THE HALIFAX FIELD NATURALIST

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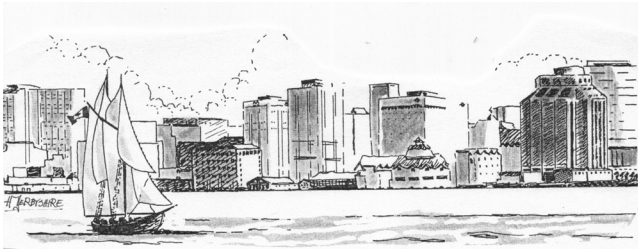

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HFN NEWS AND ANNOUNCEMENTS

FROM THE EDITOR

*– **Stephanie Robertson***

Rain, rain, rain, rain, rain, rain, rain.... and cold, cold, cold – our spring for this year. Fortunately, we have a plethora of trees in HRM, performing all kinds of benefits for us, not the least of which is taking up and holding rainwater, and preventing soil erosion and damaging run-off *(see "Urban Forest", p. 11)*. Today, June 20th, is sunny and warmer, an introduction to the first day of summer which starts June 21st at 14:16 ADT.

Tragically, there are swathes of land in and around N.S. that no longer have any trees, shrubs, or plants at all of any kind to prevent the kind of devastating run-off and consequent erosion from all this past spring's rain. Our provincial government has allowed both foreign and local forestry companies to lay them waste with the latest, state-of-the-art clear-cutting mega-equipment. For years naturalists, scientists, and environmentalists have lobbied and spent hours preparing well-researched papers on the necessity of managing our forests well, but, the devastation is still being permitted and committed, endangering the future economy and well-being of Nova Scotia and Nova Scotians *(see "Rally at Province House", p. 5)*.

HFN PROGRAMME COMMITTEE

The Programme Committee is always interested in hearing from HFN members as to what visits, walks, or speakers are of interest to you for possible inclusion in future programmes. If you have discovered a new trail, heard an interesting speaker, or are willing to talk about a recent adventure, local or world wide, please pass these ideas along to the Programme Committee *(see p. 2 for contact info)*.

OUR HRM ALLIANCE

The Halifax Field Naturalists participated recently as one of nearly 20 groups from across HRM in support of a new alliance – "Our HRM: Planning for Liveable Communities". The vision of the group is a collection of vibrant places that protects the environment, fosters healthy citizens, and attracts sustainable economic opportunities. Included among the supporting groups is the Downtown Halifax Business Commission, Ecology Action Centre, Dalhousie Office of Sustainability, Hike Nova Scotia, the N.S. Heart and Stroke Foundation, and several local trails groups. With the five-year review of the 25-year Regional Plan scheduled for this year, the group will be monitoring and participating in the review, and encouraging citizens to do the same; after all, HRM is *our* place for work and play.

Bob McDonald attended the kick-off event as representative for HFN. He spoke briefly about our mandate and our support for protection of water and wetlands habitats, also mentioning our concern with invasive alien species which accompany residental developments. For additional information, go to **www.ouralliance.ca** to learn more and see who else has signed up to participate.

THE NOVA SCOTIA MUSEUM

Marion Munro, Curator of Botany, is looking for photographs of flowers for the soon-to-be-updated e-version of Roland's Flora of Nova Scotia. Contact her at the Museum if you have photos that they could use.

Two new exhibits are on at the Museum of Natural History. **Netukulimk** (Nah-DOO-ga-limk) is a Mi'kmaq word which spans all cultures and generations and describes the connection between all living things – individual experiences harmonising both the natural and human worlds.. Six interactive modules represent the sights, sounds, and smells of a Nova Scotia forest and the essence of Netukulimk. In this, the International Year of the Forest, it's a timely event.

Also, the travelling exhibit **The Abyss: Life in the Deep**, is an exciting look at our underwater world. You'll discover a unique, strange landscape that's home to corals, a variety of creatures straight out of science fiction, unique ecosystems, and hot springs. Spectacular images, audiovisuals, interactive animation, specimens, and replicas of deep-sea diving apparati complete this fascinating exploration of the mysterious abyss.

NNS 2011 AGM & CONFERENCE

Nature Nova Scotia joined the Bras d'Or Stewardship Society on Friday, June 3rd through to Sunday the 5th, at the Gaelic College in St. Ann's, Cape Breton for an enjoyable NNS 2011 AGM and conference.

Friday evening started with wine, cheese and a bit of local Celtic music and ended with a tour of the night sky (too overcast for any stars) and listening for owls. Mornings featured nature walks for birders and early risers.

You'll find a more detailed report on some of its activities, talks, and field trips on *p. 6.*

TWO NEW WILDERNESS AREAS

Nova Scotians are invited to provide feedback on two proposed wilderness areas in Cumberland County. Their proposed boundaries were released on April 21st, 2011. Go to **http://www.gov.ns.ca/nse/protectedareas/wa_chignectocrownlands.asp** for more information. The consultation will continue until August 12th, 2011.

Public feedback will help government make informed decisions on final boundaries, and also inform and influence any management plans for these important Crown lands. The two proposed wilderness areas are **Raven Head** and **Kelly River**, **Cumberland County**.

NEW AND RETURNING MEMBERS

John McGregor Stewart

SPECIAL REPORTS

THE 2011 COLIN STEWART CONSERVATION AWARD

In the last issue of The Halifax Field Naturalist (Spring, #142), a significant portion of Doug Linzey's acceptance speech was erroneously omitted due to email transmission 'funnies'. Our sincere apologies to Doug for this error. Following below is Doug's speech in its entirety:

"When I first came to Nova Scotia, I was a conservation neophyte. We had lived for three years in the wilderness at the end of a fiord in Northern BC. We could get there only by boat or plane from Prince Rupert. The salmon fishing was fantastic. There were mountain sheep within a two-hour hike and bears everywhere. I worked for a mining company. We thought nothing of dumping mill tailings into an otherwise pristine Lime Creek, which plummeted four miles downhill into the ocean, where it created a considerable plume stretching for miles down Alice Arm.

Rachel Carson's Silent Spring had not yet reached Kitsault, BC.

We next lived for 10 years in Whitehorse, again surrounded by huge expanses of wilderness. And again I was in the mining industry. The Yukon Conservation Society was the enemy. They just didn't understand that we were really the good guys.

I always recognised the value of forests and clean water and keeping our footprint to a reasonable size, and as a mine manager I acted accordingly. But it never occurred to me to learn the different species of duck on the lakes or the birds other than Ravens and Whiskeyjacks and those damn Cliff Swallows that persisted in building their mud nests under the overhang of our mine office. I did learn a bit about the Trumpeter Swans, but only because they caused such a bloody awful racket every spring when the ice went out of the Yukon River near our cabin on Marsh Lake. As far as trees were concerned I really only knew which ones made the best Christmas tree and that the charred pine from the big Takhini burn made good firewood.

I don't think I could have defined biodiversity.

Then we lived in Ottawa for nearly four years, on a green belt that stretched for miles beyond our back door. I think that's when I started to gain some appreciation for the potential of human development to wreck nature. For the first time since a summer job surveying with the BC Forest Service, I finally started to learn something about what was going on around me. I took a birdwatching course at Algonquin College.

By the time we arrived in Halifax in 1986, I guess I was hooked on the birds, and it didn't take long to fall in with a bad crowd – Fulton Lavender and Clarence Stevens – you know, that kind of people. And that led to the Halifax Field Naturalists. At some point I went on the board and eventually became secretary for a while.

I got to know Colin Stewart through HFN. Colin was an early computer adopter. My wife, Joanne, had a state-of-the-art (for the time) laptop that came with her job, but she had little interest in using it, so I would pack it off to Colin's little office space in his house, and he taught me how to use it.

I started helping Colin with a number of his projects, and as a result I got more and more involved in the conservation issues that he'd taken on. One of them I have particular reason to remember was the Nova Scotia Trails Federation, of which Colin was a founding member on behalf of HFN in 1988. He talked me into becoming the HFN rep in his place and I wound up being its president for a couple of years.

I well remember HFN board meetings in the period when Michael Downing was president and Colin was of course the conservation committee. Meetings were long, to say the least, and when they were done and the coffee and cake consumed, the three of us on more than one occasion continued the conversation well into the night. It was that sort of conversation that resulted in the founding of the Federation of Nova Scotia Naturalists in 1990.

It's useful and instructive now and then to revisit Colin's methods of dealing with obstructionist government departments and antagonistic industry people.

Just underneath that calm and quiet exterior was an extremely determined and persistent character that surprisingly often carried the day. He believed in getting to know and understand the other players. Colin's process was certainly frustrating and seemingly interminable for some, but in the long run proved to be possibly the most successful.

There's a very good reason that the recently completed process of consultation between the forest industry and environmental interests in Nova Scotia was called the Colin Stewart Forest Forum. That's because Colin was well regarded by parties on both sides for the depth of his knowledge and his insistence on talking things over in a respectful atmosphere.

Issues like the Endangered Spaces campaign, and in particular getting candidate wilderness areas declared in Nova Scotia, were works of love for Colin. Next to his family, they were his life.

The more I hung around with Colin, observing him in action, the more impressed I was, and I often think of him, especially when writing yet another letter to a minister. And I wonder—what would Colin do?

To be in the company of other recipients of this award, – Colin himself, Jim Wolford, and Bob and Wendy McDonald – is a great honour to me, and I thank you."

– Doug Linzey
March 3rd, 2011

RALLY AT PROVINCE HOUSE

On April 13th, several groups and many individuals rallied on Granville Street in front of Province House. They were protesting and spoke on the absolutely devastating bio-mass clearcutting in our province (allowed by Premier Darrell Dexter and Charlie Parker, Minister of Natural Resources) by Bowater Mersey, NewPage, Northern Pulp, (now all foreign-owned), the Forest Products Association of Nova Scotia (FPANS), Ledwidge Lumber, and others.

Donna Crossland was one of the speakers at that rally. She and NNS President Bob Bancroft had spent many hours producing the excellent 2010 Crossland/Bancroft Report "A Natural Balance: Report to the Steering Panel Phase II", part of the N.S. Natural Resources 2010 Strategy. It was heavily researched, with a long addenda of well-respected scientific references. Following is a slightly edited version of her scathing and forthright presentation.

"I spent 15 years researching the historical forest ecology of the Acadian forest.

In 1849, can you guess what one of the biggest complaints about the Acadian forest was? The darkness! Back then, James Alexander spent weeks surveying a road through the Acadian forest, and, upon finally reaching a major river, he stated that the "sight was a very cheering one, after toiling so long in the shade". There were many other early complaints about our gloomy forests. Huge Hemlocks, Red Spruce, White Pine, Sugar Maple, and Beech created continuous closed forest canopies from which hung pendulous, slow-growing lichens, browsed upon by Caribou during the deep winter snows.

In 2011, our biggest complaint might be the complete opposite of 160 years ago – the lack of shade! – and, as we rapidly deplete our forests, gone are those magnificent and beautiful big trees.

I've been informed that now, we are actually cutting stands of Wire Birch in some places! Our children will only see stands of big trees in our protected areas and the occasional private woodlot. Is this the road we want to go down? Industry has been very successful in converting mixed stands and hardwoods to conifer crops, to the extent that tourists may well think they are in the boreal forest ecosystem.

The Acadian forest is classified as endangered by the WWF. We have reduced species biodiversity, reduced structural diversity (e.g. big trees and coarse woody debris), and have damaged the very soils on which trees grow! The only Canadian forest ecosystems that are in greater trouble than our own may be the Carolinian and Great Lakes/St. Lawrence forests. But, the difference there is that places like Ontario have taken many meaningful steps to better manage and protect them. Nova Scotia lags behind as usual, stuck with old, outdated notions that will not protect our endangered forests.

As co-author of the Bancroft-Crossland report, I firmly believe, based on the available science and research, that should our key recommendations be implemented, we *can* save our forests (as well as increase forest-related jobs). We also listened carefully to you, the people, who clearly voiced your concerns about our forests.

Bob Bancroft and I had a vision when we began this process, that forestry can be a sustainable industry – for big industry, for small woodlot owners, and everyone in between. Forests can generate ongoing sources of revenue without diminishing (as is happening now), the resource base, wildlife habitat, biodiversity, homes for American Marten, Fisher, Moose, rare lichens and mosses, and healthy streams for our trout. Our vision includes the entire ecosystem, not just a single-minded focus on 'wood supply'.

Removing forests, as we have been doing, is devastating to our long-term economy. We might look to Haiti for an example. Ranked as the poorest nation in the western hemisphere, its poverty has been directly attributed to the degradation of its forests. Will we allow Nova Scotia to suffer a similar fate?

Big industry has accused us of producing a report that was not science-based, and sadly, some people believed it despite more than 110 references listed in the back of the report and two Research Addenda which included 34 references for clearcutting, 77 references for biomass, and 50 references regarding riparian zones.

We've heard whispers that our government also believes that there was no science. Perhaps that would explain why we haven't received any phone calls or questions since we submitted the report, even though there were many, many scientifically reputable references that were employed.

And what of the experts that we suggested they consult? They were never contacted! Scientists and foresters who we recommended to be consulted, who had ideas that were central to our top recommendations, never received a phone call, neither Dr. Bob Seymour nor Peter Salonius. Moreover, the new research paper which reviews irregular shelterwood systems, by Raymond, Bedard, Roy, Laruche, and Tremblay (2009), was not explored either.

How serious is government to find the solutions? Are they planning to rely on the 'same old forestry science' that has led to the current state of our forests, the same false set of biased assumptions, the agro-forestry approach?

How dare government foresters and 'Big Industry' foresters criticise us or our ideas when these very same people have clearly failed and failed so miserably! The results of *their* forest management expertise and *their* science lie in the ruins of our former, once rich and bountiful forested areas. After decades, they clearly demonstrate their lack of reputable science over and over again.

Our apologies to all N.S. small woodlot owners who were led to believe that Bob Bancroft and I recommended 'mandatory management plans' on private woodlots. We did not. Instead, what we recommended was management plans for those who want silvicultural funding (and that is fair).

Small woodlot owners have set among the very best forestry standards in this province. The intent of our report was to provide them with more silvicultural support, educational support, and more incentives to continue using the best practices. Bob Bancroft and I are also small woodlot owners and so are many members of my family. Our intent was honourable; not meant to harm woodlot owners.

The fear-mongering led by FPANS, Bowater, and others worked against progress on the forest strategy. To those of you who became so concerned that you ended up liquidating your woodlot, I am deeply sorry. As volunteers, we were powerless to speak on this. We had no voice. A humble offer of advice: It's difficult to know who to trust. When managing your woodlot, listen more closely to those who have no monetary gains. Be careful of the rumour mills and the whisperings of 'Big Industry'. Large, foreign-owned companies are here to make their shareholders

rich. It's up to you to take care of your woodlot. As forests rapidly disappear throughout our province, it is predictable that there will be attempts to gain the resources from the small woodlots.

That's an ecological concern as well as a citizens' rights concern. It would appear that our provincial government is ignoring its own process in which we have participated in good faith.

Premier Dexter, there is an erosion of faith in public processes. That's why we are here today. The Natural Resources strategy relied heavily on volunteers like myself and Bob, as well as many of you, during its first phase (thousands of people participated in this natural resource strategy). We worked hard and we've managed to produce a report with some very reasonable, badly needed, scientifically-based recommendations that will benefit everyone.

A message to Premier Dexter and Mr. Parker – take the science seriously! We expected follow-up! Bob and I have not received one phone call to clarify any of our points. And, here is a homework assignment for the Dexter Government before you pass the final strategy:

1. *Read* our Report and our Research Addendum.

2. *Read* the references that were central to the paradigm shift we spoke about.

3. Google 'irregular shelterwood' (a form of uneven-aged management), not 'uniform shelterwood' which is the same as even-aged management. Irregular shelterwood harvests are a very reasonable alternative to clearcutting. There are other types of partial harvest systems, as well, e.g. tree-marking, as is required by law on Crown Land in Southern and Central Ontario.

FINAL WRAP-UP MESSAGE TO THE GOVERNMENT

- Move towards uneven-aged management.
- Reduce clearcutting, but – do it carefully! Be careful of how you define clearcutting. Don't overlook terms like 'seed tree release', 'mosaic cuts', and 'variable retention', these are all clearcuts, too. Don't green-wash these recommendations. Make meaningful, real changes to clearcutting practices and make them soon. Also, be careful how the 50% clearcutting reduction is calculated – is it to be 50% from current clearcutting levels, or from former levels?
- Shift the silvicultural funding; presently, > 90 % of it goes towards even-aged management.
- If you are truly serious about change, then spend taxpayer dollars on doing the right thing.
- Northern Pulp owes you $90 million dollars(!); get it back and use it to implement good forest practices.
- Regulations against whole-tree harvesting can be put in place in short order, so make it happen!

NNS AGM AND CONFERENCE

– Stephanie Robertson

This conference was held at the wonderful Gaelic College in St. Ann's, Cape Breton A wee bit warmer and less foggy weather would have been appreciated, but nature cooperates only with herself and we must follow. There were 68 registered participants at the conference, and the speakers included Don Anderson (Dragonflies); Fenton Isenor (Rocks); James Bridgland (Forests); Bruce Hatcher (the Bras d'Or Lakes); Bob Bancroft (Coyotes); and Tim Lambert (Rising Sea Levels). Ten different field trips were offered, covering botany, insects, old growth forests, local birds, owls, and star gazing, although we did not get to see any stars because of the weather which was fairly cool, with clouds and fog in the mornings and evenings .

So, the early morning birding on Saturday, June 4th, was cold and foggy. Various warblers were seen and/or heard (a 'bird-app' was judiciously and carefully used to call some near) and a glorious male Blackburnian Warbler was watched for a little while in the trees (my first sighting!).

ODONATA IN CAPE BRETON

After a delicious breakfast back at the College, our first, and very informative, talk was on Odonates, with Don Anderson, BSc Acadia, now a Forestry Biologist with DNR.

Odonate classification proceeds as follows:

- Arthropoda
  - Insecta
    - Odonata
      - Epiproctra (a suborder)

The Odonates are a *very* old order, 300 million years or more, and fossils of odonates have been found that sported two and one half- to three-foot wingspans The largest odonate wingspan now existing is only four to four and one half inches. There are 6,500 odonate species worldwide, and most occur in the tropics. In North America, there are 11 families, with nine in Cape Breton.

How can one tell the difference between damsels and dragonflies?

Eyes - Damselflies have a large space on the top of their heads between their eyes, and the eyes themselves are more bulbous. Dragonflies' eyes almost touch on the top of their heads and are flatter. Odonate eyes have 30,000 facets each, and 90% of its brain power is devoted to that sense. The eyes are more sensitive at the front and are able to detect movement very, very well. (If you want to catch one, approach it from the back).

Wings - Damsels when stationary have their wings together over their backs (there are exceptions). Dragons' wings are spread typically to the side.

Size - Damsels are light and fragile. Dragons are big and strong.

Life Cycle - Both damsels and dragons have eggs, nymphs, and adults.

Needs - For both, they are simple – food, mates, and a suitable wet habitat such as bogs, marshes, swamps, fens, rivers, streams, seeps, lakes, ponds, mud, and even puddles.

Food - Damsels and dragons are voracious eaters and both their nymphs eat all aquatic insects, tadpoles, and small fish, their hunting techniques being 'hide and wait', and a stalking method. Nymphs' lower lips are not stationery but extendable, in order to hunt for larger prey. They live for about eleven months.

Adults eat insects and other odonates, and must consume about 10 to 15% of their body weight per day. They live for about one month (exceptions; some can overwinter and live for two seasons). Adults use 'hawking' and 'gleaning' methods for hunting.

The Dragonhunter or Black Clubtail, *Hagenius brevistylus*, with a wingspan four to four and one half inches, eats other dragonflies and has very strong legs; it has a two-year life cycle.

Anatomy - Damsels and Dragons have the typical insect head, thorax, and abdomen, with six legs and four wings. these four wings move independantly, so they are uniquely agile in flight. Because of this, the U.S. military has studied them extensively for aircraft development. Damsels flutter and alternatively can hover; dragons hover as well but don't flutter. 40 to 60% of the adults' mass is related to flight (muscles, brain, etc.). Males that live two years can reproduce again; females live for only one year.

Mating - Adults spend a large percent of their lives looking for food and mates. Some are very territorial; the darners not so much. Both male damsels and male dragons have claspers. They first locate a mate, and then have to catch her; some species do a courting dance. When the male catches the female, his claspers grab the back of her head. They then fly off in tandem, the male towing the female and also doing most of the flying. The act of mating is very acrobatic; the resulting conformation of the two joined insects is called 'the wheel', which is shaped a bit like a heart. The male then transfers sperm from his ninth segment to the female's second segment (however, he first checks for and removes any other males' sperm.) The females then lay their eggs, sometimes still connected to the male, sometimes not. Some males hover and wait in order to keep away any other males from mating with her. The last male to deposit his sperm is the winning progenitor.

Nymphs - There are two 'styles'; some with external gills (the damsels), and some with internal gills in their rectum (the dragons); these latter can expel fecal pellets forcefully for 23 feet and can use this for propulsion and escape. They can molt from seven to 15 times; this is species dependant.

Metamorphosis - The final instar (molt stage) stops eating before emerging as an adult. It sticks its head out of the water as the change comes on. The shell splits, usually in the night or early morning, and it takes about an hour or so. The first emerging insect is a teneral (fragile adult), taking about an hour to a couple of weeks of eating to fully mature.

Locally, as of 2008, there are 216 Nova Scotian species. N.S. has 116; C.B. has 100, with 66 Dragons, and 34 Damsels.

Collection - One can use a hand net or a hat; a scoop and strainer are used for nymphs. Once found, they can be ID'd in the field or a voucher species can be prepared. Ron himself dries them with acetone (this sometimes fades their colour, but it removes the fat, which causes spoilage); he then stores them in glassine envelopes. Ron's preferred reference is Walker's Dragonfly Guide, and the 'highlights' of his field work are *Somatachlora albicineti* and *S. williamsoni*. His favourite odonates are Jewelwings and Ebony Jewelwings.

Bob Bancroft kept a humourous but tight rein on the length of these interesting a.m. talks. Fenton Isenor of Sydney River gave the second presentation – an overview of the geological history of Cape Breton, "**Basement to Ground Level**"; James Bridgland followed with a forest succession theme, "**Food, Fire, and Pestilence: A Short History of Disturbance**"; and Bruce Hatcher finished off with "**Biodiversity in Canada's Inland Sea**" (the Bras d'Or Lakes).

INSECT FIELD TRIP

After lunch, I and ten others attended an insect field trip with David McQuorcodale – a short walk down the nearby old farm road. It was cloudy, with *some* sunny breaks, but still cool with some breezes.

David said that In C.B. there are ±350 insect families. He likes to ID insects by their shape and characteristics, not their colour. There are 13 species of bumblebees in C.B., and 200 species of bees (which are mostly solitary). On some Dandelions we observed a small, four-winged Halictidae bee, *Halictidus rubicundus*. This species has no queens! We also saw a two-winged Diptera fly; its hind wings having evolved into little nubs which are now only speed detectors. Insect wings can vary; beetles use only their hind wings for flying, the front wings having evolved into protective hard covers for the rear ones while stationary; they are held stiffly out to the side during flight. On the road we saw another Diptera, a fungus gnat, a bark beetle, a parasitoid wasp, an aphid relative, a crane fly, a flea beetle, a weevil, a bright green Calcid wasp, and a tree hopper (camouflage defence - looks like a leaf).

All the land around the Gaelic College was once farmland. White Spruce took over the abandoned area, grew tall and old, and was attacked by Spruce Bark Beetles, *Rufipennis dentroctonus*, (the one *not* found in Point Pleasant Park in 1989 despite Forestry claims to the contrary). These large old Spruce were mostly all dead now – some down, most still standing. David explained that most all die at ±100 years in any event.

We investigated one of the Spruce logs with many holes made by Spruce Bark Beetles (and probably other beetles as well). We found an Anabid (related to the 'plant bugs',as David likes to call them) or tree hopper. They have strong front legs and are like 'chemical cuisinarts', injecting their prey with a strong chemical that liquifies their interiors, readying them for easy 'slurping up'! We came upon many Alders on the left side of this old road; upon closer inspection, their leaves sported many, many insects that looked like beautiful, bronze-coloured ladybugs. They were ID'd as *Ulnorum calligrapha* (the same family as the Colorado Potato Beetle). There were many singles, and many pairs mating, on the leaves.

A large queen bumble bee was caught. In this particlular species, David said, the workers are bigger than the queen's head, and are all female. The females are produced by fertilisation, the males of the species are not. We also found *Perplexus sandrisoni*, and a *Ternarius* sp. We spotted another Halictid on a strawberry flower, and another *Chrysomela* sp. which *looks* like a ladybug.

Then we found a bark louse, *Cycoptera* sp. on clover; a *very* small weevil also on clover (Curculonidae family); a Frog Hopper (the 'spittle bug' is its larval stage and there can be two or three of them in that ball of 'spit'); a little green caterpillar, harmless to plants; and a stink bug, perhaps a noctid.

'DON COYOTE'

After the evening's banquet, Bob Bancroft shared some general information, with slides, about coyotes. In 1977 coyotes came to N.S. through N.B. Wolves and coyotes share some genes, and coyotes here in Nova Scotia are bigger than those in the rest of Canada because of our high populations of deer and hare.

Bob had a common-sense, laid-back attitude towards these animals, and shared some slides and personal anecdotes about them – for instance, one especially which is a regular visitor around his property in Pomquet.

RISING SEA LEVELS

On Sunday after breakfast, Tim Lambert of Fisheries and Oceans expounded upon rising sea levels, especially with reference to Cape Breton, with a geological history; historical sea level changes; present short-term sea levels; and future sea level rise.

The Past – When Fortress Louisbourg's docks were being repaired during its restoration in 1961, workers noticed ring bolts set into its wall. These had certainly been used to tie up boats, but were now about three feet underwater at high tide! Obviously, sea level was now much higher than when the fortress was built in the early eighteenth century.

Geologists have documented this phenomenon in studies on the prehistoric timing and rates of sea-level change. Quite simply, the cause of sea level fluctuation is due to ice.

During ice ages, the normal water cycle is disrupted as vast quantities of water fall as snow; this is then compressed, forming vast, very deep ice caps (which covered most of the northern continents). Thus trapped, this water does not return to the ocean, and sea levels then drop.

During the last ice age, which ended about 10,000 years ago, the sea level off Cape Breton was about 50 m below its present height. As the ice retreated, lakes were formed where the land had been scoured by the glaciers' movements. At that time, the Bras d'Or Lakes were much smaller and connected by rivers, and the future entrance to them was about 25 m above sea level. As the glaciers melted, water was returned to the oceans, which slowly began to rise. By about 6,350 years ago sea level had risen 25 m, at which point the ocean broke through to the Lakes. With further sea level rise, the Lakes grew in size, became increasingly salty, and began to support marine life, which invaded from the outside ocean.

At this time, the rise in sea level was in the order of 79 cm per century, but this rate declined over the past 6,000 years and today is about 37 cm per century. Why did the sea level keep rising long after the glaciers had melted?

The answer is 'glacio-isostatic crustal subsidence'. The earth's crust is actually quite elastic. If deformed by pressure, it will rebound when released, albeit very slowly. In this case, the tremendous weight of glaciers on the continents depressed the earth's surface beneath the miles-deep ice. As a result of this deformation, the earth actually bulged upwards at the margins (Nova Scotia) to compensate (picture what happens when you sit on a large, down-filled pillow). When this great weight began to decrease, the earth directly beneath the melting ice cap gradually rose to its pre-glaciation height, whereas the land at the periphery of the continent began to lower itself to former levels.

The Present: – So, in Atlantic Canada, sea level began to rise rapidly because of both melting water and land subsidence. Even though the subsidence rate slowed as it approached former pre-glaciation levels, routine measurements indicate the rate of rise is now increasing again. There is little doubt this is due to global warming which is causing the melting of the Greenland and Antarctica ice caps.

And the Bras d'Or Lakes? Although tides in Sydney Bight *outside* the Lakes rise and fall about 37 cm, the tidal amplitude *inside* most of the Lakes is a mere 3 to 4 cm. The biggest drop, from 37 to 16 cm, is at the entrance to Great Bras d'Or Channel; in the short distance to Seal Island Bridge there's a further rapid decrease to 7.3 cm. The Great Bras d'Or Channel is too narrow and shallow to allow enough tidal water through to equal the water level in Sydney Bight before the tide falls again.

But, rise and fall of water in the Lakes is often far more than that due to the gravitational pull of the moon and sun. Surprisingly, increases ten times greater than these lunar tides are caused by low atmospheric pressure. Sea levels are higher with local low pressure systems, and vice versa. These pressure systems usually last for days and sometimes weeks. Thus, when Cape Breton experiences a prolonged low pressure system, the water in Sydney Bight stays higher than normal – long enough to bring about a level far higher than that caused by a lunar tide.

The Future: – Sea level increase will rise from the present rate of 37 cm per century to 60 cm per century by 2030 AD; 99 cm per century by 2080 AD; and 115 cm per century by the year 2100. Sea level around Cape Breton will probably rise by about 76 cm (two and one half ft) in the next 100 years.

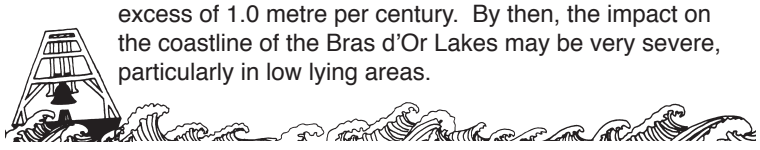
The total shoreline of the Bras d'Or Lakes is 14.4% of the total Nova Scotia coastline. The Lake's shores are classified into four main types; rocky (10%); unconsolidated beach and cliff (43.3%); vegetated (30.4 %); and artificial (2.6%). A further 13.7% are mostly vegetated or fringing beach with sloping backshore. Of these types, unconsolidated beach and cliff are the most susceptible to erosion by wave and current action.

During the next century as the rate of sea level rise increases, the rate of erosion of cliffs will also increase. Thus it would be prudent not to build anywhere near eroding cliff tops or at at low elevations around the Lakes, yet this is still being done, either through foolhardiness or ignorance. Tim showed an extreme example of just this, at Gillis Beach, Jamesville, where a house had been built on a barrier beach. It was sited on an old beach ridge behind the front, highest beach ridge. The elevation of the front ridge was 1.0 metre above sea level; the height of the house's ridge was 0.5 metres. Even now, water levels have reached the top of the outer protective beach ridge, and waves have actually carried seaweed and woody debris across the ridge to the other side. Water levels have no doubt reached this height due to the inverted atmospheric pressure effect as described earlier. Even without the dismal outlook on sea level change predicted by scientists for the coming century, this habitation would appear to be in immediate peril. Extreme storm surge water levels accompanying tropical storm or hurricane remnants, which are expected to occur there more frequently, and associated high winds/waves could easily breach this barrier beach.

The most astonishing revelation about this is that one must assume the owner of the house received planning permission for its construction!

Basing their inferences on the drowning of prehistoric shorelines, scientists predict that complete destruction and submergence of barrier beaches may become frequent by 2030 and typical by 2045. Artificial shores are also rated as highly vulnerable; they will require increased maintenance as they become more and more ineffective in protecting backshores as sea levels rise.

By the end of 2100, the rates of sea level rise will be in excess of 1.0 metre per century. By then, the impact on the coastline of the Bras d'Or Lakes may be very severe, particularly in low lying areas.



YNC YEAR-END REPORT

– Laura Lambie

The Young Naturalists Club is very grateful to the Halifax Field Naturalists for the support you have provided over the past six years. You should be really proud of playing an important role in starting and maintaining the Young Naturalists Club, actively contributing to the creation of the next generation of passionate naturalists such as yourselves. Below are a few snapshots of what the Young Naturalists have been up to this winter. Remember, you are always welcome to share your knowledge of natural history with the Young Naturalists in a presentation or a field trip!

January – Our most popular presentation of the winter was "Caring for Injured Wildlife", by Dr. Helene Van Donninck of the Cobequid Wildlife Rehabilitation Centre **http://www.cwrc.net/**. Helene fascinated the children with her stories and videos of animals – some heart-warming, some sad, some hilarious. The YNC nominated Helene for an award, and the Canadian Wildlife Federation named her the "Stan Hodgkiss Outdoorsperson of the Year." (We couldn't visit the CWRC because injured animals are not allowed to see humans, in order to maximise their chances of reintegration into the wild.) Also, on a very chilly but thankfully sunny day, we had fun looking for waterfowl and other birds with Pat Kelly of the Blomidon Naturalists around several Dartmouth lakes.

February – We were treated to a very detailed presentation by Dr. Christine Ward-Paige about the devastating effects of shark finning on sharks, economies, and ecosystems. Christine runs Global Shark Assessment **http://www.globalshark.ca**. Sharks are apex predators, so if too many are killed, it may result in food shortages (their prey are able yo proliferate thereby reducing *their* prey drastically and so on down the food chain), smaller coral reefs, beach erosion, loss of land and smaller islands. It is estimated that one living shark can generate thousands of dollars annually by attracting diving tourists. They provide income to local people around the world through shark diving. She explained practical steps we can take to slow the decline of shark populations. If we learn about which fishing practices harm sharks, turtles, whales, and birds, we can avoid consuming fish caught this way. Our purchasing power can make fishermen use less harmful methods.

Since we could not swim with sharks, two wildlife biologists led us on a search for signs of animals in the Blue Mountain/Birch Cove Lakes Wilderness Area. We were extremely fortunate to have a fresh snowfall 36 hours before our hike. The children were excited to find so many animal tracks in the snow, as well as many nibbled branches and several types of scat!

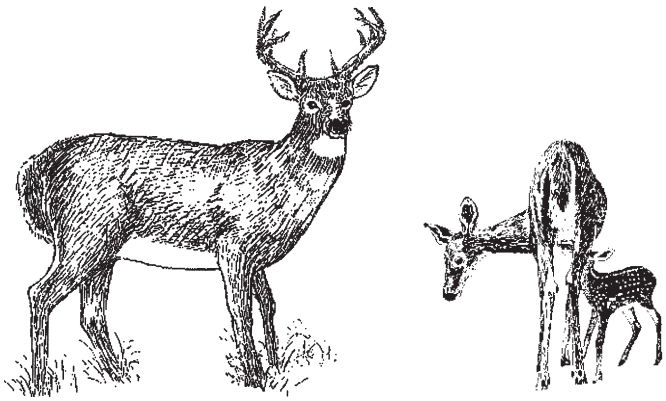
March – At a low tide, with Mt. Allison biology instructor Brian MacDonald, we once again braved cold winds, this time to explore the intertidal zone on gorgeous McCoos Island in St. Margaret's Bay. Brian's speciality is algae. At our meeting, Brian introduced us to the wide variety of algae species and explained the role played by algae in various ecosystems. We found several skulls on the island, and the children enjoyed using their knowledge and logical thinking skills to deduce to which types of animals the skulls belonged.

April – We were geology detectives on Lawrencetown Beach with Dr. Anne Marie Ryan and Bob Ryan, both geologists. Faris Kanth, age 11, found a *Lepidodendron* sp. plant fossil. This plant was common during the Carboniferous period, 350 to 290 million years ago, just around the time that the first amphibians evolved. *Lepidodendron* was a bamboo-type tree, a few metres tall. The fossil would have been part of the bark of the tree. At our meeting, Anne Marie had the children sifting sediment, examining earth materials, comparing how slopes of different sediment types behave when wet and dry, and everyone got a bit muddy!

May – We planted 100 Acadian Forest species tree seedlings on the Mainland Common, thanks to the organisational skills of Wendy and Bob McDonald, who had the trees donated and who had planned out good planting sites. This was the YNC's contribution to the global 'Billion Tree Campaign'.

We also hiked up to a steep granite look-off in Waverley-Long Lake-Salmon River Reserve and were rewarded with an awesome panoramic view. Waverley-Long Lake-Salmon River Reserve contains pockets of old-growth Hemlock and White Pine. We clambered over hummocky Black Spruce and Balsam Fir forests and saw up close the old-growth forest characteristics which we had learned about at our May meeting.

