



Blomidon Naturalists Society

Fall 2004 – Volume 31 Number 3

Blomidon Naturalists Society

The primary objective of the Society shall be to encourage and develop in its members an understanding and appreciation of nature. For the purpose of the Society, the word "nature" will be interpreted broadly and shall include the rocks, plants, animals, water, air, and stars.

(from the BNS constitution)

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The Blomidon Naturalists Society is a member of the Sable Island Preservation Trust and the Federation of Nova Scotia Naturalists and is an affiliate member of the Canadian Nature Federation.

The Blomidon Naturalists Society is a registered charity. Receipts (for income tax purposes) will be issued for all donations.

Visit us on the web

<www.go.ednet.ns.ca/~bns/home.htm>

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Illustrations by Mary Pratt (cover, pp. 16, 17, 20)

Tetrapod making tracks (p. 17) from *The Last Billion Years*

The *Blomidon Naturalists Society Newsletter* is published quarterly – in March, June, October, and December – by the Blomidon Naturalists Society, PO Box 2350, Wolfville, NS B4P 2N5.

Contributions to the BNS newsletter are always welcome. Members are encouraged to share unusual or pleasurable nature stories through the pages of the BNS newsletter. If you have a particular area of interest, relevant articles and stories are always welcome. Send them to Jean Timpa by mail (25 Gaspereau Ave., #1, Wolfville, NS B4P 2C5) or by e-mail <jtimpa@ns.sympatico.ca>.

Upcoming newsletter deadline

Winter, December 10, 2004 (*earlier deadline to beat Christmas rush*)

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Printed in Canada. For subscription information, see the membership fees form at the back of this newsletter. Please notify us at the above address if you change your address.

So Many to Thank . . .

. . . from the BNS executive to those who have presented programs and led field trips, for the work of committees, and contributors to the production of this newsletter.

Special thanks to Stephen Petersen, who has contributed articles, illustrations, and time on the executive. Best of luck in your PhD studies at Trent University in Ontario, Stephen.

Jean Timpa, editor

PS: This newsletter is full, and we had to leave out a few field trip reports. We'll catch up on them in the December issue, where we'll also have Judy Tufts' report on the North American Migration Count, another victim of our shortage of space.

Thank You, Acadia

Members of the Blomidon Naturalists Society would like to express our thanks to Acadia University for providing us with the opportunity to use the facilities of the Irving Centre for our regular monthly meetings.

Thank you to president Dr. Gail Dinter-Gottlieb, Tom Ellis, and Peter Romkey for your kind offer. Special thanks to Peter for your assistance in arranging the technical aspects of our meetings and for your enthusiasm for sharing the resources of the Irving Centre with us.

Our access to this fine facility will provide some excellent opportunities for sharing expertise and cooperation in furthering our joint goals in the area of nature education.

Thank you.

Liz Vermeulen, president, BNS

Blomidon Naturalists Society

Fall/Winter 2004

Meetings

Unless otherwise noted, meetings are held at 7:30 p.m. on the third Monday of each month (except July and August) in the auditorium of the K.C. Irving Environmental Centre, Acadia University. The Centre is on University Avenue, up the hill from the Acadia arena. Parking is available at Wheelock dining hall, along Crowell Drive immediately east of the Centre, at the Acadia arena, the student union building, or on Westwood Avenue. Everyone is welcome.

Monday, October 18, 2004 – Ancient Shores of the Bay of Fundy. In 1841, Sir William Logan discovered the first Carboniferous tetrapod footprints the world ever knew near Blue Beach on the Minas Basin. