8**	2.6		0838	**0.7**	2.3
FR	1204	**1.7**	5.6	SA	1341	**1.5**	4.9
VE	1924	**0.4**	1.3	SA	2040	**0.5**	1.6
9	0101	**1.5**	4.9	**24**	0234	**1.6**	5.2
	0752	**0.8**	2.6		0933	**0.7**	2.3
SA	1302	**1.6**	5.2	SU	1449	**1.4**	4.6
SA	2019	**0.4**	1.3	DI	2129	**0.6**	2.0
10	0208	**1.6**	5.2	**25**	0335	**1.6**	5.2
	0853	**0.7**	2.3		1023	**0.6**	2.0
SU	1411	**1.6**	5.2	MO	1555	**1.4**	4.6
DI	2113	**0.4**	1.3	LU	2217	**0.6**	2.0
11	0316	**1.6**	5.2	**26**	0426	**1.6**	5.2
	0953	**0.5**	1.6		1110	**0.6**	2.0
MO	1529	**1.6**	5.2	TU	1651	**1.4**	4.6
LU	2206	**0.3**	1.0	MA	2303	**0.6**	2.0
12	0416	**1.8**	5.9	**27**	0508	**1.7**	5.6
	1052	**0.4**	1.3		1151	**0.5**	1.6
TU	1639	**1.6**	5.2	WE	1739	**1.5**	4.9
MA	2300	**0.3**	1.0	ME	2348	**0.6**	2.0
13	0507	**1.9**	6.2	**28**	0545	**1.7**	5.6
	1150	**0.2**	0.7		1228	**0.4**	1.3
WE	1739	**1.7**	5.6	TH	1824	**1.5**	4.9
ME	2355	**0.3**	1.0	JE			
14	0557	**2.0**	6.6	**29**	0029	**0.6**	2.0
	1245	**0.1**	0.3		0620	**1.7**	5.6
TH	1834	**1.7**	5.6	FR	1303	**0.3**	1.0
JE				VE	1906	**1.5**	4.9
15	0051	**0.3**	1.0	**30**	0107	**0.6**	2.0
	0646	**2.0**	6.6		0655	**1.7**	5.6
FR	1339	**0.0**	0.0	SA	1339	**0.2**	0.7
VE	1927	**1.8**	5.9	SA	1946	**1.6**	5.2