June – The YNC successfully capped off its sixth season by touring the green roof and living wall at Saint Mary's University; playing nature games among beautiful trees on campus; holding an AGM; and peeking in nest boxes of starlings with two SMU students who monitor hundreds of nest boxes, all on campus. They research starling survival rates under the guidance of Dr. Colleen Barber. Our guide was Deanna Bru, an Environmental Sciences Masters student who researches the use of plants which are native to N.S. Coastal Barrens on green roofs, under the guidance of Dr. Jeremy Lundholm. Deanna is also a very active volunteer teacher in the learning gardens at St. Catherine's Elementary School.



HFN TALKS

N.S. SALAMANDERS — 5 MAY

– Janet Dalton

Ryan Kerney has been a post doctoral researcher at Dalhousie for the past three years. He came to Dal to investigate frog skeletal development during metamorphosis from tadpoles to adults (still ongoing). However, he also became involved in several 'side projects' involving our local salamanders, and much of that work ended up progressing further than his frog work (also still ongoing).

Ryan said that Northeastern North America is not a hot spot of amphibian diversity, but our local salamanders do present many fascinating problems for ecological, evolutionary, and developmental research. Ryan's presentation, "Nova Scotia Salamanders; Field Embryology", reviewed their diversity, and described some on-going projects on their unique development, in particular, salamander embryos and their symbiotic relationship with cellular algae inclusions, and how these embryos develop and assemble themselves.

There were three main topics: general Information about salamanders; the relationship between algae and salamander embryos; and lungless salamanders.

SALAMANDERS

Nova Scotia has basically five salamander species, and New Brunswick has two additional ones that never ventured this far south after the last Ice Age. Once we get into Maine and New England the numbers continue to rise until we hit Appalachia, where there is found the most concentrated global biodiversity of salamanders.

Salamanders are amphibians. Many lay their eggs in water, and ancestrally they are thought to have had an aquatic larval stage. Many think salamanders and newts are separate, but newts are merely a subset of the salamander family, the Salamandridae.

A significant characteristic of the newt salamanders is their unique life history. Some newts actually skip the eft stage and go from aquatic larvae to aquatic adult. This type of variation in salamander development is of particular interest to researchers in Ryan's field.

Nova Scotia has two 'mole salamanders'. The less common of the two is the Blue-spotted Salamander, which breeds here in April and May. (In northern Nova Scotia we also have the triploid Blue-spotted salamanders, which in the past were known as a different species, *Amblystoma tremblayi*.) The more common mole salamander is our Yellow-spotted (or, just 'Spotted') Salamander, and Ryan's research was carried out on this species.

Nova Scotia also has two species of lungless salamanders. The first is the Four-toed, which is the least common; the more common one is the Red-backed which, unlike any of the others, deposits its eggs on land.

ALGAE AND SALAMANDER EMBRYOS

There's a long history of research on field-collected amphibian embryos in the early days of experimental embryology, particularly on the Spotted Salamander. The most influential pioneers were Ross Granville Harrison, Victor Twitty, and Leon Stone, who all collected wild Spotted Salamanders (then labelled *Amblystoma punctatum*), which were commonly found in vernal pools both east of the Mississippi and in eastern Canada. (Ryan himself has found egg clutches on two separate occasions in the wheel tracks left by off-road vehicles!)

The adults are primarily fossorial (burrowing), but migrate during the first warm rains of spring to breed in large aggregations. Several days afterward, the female lays egg clutches with large outer jelly coats containing many individual embryos inside smaller fertilisation capsules. Each of these capsules often appear green due to the presence of a facultative ectosymbiotic green algae, *Oophilia amblystomatis*, which is present in many, but not all, clutches.

This association was first described in the scientific literature 120 years ago, and since then there have been many studies on the mutual benefits for both the host and the symbiont. The salamander embryos benefit from an increased oxygen concentration within their egg capsules, while the algae benefit from carbon dioxide and nitrogenous waste (in the form of ammonia) which the embryos secrete.

Early studies from the 1940's and 1970's tried to determine whether the algae was acquired from the environment (horizontal transmission) or passed from one generation to the next (vertical transmission). These particular studies failed to find algae living in the oviducts of mature female salamanders, and also did not find any in the clutches grown in fresh water in the lab. They therefore concluded that the algae must be environmentally derived. However, something must allow for the acquisition of this algae in such extremely large numbers.

During graduate school, Ryan became interested in tracking the algae, especially when he learned that algal cells can be imaged through the auto-fluorescence of chlorophyll. On a lark he decided to take a long exposure fluorescent image of a pre-hatchling salamander embryo. He was surprised to discover that there were many autofluorescing cells embedded right within the embryo itself. Could these autofluorescing cells be algal? If so, then what were they doing inside the Spotted Salamander embryo? They were scattered throughout as well as in the tissue types derived from all of the embryo's three germ layers. Ryan then decided to take a crash course on algal ultrastructure, and started taking transmission electron micrographs of the free-living algae found within the egg capsules.

Algal ultrastructure is incredibly variable, even for a single species, but commonly consists of arrangements of certain membranes (comprising the chloroplasts), starch granules, flagella, and an often very elusive nucleus. He and his colleagues devised a way to pre-fix the embryos, vibratome the sections, and image individual slices (and then ultra-thin sections) containing autofluorescent cells. They could then target specific candidate regions, excluding a needle-in-the-haystack approach to visualising the intra-tissue algae with the electron micrography (algal cells are easy to miss under the electron beam). They once again found algal cells not only embedded within the salamander's tissues, but also within the salamander's cells themselves.

Intracellular symbiotic relationships are relatively common across the tree of life, but to date have been conspicuously absent from the vertebrates. It has evolved in land plants (49% of the existing 55 groupings of eukaryotes (such as dinoflagellates), and in several animal groups,

including Acoels, Sponges, Cnidarians, Mollusks, and even Tunicates. Common features of secondary photosymbiosis include photosynthate transfer from symbiont to host, and lateral gene transfer.

These common photosymbiosis features generate immediate hypotheses about the relation between Oophilia and Spotted Salamanders. The salamander mitochondria surrounding the algae may either be benefitting from fixed carbon released by the algae, or possibly from reduced toxic reactive oxygen in the cytoplasm. Several algae also border the salamander nuclei, suggesting an easy route for lateral gene transfer.

Oophilia is a Chlamydomonad green algae with no close affinities to other symbiotic green algal groups. High algal concentrations were found within the alimentary canal and also the yolk of the embryo, and looking at the ultrastructure of this region they saw both extracellular and intracellular algae.. At or near the algal-host points of contact there were dissociated host membranes and cytoplasm, suggesting an active process of cellular invasion. Ryan illustrated his talk with electromicrosopic images, and we saw a large algal cell embedded in a salamader lumenal cell.

Ryan and his colleagues then found that Spotted salamanders do not contain Oophilia until after stage 17 of their development. While most invertebrate photosynthetic symbionts enter their hosts through ingestion and partial digestion, these Oophilia entered the Spotted Salamanders before the formation of a stomach. This suggested that the cells may be entering the alimentary canal through the blastopore, and indeed, a bloom of algae does form outside the blastopore during the late gastrula or early neurula stages. A time-lapse video showed us dense algal accumulations outside the blastopore of developing Spotted Salamanders.

Algal blooms are largely synchronous between clutches and within individuals of a given clutch. These blooms suggested an active process of cell to cell communication between the embryo and its algae.

Tissue-specific PCR was also ussed to assess the retention of algae in adult hosts. The reproductive tissues of three adult female and three adult male salamanders were dissected and DNA was extracted from various regions. *Oophilia* was found in the Mullerian and Wolffian ducts of one out of three individuals. The anterior oviduct and posterior ovary of single female individuals also showed *Oophilia*, while the posterior oviduct had algae in two out of three females. The presence of algae in the oviducts is consistent with a vertical transmission of symbiont cells from one generation to the next, and an oviductal transmission is supported by the presence of encysted algae occurring in clusters on the innermost egg capsule of early embryos. We were then shown these clusters through fluorescence microscopy. The oddly shaped algal cells no longer had accumulation bodies and were surrounded by an envelope, suggesting an encysted state.

LUNGLESS SALAMANDERS

Lungless salamanders belong to the largest salamander family, the Plethodontidae, which comprise two thirds of all known salamander species. This family is united, among other things, by the complete absence of lungs in the adults. Ryan has been working with others on several projects dealing with lungless Eastern Redback *(Plethodon cinereus)*, embryology, since it is a common salamander in the eastern United States and therefore a useful one for further developmental studies down the road. This work has required several different imaging strategies, including micro-computed tomography. We saw a section through a *P. cinereus* embryo showing the internal features in good detail, with perfect alignment. Ryan pointed out the presence of a slight groove just behind the heart. He had been interested in looking for just such a groove, since there are hints from the early literature that they may form vestigial lungs. This groove topographically corresponds to the early laryngotracheal tube, or lung bud, that forms in species which do have lungs as adults. In order to get a better sense of the Eastern Redback developmental morphology, he switched to a more conventional histological approach. Through sequential images of the developing embryo to the adult animal, we could see that the vestigial 'lung-groove' gradually disappeared, so that by the time of hatching there were no remaining signs of its presence.

The formation and loss of this laryngotracheal tube is an interesting finding in its own right, but again opens up several new research directions. The network of regulatory genes involved in mammalian lung formation is relatively well known. Along with other collaborators, Ron has cloned several of these genes in order to look at their developmental expression.

Certain genes are particularly interesting because knocking them out in mice causes them to fail to form mature lungs as adults, even though they do form lung rudiments. Many of the genes involved in lung development have roles in other developmental processes, and this may be the root cause of maintaining vestigial lung formation in the embryo.

This was a fascinating talk, and Ryan continues his interesting research on algae and salamander embryology, and on the details of lungs and lunglessness in salamanders.

Thank you so much, Ryan, for your time and your presention about such interesting work.

OUR URBAN FOREST 2 JUN.

– Allan Robertson

John Simmons, HRM's Urban Forester, presented "HRM's Urban Forest Master Plan", based on work done by John and David Novak from the USDA Forest Service.

Urban forests help mitigate problems associated with urbanisation, greatly improving environmental quality and human health, and his talk outlined the enormous and inummerable benefits our urban trees perform for us. Trees filter and clean our air, reducing the greenhouse effect globally, and producing a more healthy environment locally, by absorbing polluting gases through stomatae on the leaf surface, and what's more, with the plants' other surfaces as well. These pollutants include nitrogen dioxide, sulfur dioxide, carbon dioxide, cadmium, nickel, lead, and ground level ozone.

Trees remove atmospheric carbon through photosynthesis, adding it to their structures as they grow. Every ton of new wood removes 1.5 tons of CO_2 and produces 1.1 tons of O_2. During a 50-year life span, one tree will generate $30,000 of oxygen, recycle $35,000 worth of water, and clean up $60,000 worth of air pollution – a total of $125,000 per tree! Some cities' reports on the annual value of air-cleaning are: Seattle, $4.9 million (2006); Syracuse, $850,000 (1994), Chicago, $9 million (1997), Washington, $49 million (2002); Frankston (Australia), $1.0 million (2006), and Oakville, $1.3 million (2006).

Trees also reduce heat caused by low reflectivity of solar-absorbing urban structures and by human activities such as heating/cooling buildings, operating motor vehicles, etc. They reduce this heat by shading, by reflecting incoming solar radiation, and through transpiration (mature trees transpire up to 100 gallons of water a day, which equals five large air conditioners running 20 hours per diem). Heat islands in urban areas can be from one to six degrees C warmer than surrounding rural areas. Excess heat is serious; in the USA more people die from exposure to excessive heat than from hurricanes, tornadoes, floods, and earthquakes combined. And, reduction in heat means substantial energy reductions – a 20% to 50% saving in summer cooling costs.

Also, very importantly, urban trees interrupt the flow of water from heavy rains. Through their canopy, branch structure, and trunk, trees intercept, reduce the flow, and absorb and transpire large amounts of precipitation. A single tree can interrupt from between 850 to 2,400 gallons of water a year. Tree roots hold soil in place, reducing erosion during storms, and absorbing the first 30% of most precipitation events. This flow interruption means that storm drainage systems do not need to be designed for extreme rainfalls; that treatment plants fed by combined sewer and storm drains become less-overloaded during large rain events; and that during heavy downpours rain will carry fewer contaminants (oil, metals, or pesticides) into streams, wetlands, lakes, and marine waters. This storm water management by trees has substantial economic benefit. The values attributed to storm water management by trees in some US cities are as follows: Detroit, $382 million (2002), Washington, $4.7 billion (2001), Seattle, $20.6 million (2006), and Buffalo, $42 million (2003).

Another benefit of urban trees relates to their function as canopies over parking lots. These canopies lessen evaporation of hydrocarbons (fuel vaporises from fuel tanks and gas lines even more under hot conditions); help to retain asphalt health; mitigate thermal hot spots by reducing the size of asphalt surfaces which absorb and retain large amounts of solar radiation; and make them more comfortable for vehicle users (the interior of a vehicle can reach 65˚C in an unshaded parking lot). One might ask why trees help keep asphalt 'healthy'. The answer lies in the fact that asphalt isn't a smooth material, but is simply a combination of binder and aggregate (gravel). As temperatures rise, the binder evaporates, the asphalt turns harder, shrinks, and begins to crack. The life of asphalt is extended by treating it with a slurry sealant, and the amount of slurry treatments can be diminished greatly by an increase in canopy cover. Asphalt binders are derived from oil, and as the price of oil increases the price of asphalt increases as well. Over a 30-year life span, a good canopy cover can save up to $2,900 for a 40-metre section of 10-metre-wide road.

Another benefit we derive from urban trees is their calming effect on traffic; trees placed near roadways slow traffic measurably. They forewarn drivers of turns, provide a vertical presence which makes streets seem narrower, and work as physical barriers between pedestrian and vehicular traffic, defining the two traffic corridors. They also help drivers gauge speeds. Closed canopies gives the perception of driving in a tunnel. A tree-lined street can reduce speeds by as much as 13 kph; this traffic-calming effect translates into the saving of lives. 85% of pedestrians struck by vehicles traveling at 64 kph become fatalities, 45% of those struck by vehicles traveling at 48 kph die, but only 5% struck by vehicles traveling at 32 kph meet the same fate. There are 50% fewer collisions on traffic calmed streets.

Trees raise property values – commercial, retail, and residential. Apartments and offices rent more quickly and have higher occupancy rates in treed areas, and customers are willing to pay 10% more for certain products if the businesses are located on tree lined streets. Property values increase from 5% to 20% when they are treed. A study in Rochester indicated that trees add more than 18% to the price of a home. Property values also increase with proximity to green spaces or parks. A Surrey study found property near parks and green spaces increased as much as $11,000.

Trees provide home-owners with cost savings from lower energy requirements. Appropriately placed trees save money in air conditioning, and trees on the north sides of buildings can reduce cold winter winds, reducing heating cost by 20%-30%. The cooling effect of a young healthy tree equates to ten room-size air conditioners running 20 hours a day. As well, trees are useful as visual, sound, and wind barriers. Screens of trees hide undesirable sights, reduce the glare of headlights, delineate boundaries for varying land uses, and soften the effects of man-made structures. Trees used as sound buffers along roadways and in commercial and industrial areas can reduce highway noise by six to ten decibels. They form windbreaks around homes, along roadways, and open areas, shielding against wind and snow.

Many cities have substantial watershed areas, and it is here that trees help as riparian buffers. They reduce the migration of pollutants, filter water, control storm flow, retain water in the soil table, stop erosion, and they shade shoreline and stream edges to provide habitat and food for birds and small mammals. Trees also play a big role in recreation and education. As our population ages, more areas of passive recreation are needed, and studies show that people are willing to pay $1.60 per visit to a tree covered park.

Trees shade playgrounds on hot days. For many children raised in urban areas, parks and wooded glades are their only interaction with nature.

Trees play a role in crime prevention. Studies have concluded there is less crime in areas of trees and greenery, as opposed to identical areas which are barren of vegetation. One study indicates 48% reduction in property crime, and 56% fewer violent crimes.

Of course, the location and the size of trees have an impact on their urban benefits. Closer trees absorb nine times more pollutants than do more distant trees. One street tree provides more benefits than fifteen trees in the rural woods, and a large tree has 425 times more benefit than a small tree in the same location.

Study results vary on the dollar benefit and cost of trees, as variables include species, size, and what can and cannot be quantified. Average annual benefits increase with mature tree size. Some of the aforementioned advantages that are still being quantified in HRM include the filtering and cleaning of air; the removal of pollutants and particulates in the air; carbon sequestration; the reduction of heat island effects; storm water interruption; parking lot shading; retention of asphalt health; traffic-calming; energy saving; increasing property values; visual screening; sound buffering; and recreation and education.

The economics of these factors are substantial. Even a small tree will show a net benefit over a 40-year period of over $300. A medium-sized tree has a net benefit of over $2,000 over the same time period, and a large tree shows a net benefit of over $4,500!

Many more benefits have not yet been attributed values, although studies are underway on some of them. These include reductions in crime and physical violence; faster patient recovery rates when hospital windows have a view of trees; a general feeling of relaxation and well-being; screening of skin from ultraviolet light; promotion of a connection with nature; the psychological link between people and trees through culture, socialisation and co-adaptive history; general aesthetics; wildlife habitat; and the very important fact that access to wooded natural park areas is not particularly dependent on income.

There are problems within urban forests however – competition for enough ground area to grow; conflicts with utilities and other needs; development demands; lack of nutrient replacement; compaction of soils; damage due to construction and vehicles; and vandalism; urban pollutants; pests and diseases; competition from invasive pests and non-indigenous species; the paucity of funding for urban forest needs; a lack of regulatory protection; global warming (increased dramatic weather events); lack of education regarding the importance of trees; lack of a strategic long range plan; and the need for internal policies on the importance of trees.

Happily for us, HRM is taking the issue of its urban forest seriously, but the scale and size of our urban forests show that their management is not trivial. HRM's Urban Forest Effect Model, which looks at the overall canopy structure, pollutant removal, and carbon sequestration, indicate that the 57.9 million trees in our urban area are responsible for sequestering 120,000 tonnes of carbon per year. The stock value of these trees was over $10 billion!

After his presentation, John spent close to an hour in individual discussions and in answering questions – a testament to his excellent talk and the value that the audience appeared to place on their trees.

FIELD TRIPS

HALIFAX WATERFALLING

– Lesley-Jane Butters

Date: Saturday, April 9th and 16th
Place: Various sites around HRM
Weather: April 9th,sunny, ±15˚C; April 16th, cloudy, 3˚C
Interpreter: Richard and Grace Beazley
Participants: April 9th - 16; April 16th - 14

It was a delight for me to have had the opportunity to join The Halifax Field Naturalists and knowledgeable leaders, Richard and Grace Beazley, on one of this spring's two field trips to five waterfalls near Halifax.

April 9th was sunny with low to mid-teen temperatures whereas April 16th was a mostly cloudy day with periodic glimpses of the sun and the temperature around 3ºC. Both Saturdays were good for tramping around the woods and down and up river-side terrains. On the first trip, less sunlight would have been appreciated by the photographers in the group, whereas on the second trip, more sunlight, and no lunch-time snow flurry(!) would have been appreciated by everyone.

The waterfalls visited were small- to medium-sized compared to falls we have seen over the years, but each is within a 30-minute drive of Halifax and well worth seeing. The trip's route from Halifax to Middle Sackville to Pockwock, to Long Lake Provincial Park, to West Pennant, and then back to Halifax covered 150 km of driving. And – we did about five km of easy to difficult walking, much of it over granite bedrock and through beautiful Acadian forest.

This past winter our area of the province did not receive much in the way of snow or rain, hence little run-off was expected from the watershed areas that feed the brooks and rivers. But surprise, surprise – the streams on which the five waterfalls are located were more than amply supplied with water by very heavy rains just a few days prior to each trip.

The first waterfall of the morning was on the Sackville River, just below the bridge on the Lucasville Road and between Hefler's Forest Products and Dunham's Trucking and Equipment Limited. Gary Dunham was very gracious in giving us permission to cross his property to have the best view of this waterfall. Before heading down the embankment on April 16th, Mr. Dunham gave us some information about the area and the fine work the Sackville River Association is undertaking towards education, conservation, and restorative projects. Due to urbanisation, industry, and acid rain, the salmon, trout, and other fish species were almost wiped out. With the habitat restoration efforts of interested groups since 1988, (including a fish ladder on the east side of the falls), salmon, Speckled Trout, Gaspereau, Bass, and other fish species have been re-established in the Sackville River.

The embankment down to the falls was really quite steep, but then again this area is drumlin country. The forest trees in the area consist mainly of Balsam Fir, White Spruce, Eastern Hemlock, Red Maple, and Red Oak. The water flowed over the full width of this convex-shaped, 30-metre-wide by two-meter-high slate-bedrock ridge with enough

force to create frothy foam in its large plunge pool. This falls is in a surprisingly peaceful and attractive shallow ravine that is sided by mixed forest between two thriving businesses. Impressive! At this site we saw a lone Blue Violet in bloom, heard a White-throated Sparrow singing its morning tune, watched a few Black-capped Chickadees fluttering about, and found evidence of a Pigeon kill.

Pockwock River Falls was our next destination. From the paved road through Upper Hammonds Plains and Pockwock, we proceeded down an old road (perhaps part of the Old Annapolis Road), which is now used by hikers, bikers, and, unfortunately, those who engage in illegal dumping of garbage. Bypassing an old car body or two, whole mattresses, and other assorted debris, we naturalists concentrated on the beauty within the forest around us.

We stopped at the site of an abandoned farm, which was one of those that had been located along this road, to view what remained of the foundation. Also on this site were a number of apple trees and a couple of lilac bushes in small bud, still alive after years of neglect! In a frozen puddle on the road, we saw and photographed a striking, elongated, thin, single ice crystal; a crystal which is formed when the ground-level temperature suddenly drops below 0˚C. The bird watchers in the group thrilled to the sound and sight of a Downy (or Hairy) Woodpecker, while others enjoyed a few Mayflowers in partial bloom. And, one hiker found a wood tick on his woolen mitten.

Within 25 minutes of leaving the cars, we reached the small wooden bridge that spans Pockwock River. Then we walked upstream on the right-hand side of the river through a lovely mixed forest for about 50 metres to where the water flows over a ten-metre-wide granite rock face of varying heights. We saw the beautiful, twin five-metre-high falls, which is created by a granite pillar, and to the far left, yet a third part of the falls. A generous amount of water was tumbling into the rather large plunge pool, from which it continues down the rock-strewn, curved river on its way to Wright's Lake. Even though there were large clear-cut areas near the river and falls, the site itself was secluded and peaceful, with only the sounds and sights associated with flowing water in a mossy-green forest.

Beaverdam Brook Falls, in Long Lake Provincial Park, was the third site of the day and provided a picturesque place for our lunch break. Having left our cars on the Exhibition Park grounds, we walked to the forest edge and navigated a rugged little decline to a well-defined path that leads to the Provincial Park. Extra concentration was in order as we hiked through the forest along well-worn, moist, and mossy footpaths; indeed, some parts seemed to be little more than tree roots crisscrossing granite rocks. Along the way, we naturalists noticed some quite large and fuzzy Pussy Willow shrubs, a sure sign of spring, and three beautiful cushion moss clumps. In the final 150 metres to the falls, the path followed along the edge of Beaverdam Brook with its wonderful twists and turns and babbling water. We noted that previous high-water flooding had washed much of the thin soil layers off the granite rocks along the sides of the brook and, no doubt, had deposited some of it in Long Lake, which is a short walk below the falls. This small fan-shaped falls is about three metres high and perhaps four metres wide at the bottom. Its water flows over granite boulders before dropping into a picturesque plunge pool. All around the falls are moss- or Polypody Fern-decorated large glacial erratics, and many boulders have old spruce or fir trees growing right on them, with the tree roots draping over the boulders much like octopus arms. Some of the larger trees were broken during storms and lay across the brook just above and below the falls. Some of us ate lunch at the falls, while others lunched downstream at Long Lake.