December-décembre

Day	Time	Metres	Feet	jour	heure	mètres	pieds
1	0144	**0.6**	2.0	**16**	0232	**0.4**	1.3
	0732	**1.7**	5.6		0809	**1.9**	6.2
SU	1417	**0.2**	0.7	MO	1506	**0.1**	0.3
DI	2025	**1.6**	5.2	LU	2059	**1.8**	5.9
2	0221	**0.6**	2.0	**17**	0326	**0.5**	1.6
	0811	**1.7**	5.6		0859	**1.9**	6.2
MO	1457	**0.2**	0.7	TU	1555	**0.2**	0.7
LU	2103	**1.6**	5.2	MA	2148	**1.8**	5.9
3	0301	**0.6**	2.0	**18**	0420	**0.6**	2.0
	0852	**1.8**	5.9		0948	**1.8**	5.9
TU	1540	**0.2**	0.7	WE	1643	**0.2**	0.7
MA	2143	**1.6**	5.2	ME	2234	**1.8**	5.9
4	0345	**0.6**	2.0	**19**	0514	**0.6**	2.0
	0935	**1.8**	5.9		1036	**1.8**	5.9
WE	1626	**0.3**	1.0	TH	1730	**0.3**	1.0
ME	2224	**1.6**	5.2	JE	2318	**1.7**	5.6
5	0436	**0.7**	2.3	**20**	0608	**0.7**	2.3
	1018	**1.8**	5.9		1122	**1.7**	5.6
TH	1716	**0.3**	1.0	FR	1815	**0.4**	1.3
JE	2307	**1.6**	5.2	VE			
6	0534	**0.7**	2.3	**21**	0003	**1.7**	5.6
	1103	**1.7**	5.6		0702	**0.7**	2.3
FR	1807	**0.3**	1.0	SA	1210	**1.6**	5.2
VE	2354	**1.6**	5.2	SA	1859	**0.5**	1.6
7	0635	**0.7**	2.3	**22**	0049	**1.7**	5.6
	1152	**1.7**	5.6		0755	**0.7**	2.3
SA	1859	**0.3**	1.0	SU	1300	**1.5**	4.9
SA				DI	1943	**0.6**	2.0
8	0044	**1.6**	5.2	**23**	0139	**1.7**	5.6
	0736	**0.6**	2.0		0846	**0.7**	2.3
SU	1247	**1.6**	5.2	MO	1356	**1.4**	4.6
DI	1952	**0.4**	1.3	LU	2027	**0.6**	2.0
9	0139	**1.7**	5.6	**24**	0233	**1.6**	5.2
	0836	**0.5**	1.6		0935	**0.6**	2.0
MO	1352	**1.6**	5.2	TU	1459	**1.4**	4.6
LU	2045	**0.4**	1.3	MA	2115	**0.7**	2.3
10	0238	**1.7**	5.6	**25**	0326	**1.6**	5.2
	0935	**0.4**	1.3		1021	**0.6**	2.0
TU	1504	**1.6**	5.2	WE	1604	**1.4**	4.6
MA	2140	**0.4**	1.3	ME	2207	**0.7**	2.3
11	0337	**1.8**	5.9	**26**	0416	**1.6**	5.2
	1034	**0.3**	1.0		1105	**0.5**	1.6
WE	1616	**1.6**	5.2	TH	1703	**1.4**	4.6
ME	2238	**0.4**	1.3	JE	2300	**0.7**	2.3
12	0435	**1.9**	6.2	**27**	0501	**1.6**	5.2
	1132	**0.2**	0.7		1148	**0.4**	1.3
TH	1721	**1.6**	5.2	FR	1755	**1.5**	4.9
JE	2339	**0.4**	1.3	VE	2351	**0.7**	2.3
13	0530	**1.9**	6.2	**28**	0544	**1.6**	5.2
	1229	**0.1**	0.3		1231	**0.3**	1.0
FR	1819	**1.7**	5.6	SA	1841	**1.5**	4.9
VE				SA			
14	0039	**0.4**	1.3	**29**	0037	**0.7**	2.3
	0624	**1.9**	6.2		0627	**1.7**	5.6
SA	1323	**0.1**	0.3	SU	1314	**0.2**	0.7
SA	1914	**1.7**	5.6	DI	1924	**1.5**	4.9
15	0136	**0.4**	1.3	**30**	0120	**0.6**	2.0
	0717	**1.9**	6.2		0710	**1.7**	5.6
SU	1416	**0.1**	0.3	MO	1358	**0.2**	0.7
DI	2007	**1.7**	5.6	LU	2005	**1.6**	5.2
				31	0202	**0.6**	2.0
					0754	**1.8**	5.9
				TU	1442	**0.2**	0.7
				MA	2046	**1.6**	5.2

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ORGANISATIONAL EVENTS *(continued)*

The Nova Scotia Bird Society, https://nsbirdsociety.ca.

21 Sep. Bird Watching/Fall Migrants, Taylor's Head, 9:30 a.m. to 3:00 p.m., with Peter Oickle (902-499-4114). Level of difficulty: Difficult.

Royal Astronomical Society of Canada, Halifax Centre, http://halifax.rasc.ca. Meetings are held (Zoom + Live) at Saint Mary's University, RM AT101, The Atrium, starting at 13:00:

5 Oct. JAXA's XRISM Satellite, presented by Dr. Luigi Gallo
2 Nov. World Asterism Project, presented by Charles Ennis
7 Dec. Stereoscopy, presented by Lisa Ann Fanning (and AGM)

Miscellaneous

14 Dec. to 5 Jan. Audubon Christmas Bird Count.

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