Our next stop, Pennant River Falls, are located past the Village of Sambro, down the West Pennant Road, and just upstream of the bridge spanning the Pennant River. There is an interesting, narrow and root-strewn rocky footpath through the mixed forest on the right-hand side of the river; this goes from the bridge up to Grand Lake. We could see the falls about 90 metres above the bridge, and a short walk took us there. The falls have several tiers, which together have a total height of four metres and a variable width of up to 15 metres. The surrounding topography is low-rise and unspectacular, but numerous areas of the cascading water are well worth seeing because of the tannin-colored water spilling over granite rock ledges of various sizes and shapes. In other spots, softly flowing water formed lots of bubbles around the edges of rocks and in little quiet coves. Some of the bubbles grew quite large in size before they burst. It was quite fascinating to observe. Among the bubbles there were interesting, light, foamy swirls and patterns in the calm water – a photographer's delight.

Along the path we found olive-green coloured, rare, and medicinally important Canada Yew. These low, spreading shrubs at first looked like Balsam Fir, which may be why it is sometimes called Ground Hemlock. But, upon examining the underside a little closer, one could definitely see the Yew's fruiting bodies. Tight, tiny whitish balls form at the intersection where its stem meets its alternating, soft, and elongated needles. We also saw extensive clumps of budding Mayflowers and lots of Lambkill.

The last waterfall of the field trip, really a vertical set of eight, is located on a brook that flows sharply downhill into the Atlantic Ocean near the mouth of Halifax Harbour, on the forested border line of two private properties. Our visit to them was with the gracious permission of the property owners. What a dream location on the edge of the ocean!

The eight waterfalls vary in size from one to six metres high and from one to four metres wide, each with its own special characteristics. The four upper falls are typical of small woodland brooks in Nova Scotia, but the four falls nearest the ocean are dramatically different from each other, and are located in dangerous territory typical of Nova Scotia's shoreline of granite boulders and steep, sheer-sided outcrops. The water in the uppermost falls rushes several metres down over a series of ledges and through a narrow, steep-sided granite rock gorge to the top of the next falls. It then continues over and drops vertically an impressive six metres into a semi-round, calming pool, which offers a wonderfully private cooling-off spot in the summer. The now slow-moving water continues downstream for about ten metres to tumble over a two-metre-high, five-metre-wide granite rock face. This waterfall scene with its backdrop of the previous falls and a high, tree-topped granite ridge, is spectacular. Around a granite outcrop the flowing water comes to its last fall, this time over a three-metre-high narrow ridge into a pool at the ocean's edge. Large granite outcrops, mixed forest, flowing and falling water, sea-shore view, ocean-fresh air, and a soaring Bald Eagle – exhilarating, awesome, captivating – a great ending to the trip!

Thank you to Richard and Grace for again sharing your love and passion of 'waterfalling' with members of The

Halifax Field Naturalists. Each outing over the years has had its own unique ambience, and your style as leaders is well appreciated by all.

ROGART MOUNTAIN TRAIL

– Wendy & Bob McDonald

Date: Saturday, May 21st
Place: Earltown, Colchester Co.
Weather: Rainy. Start: 12˚C; end: 8˚C
Interpreters: Norris Whiston, Cobequid Eco-Trails Society
Participants: 23

The forecast for the first day of the May long weekend was not great! Nevertheless, 23 keen hikers braved the wind and the on-and-off showers to discover the Rogart Mountain Trail near Earltown with local trail champion, Norris Whiston. Several members of the NS Wild Flora Society who were anxious to visit a new 'special place' joined us.

The Cobequid Eco-Trails Society built this 6.2 km trail with the help of volunteers and the guidance of local trail expert, Garnet McLaughlin. It has only been open for three years now, and it is one of six that the group has developed. The trails are all back-country and have been routed to avoid environmentally sensitive areas. No material is brought in from off-site. In one damp area, we saw where over eight tons of rock had been transported, using wheelbarrows and human muscle-power to create stepping-stones instead of building a boardwalk.

The Rogart Mountain Trail has become a popular year-round hiking destination, partially also because of the convenient location of the Sugar Moon Farm. This restaurant features pancakes and their own local maple syrup and is open every weekend of the year. We all enjoyed a hot meal and/or drink following our hike.

Norris is a fountain of knowledge on both the cultural and natural history of the area and, in particular, along the trail. The name Rogart (meaning 'high plateau' in Gaelic) originates from Scotland, from whence many of the local settlers came in order to homestead the area in the early- to mid-1800's. They enjoyed a landscape similar to that of their homeland, including hills and rocky lands. We learned about their struggles over the years and discovered several foundations from their early homes. Norris spoke with such fondness and passion about these early settlers that we felt that we just might meet one or two on the trail during our hike!

As we climbed the hillside, the fog and mist obscured the views of the local Cobequid 'mountains', – all the more reason to return for another visit. At the summit of Rogart Look-off, the elevation was noted at 1,129 feet. Our walk was slow and steady as we observed the first blossoms of spring and listened for some bird song, although they were mostly silent. We learned about the local geology, mosses, lichens, and the flowers and ferns. No butterflies were seen. However, we did enjoy Jane's Waterfall, a full drop with plenty of water coming over the wide rock wall. The hardwood trees, most in bud or a hint of leaves, allowed the sun to reach the forest floor and many spring flowers were at the early stages of development. Another week and the canopy of leaves would shade the area and the bracken ferns would be covering many of the smaller specimens.

This trail would invite a marvellous trip in the autumn, when the leaves are turning and the ferns make their last colour statement of the year – a photographer's delight. If others are interested in walking this trail in the future, a map and brief description are available online at **http://www.cobequidecotrails.ca/trails/**.

Sugar Moon Farm, open every weekend, has maps and detailed descriptions for this and the other trails. Anyone interested in geo-caching will be pleased to know this trail also has some trail-friendly geo-caches.

ROGART MOUNTAIN SPECIES

Some of the species observed include:

Lichens

Lungwort (3 types)	*Lobaria* sp.
Reindeer Lichen	*Cladonia rangiferina*
British Soldiers	*C. cristatella*
Pixie Cups	*C. pyxidata*
Pink earth	*Dibaeis baeomyces* (?)
Gold Rim Lichen	*Pseudocyphellaria perpetua*

Ferns

Interrupted Fern	*Osmunda claytoniana*
Cinnamon Fern	*O. cinnamomea*
Bracken	*Pteridium aquilinum*
Northern Beech	*Phegopteris connectilis*
Sensitive Fern	*Onoclea sensibilis*
Christmas Fern	*Polystichum acrostichoides*
Braun's Holly Fern	*P. braunii*
Oak Fern	*Gymnocarpium dryopteris*
Rock Polypody	*Polypodium virginianum*

Flowers and Shrubs

Goldthread	*Coptis trifolia*
Dutchman's Breeches	*Dicentra cucullaria*
Spring Beauty	*Claytonia caroliniana*
Blue Violet	*Viola cucullata*
White Violet	*V. blanda*
Starflower	*Trientalis borealis*
Foamflower	*Tiarella cordifolia*
Shadbush or Serviceberry	*Amelanchier* sp.
Dwarf Ginseng	*Panax trifolius*
Hobblebush	*Viburnum alnifolium*
Fly Honeysuckle	*Lonicera canadensis*
Trout Lily (carpets)	*Erythronium americanum*
Clintonia-lily	*Clintonia borealis*
Painted Trillium	*Trillium undulatum*
Nodding Trillium	*T. cernuum*
Wild Lily-of-the-valley	*Maianthemum canadense*
Rosy Twisted stalk	*Streptopis roseus*
False Solomon's seal	*Smilacina* sp.
Pink Lady's Slipper (white form also)	*Cypripedium acaule*

Birds (all heard)

Ruby-crowned Kinglet	*Regulus satrapa*
Hermit Thrush	*Catharus guttatus*
Black-throated Green Warbler	*Dendroica virens*
Ovenbird	*Seiurus aurocapilla*

CANOEING THE SHUBENACADIE

– Stephanie Robertson

Date: Saturday, May 28th
Place: Enfield Bridge
Weather: Cloudy with sunny periods; hot later on
Leader: Burkhard Plache
Participants: 14, in eight watercraft

There were many of Nova Scotia's small biting flies, so daubs of 'Off' were shared among participants, as we waited for everyone to assemble and get their watercraft

and gear ready for embarkation down the river at Enfield Bridge. All of us finally pulled at about 12:30 p.m., and then off we paddled down the beautiful and idyllic Shubenacadie. The water was very rough and a wee bit high where we entered; but a little further along it soon stilled. The tree- and shrub-lined banks were lovely and rich with lots of spring greenery. Our first observation was of a Bald Eagle, which was disturbed from its high tree perch to fly slowly ahead of us and find another on which to alight. By the time we reached it again, it had decided we were harmless, and it stayed put on its branch to watch us pass.

On this particular trip, we saw domestic sheep and donkeys in the pastures as we paddled by. I don't remember seeing them last time; cows were the only farm animals I recall seeing previously. The two donkeys stared at us immobile, their long ears straight up and very close together.

The air was fresh, and it was pleasantly overcast as we made our way down the river. We saw the usual plethora of Muskrat middens, and also saw one swimming across our line of sight. We heard, and some saw, Song Sparrows, Grackles, and American Robins. Another Bald Eagle was also spotted. As we neared our lunching spot, many fishermen lined the banks, as they did on the last trip. Some had been successful; some had not! It grew warmer, and became quite hot; the shedding of layers was necessary as we paddled along to our pull-out.

The sun emerged for our lunch break, and up above and behind the bank where we had chosen to sit was a large stand of fiddlehead ferns which looked as if they had been grown for harvesting. While munching on our sandwhiches and partaking of various liquid libations, someone mentioned they had spotted a White-tailed Deer doe along the banks.

After lunch most participants continued on for a longer paddle, but we and two others in two canoes turned around to the last bridge we had passed under, where their truck had been parked waiting to take watercraft and gear back to our original point of entry. The two ladies sat in the back in the roofed-over truck bed, and for a few tense minutes we were followed closely by a police car. However, when he saw that our trip without either seats or seat belts was quite short, thankfully he left us at our destination and sped on his way.

There were a further number of Bald Eagles seen on the second leg of the trip; and what was most probably a Beaver as well. Thank you Burkhard, for organising this idyllic and enjoyable trip once more.

NATURE NOTES

Burkhard and Ingrid Plache were recently in Germany and emailed this following sighting after the Spring Issue had gone to press. On April 25th, at 6:30 p.m. in Jollimore under a piece of rock on a sunny day, Burkhard spotted a small (approximately 9 cm long and 5 mm thick) Ringneck Snake, *Diadophis punctatus*. John Gilhen, in his Amphibians and Reptiles of Nova Scotia, 1984, states that the earliest Nova Scotia record is May 7th, 1972. Burkhard just had to find out a bit more about this snake, especially since he had never seen one before.

He went to Wikipedia and found that Ringneck snakes are venomous but of no danger to humans. Our local subspecies, *D. punctatus edwardsi*, does not even have fangs! "Most subspecies are rear-fanged with the last maxillary teeth on both sides of the upper jaw being longer and channelled; the notable exception is *D. punctatus edwardsii,* which is fangless."

MAY ***– Janet Dalton***

Ryan Kerney had seen **amphibian egg masses** everywhere. They could not have been salamander eggs as it was too early. Lesley-Jane Butters was at her cottage and saw a **Red-backed Salamander** and some very sticky **Horse Chestnuts**; she surmised that they would make a great glue! She also spotted a **Wood Frog** and some **Barn Swallows**.

Stephanie Robertson mentioned that the **white Rosebush** near the anchor monument in Point Pleasant Park was almost ready to burst into leaf. Jim Wolford saw a **mating pair of American Goldfinch** flying around his back garden for about five minutes.

Regine Maass saw **blue worms** in her garden. Does anyone know what these worms might be? Bob McDonald visited Smiley's Park and saw **Bloodroot blooming** everywhere in spite of the lack of sunshine; he also saw **Nodding Trilliums in their early budding stage**. Across the road in the land belonging to Nature Trust he saw **American Fly Honeysuckle**, which blooms first with tiny flowers and there was **Leatherleaf** also. While in Smiley's Park he noticed that there was very much tree blow-down.

Patricia Chalmers was at Margaretsville on North Mountain and noted newly arrived birds such as **Blue Throated Warbler, Oven Bird, Rough Grouse (drumming),** and **Yellow Warblers;** she also saw **Mourning Butterflies, Chipmunks,** and **Purple Trilliums**. Brian Bartlett saw a **Red-bellied Snake** as well as a **Garter Snake** in Susie's Lake area. He also saw **toads and trilliums**. Janet Dalton heard the loud **noise of Spring Peepers** coming from the Macintosh Run steam two blocks away from her home. They were heard about the last week in April.

JUNE ***– Allan Robertson***

Bob McDonald reported that when re-walking the Rogart Mountain trail after the hike, participants noted that flowers were finally opening and many birds were in evidence. They saw **Trout Lilies, Nodding Trilliums, and Dutchman's Breeches**, as well as **six warbler species, a Winter Wren,** and an **Olive-sided Fly-catcher**.

Grace Beazley recently saw **Yellow Lady's Slippers** in Hants County, as well as the **Ram's Head** variety. They represent the rarest kinds of orchids in the Province. Neither Grace nor Richard had seen them before, and consider themselves lucky to have seen them both on the same day.

Dennis Hippern noticed **three Black-bellied Plovers** apparently breeding near the Salt Marsh Trail. He wondered whether they were on their way farther north, or were actually breeding here. Bob McDonald said he'd seen a group near Truro, and felt they were probably on the move.

Patricia Chalmers indicated that while there were a lot of birds present lately, she hadn't seen any Piping Plovers arriving yet. They normally arrive during the third week of April. Janet Dalton reported seeing a **Hummingbird** that was the size of a June bug!

ALMANAC

This almanac is for the dates of events which are not found in our HFN programme: for field trips or lectures which members might like to attend, or natural happenings to watch for, such as eclipses, comets, average migration dates, expected blooming seasons, etc. Please suggest other suitable items.

"Oh dandelion, yellow as gold,
What do you do all day?"
"I just wait here in the tall green grass
Till the children come out to play."

"O dandelion, yellow as gold,
What do you do all night?"
"I wait and wait til the cold dews fall
And my hair grows long and white."

"And what do you do when your hair is white
And the children come out to play?"
"They take me up in their dimpled hands
And blow my hair away."

– Anon, Manitoba Reader, ca. 1930.

NATURAL EVENTS

21 Jun. Summer Solstice at 14:16 ADT. Summer begins in the Northern hemisphere. The longest day of the year, with 15 hours and 34 minutes of daylight at Halifax.
23 Jun. -30 Jun. The latest evenings of the year: Sun sets at 21:04 ADT.
15 Jul. Full Moon. Moonrise at 21:03 ADT.
16 Jul. Canada's "Parks Day"; look for events at local parks.
5 Aug. -12 Aug. Average dates of the hottest days of summer (average daily maximum is 22.5 C.).
11/12 Aug. Perseid Meteor showers peak.
13 Aug. Average date for temperatures to start decreasing.
13 Aug. Full Moon. Moonrise at 20:01 ADT.
12 Sept. Full Moon. Moonrise at 19:14 ADT.
22 Sept. Autumnal Equinox at 06:05 ADT: Fall begins in the Northern Hemisphere.
28 Sept. Eighth anniversary of Hurricane Juan.
30 Sept. Average date for first frost in Halifax (i.e. Env. Can. says there is only a 1:10 chance of frost before this date). Look forward to 210 days of frosty weather.

– Sources: Atmospheric Environment Service, Climate Normals 1951-80 Halifax (Shearwater A) N.S.; Blomidon Naturalists Society's 2011 Calendar; United States Naval Observatory Data Services.

SUNRISE AND SUNSET ON SUMMER AND EARLY FALL SATURDAYS FOR HALIFAX: 44 39 N, 063 36 W

4	**Jun.**	5:31	20:55	**2**	**Jul.**	5:33	21:03
11	**Jun.**	5:29	20:59	**9**	**Jul.**	5:38	21:01
18	**Jun.**	5:29	21:03	**16**	**Jul.**	5:44	20:57
25	**Jun.**	5:30	21:04	**23**	**Jul.**	5:51	20:50
				30	**Jul.**	5:58	20:43
6	**Aug.**	6:06	20:34	**3**	**Sept.**	6:39	19:48
13	**Aug.**	6:13	20:24	**10**	**Sept.**	6:47	19:35
20	**Aug.**	6:22	20:12	**17**	**Sept.**	6:55	19:22
27	**Aug.**	6:31	20:00	**24**	**Sept.**	7:03	19:09

ORGANISATIONAL EVENTS

Blomidon Naturalists Society: Indoor meetings are held on the 3rd Monday of the month, in the auditorium of the K.C. Irving Centre, University Avenue, Wolfville. Field trips usually depart from the Wolfville Waterfront, Front Street, Wolfville. For more information, go to **http://www.blomidonnaturalists.ca/**.

until 23 Aug., - every Tuesday evening: "Acadia University Woodland Trail Biodiversity List", with leader Melanie, 585-1916, at the K. C. Irving Environmental Science Centre.
22 Jun. & 29 Jun., "Blomidon Provincial Park: Birding for Beginners", Blomidon Park, 582-7319; **charlanebishop@gmail.com**.
25 Jun. "Palmeter's Woods", with leaders Bernard Forsythe, 542-2427, and Rick Whitman, 542-2917.
2 Jul. "Blomidon Provincial Park: Birds of Prey in Nova Scotia", a talk sponsored by N.S. DNR. Contact Kim, 679-6097; **huskinkd@gov.ns.ca**.
9 Jul. "Cornwallis River Greenway", with leaders Murray Colbo and Bernard Forsythe, 542-2427.
11 Jul. "Blomidon Provincial Park: Birding for Beginners", Blomidon Park, 582-7319; **charlanebishop@gmail.com**.
13 Aug. "Moon Over the Water". Watch the sun set and the full moon rise from the look-off on the North Mountain.
19 Sept. "The Bloody Creek Structure", with speaker Dr. Ian Spooner of Acadia's Dept. of Geomatics.

Burke-Gaffney Observatory: Public shows at the Burke-Gaffney Observatory at Saint Mary's University are held on the 1st and 3rd Saturday of each month, except from June through September when they are held every Saturday. Tours begin at 7:00 p.m. between November 1st and March 30th, and at either 9:00 p.m. or 10:00 p.m. (depending on when it gets dark) between April 1st and October 31st. For more information, 496-8257; or go to **http://www.smu.ca/academic/science/ap/**.

Nova Scotia Bird Society: Indoor meetings take place on the 4th Thursday of the month, September to May, at the Nova Scotia Museum of Natural History, 7:30 p.m. For more information, Chris Pepper, 829-3478, **cpepper@ymail.com**; or email the trip leader; or go to **http://nsbs.chebucto.org/**.

25 Jun. "New Birders' Walk, Windsor"; leader Patrick Kelly, 494-3294(w), 472-2322 h); **patrick.kelly@dal.ca**.

10 Jul. "Abraham's Lake, Sheet Harbour Area"; leaders Jim Cameron, 885-2970; **jim.cameron@ns.sympatico.ca** and Warren Parsons, 772-2207; **warren@bellaliant.net**.

17 Jul. "New Birders' Walk, Taylor Head Prov. Park"; leaders Jim Cameron, 885-2970; **jim.cameron@ns.sympatico.ca**, and Warren Parsons, 772-2207; **warren@bellaliant.net**.

6 Aug. "Taylor Head Provincial Park, HRM"; leaders Jim Cameron, 885-2970; **jim.cameron@ns.sympatico.ca**, and Warren Parsons, 772-2207; **warren@bellaliant.net**.

2 Sept. -4 Sept. "Bon Portage Island, Shelburne Co."; leader Claire Diggins, 825-6152; **claire_diggins@hotmail.com**. **Pre-Registration is necessary for this trip!**

Nova Scotia Department of Natural Resources: Many outings that will take place in Provincial Parks are listed in the "Parks are for People" Programme, available at museums, parks, and tourist bureaus, and on the web at **http://www.novascotiaparks.ca/**.

Nova Scotia Museum of Natural History: For more information, 424-7353; or go to **http://museum.gov.ns.ca/mnh/**.

3 Jun. "Netukulimk" opens – a new permanent exhibit. It consists of six interactive modules that represent the sights, sounds, and smells of a Nova Scotia forest and the essence of 'Netukulimk'.

Nova Scotia Wild Flora Society: Meets on the 4th Monday of the month, September to May, at the Nova Scotia Museum of Natural History, 7:30 p.m. For more information, Heather Drope, 423-7032, or go to **http://www.nswildflora.ca/**.

18 Jun. - "Purcell's Cove Lands, its Flora and Fauna"; leader Charlie Cron, 477-8272 after 6 p.m.

Nova Scotian Institute of Science: Meets 1st Monday of the month, September to April, usually at the Nova Scotia Museum of Natural History, 7:30 p.m. For more information, got to **http://www.chebucto.ns.ca/Science/NSIS/index.html**.

3 Oct. "Coal Age Galapagos", with speaker Dr. John Calder, 7:30 p.m., Nova Scotia Museum of Natural History.

Royal Astronomical Society of Canada (Halifax Chapter): Meets 3rd Friday of each month in Room L176 of the Loyola Academic Building at Saint Mary's University, 8:00 p.m. For more information, go to **http://halifax.rasc.ca/**.

26 Aug. -28 Aug. "NOVA EAST 2011", Atlantic Canada's longest-running star party, will be held at Smileys Provincial Park near Brooklyn in Hants County. More information at **http://halifax.rasc.ca/ne**.

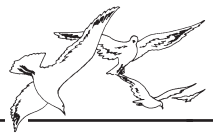
Young Naturalists' Club: A fun, free nature club for children eight and older. Meetings take place usually every 3rd Saturday of the month, **excepting July and August**, at the **Maritime Museum of the Atlantic**, 1675 Lower Water St., at 10:00 a.m. Field trips take place every 4th Sunday, at 1:00 p.m. For more information, Laura Lambie, 431-0207; or go to **ync.nature1st.net**.

5 Jun. "McNab's Island Beach Clean-up",10:45 a.m. Cable Wharf. Help clean McNab's and Lawler's Island beaches!

11 Jun. "Nature Games & AGM", 10:00 a.m. at Saint Mary's University. Games, tour of the Green Roof & Wall, parents' AGM, & potluck.

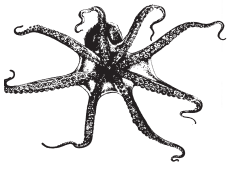
– compiled by Patricia L. Chalmers

HALIFAX TIDE TABLE



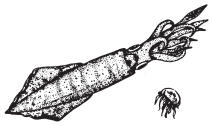
July-juillet

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0156	**0.7**	0.2	**16**	0250	**0.7**	0.2
	0800	**5.2**	1.6		0842	**5.9**	1.8
FR	1401	**1.6**	0.5	SA	1510	**1.6**	0.5
VE	1954	**6.2**	1.9	SA	2046	**6.2**	1.9
2	0239	**0.3**	0.1	**17**	0331	**0.7**	0.2
	0842	**5.6**	1.7		0924	**5.9**	1.8
SA	1447	**1.6**	0.5	SU	1553	**1.6**	0.5
SA	2038	**6.2**	1.9	DI	2130	**5.9**	1.8
3	0322	**0.3**	0.1	**18**	0409	**1.0**	0.3
	0924	**5.6**	1.7		1003	**5.9**	1.8
SU	1536	**1.3**	0.4	MO	1635	**1.6**	0.5
DI	2123	**6.2**	1.9	LU	2212	**5.9**	1.8
4	0407	**0.3**	0.1	**19**	0443	**1.3**	0.4
	1006	**5.9**	1.8		1041	**5.9**	1.8
MO	1629	**1.3**	0.4	TU	1717	**2.0**	0.6
LU	2208	**6.2**	1.9	MA	2253	**5.6**	1.7
5	0453	**0.3**	0.1	**20**	0516	**1.6**	0.5
	1049	**5.9**	1.8		1119	**5.9**	1.8
TU	1726	**1.3**	0.4	WE	1802	**2.0**	0.6
MA	2255	**5.9**	1.8	ME	2333	**5.2**	1.6
6	0544	**0.7**	0.2	**21**	0551	**1.6**	0.5
	1133	**5.9**	1.8		1158	**5.6**	1.7
WE	1826	**1.3**	0.4	TH	1848	**2.0**	0.6
ME	2345	**5.6**	1.7	JE			
7	0638	**1.0**	0.3	**22**	0016	**4.9**	1.5
	1219	**5.9**	1.8		0633	**2.0**	0.6
TH	1926	**1.3**	0.4	FR	1239	**5.6**	1.7
JE				VE	1937	**2.0**	0.6
8	0039	**5.2**	1.6	**23**	0102	**4.6**	1.4
	0736	**1.0**	0.3		0722	**2.3**	0.7
FR	1310	**5.9**	1.8	SA	1324	**5.2**	1.6
VE	2026	**1.0**	0.3	SA	2026	**2.0**	0.6
9	0139	**5.2**	1.6	**24**	0156	**4.6**	1.4
	0836	**1.3**	0.4		0818	**2.3**	0.7
SA	1407	**5.6**	1.7	SU	1415	**5.2**	1.6
SA	2126	**1.0**	0.3	DI	2117	**2.0**	0.6
10	0249	**4.9**	1.5	**25**	0303	**4.6**	1.4
	0938	**1.6**	0.5		0917	**2.3**	0.7
SU	1512	**5.6**	1.7	MO	1513	**5.2**	1.6
DI	2227	**1.0**	0.3	LU	2209	**1.6**	0.5
11	0405	**4.9**	1.5	**26**	0415	**4.6**	1.4
	1041	**1.6**	0.5		1014	**2.3**	0.7
MO	1619	**5.6**	1.7	TU	1614	**5.2**	1.6
LU	2326	**0.7**	0.2	MA	2302	**1.3**	0.4
12	0516	**4.9**	1.5	**27**	0517	**4.6**	1.4
	1143	**1.6**	0.5		1109	**2.3**	0.7
TU	1723	**5.9**	1.8	WE	1709	**5.6**	1.7
MA				ME	2354	**1.0**	0.3
13	0023	**0.7**	0.2	**28**	0607	**4.9**	1.5
	0617	**5.2**	1.6		1200	**2.0**	0.6
WE	1241	**1.6**	0.5	TH	1759	**5.9**	1.8
ME	1820	**5.9**	1.8	JE			
14	0116	**0.7**	0.2	**29**	0043	**0.7**	0.2
	0709	**5.6**	1.7		0652	**5.2**	1.6
TH	1335	**1.3**	0.4	FR	1249	**1.6**	0.5
JE	1912	**6.2**	1.9	VE	1847	**5.9**	1.8
15	0205	**0.3**	0.1	**30**	0129	**0.3**	0.1
	0758	**5.9**	1.8		0734	**5.6**	1.7
FR	1424	**1.6**	0.5	SA	1338	**1.3**	0.4
VE	2000	**6.2**	1.9	SA	1934	**6.2**	1.9
				31	0214	**0.3**	0.1
					0817	**5.9**	1.8
				SU	1428	**1.0**	0.3
				DI	2020	**6.2**	1.9



August-août

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0257	**0.0**	0.0	**16**	0335	**1.0**	0.3
	0859	**6.2**	1.9		0931	**5.9**	1.8
MO	1519	**1.0**	0.3	TU	1556	**1.6**	0.5
LU	2106	**6.2**	1.9	MA	2145	**5.9**	1.8
2	0342	**0.0**	0.0	**17**	0403	**1.3**	0.4
	0943	**6.2**	1.9		1006	**5.9**	1.8
TU	1612	**1.0**	0.3	WE	1631	**1.6**	0.5
MA	2153	**6.2**	1.9	ME	2223	**5.6**	1.7
3	0430	**0.3**	0.1	**18**	0429	**1.6**	0.5
	1026	**6.2**	1.9		1041	**5.9**	1.8
WE	1709	**0.7**	0.2	TH	1708	**1.6**	0.5
ME	2241	**5.9**	1.8	JE	2300	**5.2**	1.6
4	0522	**0.3**	0.1	**19**	0500	**2.0**	0.6
	1111	**6.2**	1.9		1116	**5.6**	1.7
TH	1808	**1.0**	0.3	FR	1750	**2.0**	0.6
JE	2330	**5.6**	1.7	VE	2338	**5.2**	1.6
5	0620	**0.7**	0.2	**20**	0541	**2.0**	0.6
	1157	**5.9**	1.8		1153	**5.6**	1.7
FR	1908	**1.0**	0.3	SA	1839	**2.0**	0.6
VE				SA			
6	0022	**5.2**	1.6	**21**	0019	**4.9**	1.5
	0722	**1.3**	0.4		0634	**2.3**	0.7
SA	1247	**5.9**	1.8	SU	1233	**5.2**	1.6
SA	2009	**1.0**	0.3	DI	1932	**2.0**	0.6
7	0120	**4.9**	1.5	**22**	0106	**4.6**	1.4
	0826	**1.3**	0.4		0736	**2.3**	0.7
SU	1344	**5.6**	1.7	MO	1320	**5.2**	1.6
DI	2111	**1.0**	0.3	LU	2028	**2.0**	0.6
8	0228	**4.9**	1.5	**23**	0206	**4.6**	1.4
	0929	**1.6**	0.5		0838	**2.6**	0.8
MO	1451	**5.2**	1.6	TU	1418	**4.9**	1.5
LU	2212	**1.0**	0.3	MA	2126	**1.6**	0.5
9	0351	**4.6**	1.4	**24**	0323	**4.6**	1.4
	1032	**1.6**	0.5		0938	**2.3**	0.7
TU	1606	**5.2**	1.6	WE	1527	**5.2**	1.6
MA	2312	**1.0**	0.3	ME	2223	**1.6**	0.5
10	0509	**4.9**	1.5	**25**	0437	**4.9**	1.5
	1133	**1.6**	0.5		1035	**2.3**	0.7
WE	1715	**5.6**	1.7	TH	1634	**5.6**	1.7
ME				JE	2318	**1.3**	0.4
11	0008	**1.0**	0.3	**26**	0533	**4.9**	1.5
	0607	**5.2**	1.6		1130	**2.0**	0.6
TH	1229	**1.6**	0.5	FR	1731	**5.9**	1.8
JE	1811	**5.9**	1.8	VE			
12	0059	**0.7**	0.2	**27**	0009	**0.7**	0.2
	0655	**5.6**	1.7		0620	**5.6**	1.7
FR	1320	**1.6**	0.5	SA	1224	**1.3**	0.4
VE	1859	**5.9**	1.8	SA	1822	**6.2**	1.9
13	0146	**0.7**	0.2	**28**	0057	**0.3**	0.1
	0738	**5.6**	1.7		0704	**5.9**	1.8
SA	1405	**1.6**	0.5	SU	1317	**1.0**	0.3
SA	1944	**5.9**	1.8	DI	1911	**6.2**	1.9
14	0227	**0.7**	0.2	**29**	0144	**0.0**	0.0
	0818	**5.9**	1.8		0747	**6.2**	1.9
SU	1445	**1.6**	0.5	MO	1409	**0.7**	0.2
DI	2026	**5.9**	1.8	LU	1959	**6.2**	1.9
15	0304	**1.0**	0.3	**30**	0229	**0.0**	0.0
	0855	**5.9**	1.8		0832	**6.6**	2.0
MO	1522	**1.6**	0.5	TU	1501	**0.3**	0.1
LU	2106	**5.9**	1.8	MA	2048	**6.2**	1.9
				31	0317	**0.0**	0.0
					0916	**6.6**	2.0
				WE	1555	**0.3**	0.1
				ME	2136	**6.2**	1.9



September-septembre

Day	Time	Feet	Metres	jour	heure	pieds	mètres
1	0407	**0.3**	0.1	**16**	0351	**1.6**	0.5
	1002	**6.6**	2.0		1003	**5.6**	1.7
TH	1650	**0.3**	0.1	FR	1626	**1.3**	0.4
JE	2225	**5.9**	1.8	VE	2230	**5.2**	1.6
2	0503	**0.7**	0.2	**17**	0423	**2.0**	0.6
	1047	**6.2**	1.9		1037	**5.6**	1.7
FR	1749	**0.3**	0.1	SA	1706	**1.6**	0.5
VE	2315	**5.6**	1.7	SA	2306	**5.2**	1.6
3	0605	**1.0**	0.3	**18**	0504	**2.3**	0.7
	1135	**5.9**	1.8		1113	**5.6**	1.7
SA	1850	**0.7**	0.2	SU	1754	**1.6**	0.5
SA				DI	2345	**4.9**	1.5
4	0006	**5.2**	1.6	**19**	0559	**2.3**	0.7
	0711	**1.3**	0.4		1152	**5.2**	1.6
SU	1225	**5.6**	1.7	MO	1850	**2.0**	0.6
DI	1952	**1.0**	0.3	LU			
5	0103	**4.9**	1.5	**20**	0029	**4.9**	1.5
	0816	**1.6**	0.5		0705	**2.6**	0.8
MO	1323	**5.2**	1.6	TU	1237	**5.2**	1.6
LU	2054	**1.0**	0.3	MA	1949	**2.0**	0.6
6	0212	**4.6**	1.4	**21**	0123	**4.9**	1.5
	0919	**1.6**	0.5		0808	**2.6**	0.8
TU	1434	**5.2**	1.6	WE	1332	**5.2**	1.6
MA	2154	**1.0**	0.3	ME	2048	**1.6**	0.5
7	0341	**4.6**	1.4	**22**	0235	**4.9**	1.5
	1021	**1.6**	0.5		0908	**2.3**	0.7
WE	1556	**5.2**	1.6	TH	1441	**5.2**	1.6
ME	2253	**1.3**	0.4	JE	2145	**1.6**	0.5
8	0458	**4.9**	1.5	**23**	0353	**4.9**	1.5
	1120	**1.6**	0.5		1007	**2.0**	0.6
TH	1705	**5.2**	1.6	FR	1556	**5.6**	1.7
JE	2348	**1.0**	0.3	VE	2240	**1.3**	0.4
9	0551	**5.2**	1.6	**24**	0454	**5.2**	1.6
	1213	**1.6**	0.5		1105	**1.6**	0.5
FR	1758	**5.6**	1.7	SA	1701	**5.6**	1.7
VE				SA	2332	**1.0**	0.3
10	0038	**1.0**	0.3	**25**	0544	**5.9**	1.8
	0634	**5.6**	1.7		1202	**1.3**	0.4
SA	1301	**1.6**	0.5	SU	1757	**5.9**	1.8
SA	1842	**5.6**	1.7	DI			
11	0123	**1.0**	0.3	**26**	0023	**0.7**	0.2
	0712	**5.6**	1.7		0630	**6.2**	1.9
SU	1342	**1.3**	0.4	MO	1257	**0.7**	0.2
DI	1924	**5.9**	1.8	LU	1849	**6.2**	1.9
12	0201	**1.0**	0.3	**27**	0113	**0.3**	0.1
	0748	**5.9**	1.8		0716	**6.6**	2.0
MO	1419	**1.3**	0.4	TU	1350	**0.3**	0.1
LU	2003	**5.9**	1.8	MA	1940	**6.2**	1.9
13	0234	**1.0**	0.3	**28**	0203	**0.0**	0.0
	0823	**5.9**	1.8		0802	**6.9**	2.1
TU	1451	**1.3**	0.4	WE	1443	**0.0**	0.0
MA	2042	**5.9**	1.8	ME	2030	**6.2**	1.9
14	0301	**1.3**	0.4	**29**	0254	**0.3**	0.1
	0857	**5.9**	1.8		0850	**6.9**	2.1
WE	1521	**1.3**	0.4	TH	1537	**0.0**	0.0
ME	2119	**5.6**	1.7	JE	2120	**5.9**	1.8
15	0326	**1.6**	0.5	**30**	0348	**0.3**	0.1
	0930	**5.9**	1.8		0937	**6.6**	2.0
TH	1552	**1.3**	0.4	FR	1632	**0.0**	0.0
JE	2155	**5.6**	1.7	VE	2210	**5.9**	1.8

ALL TIMES ARE AST

NEXT DEADLINE

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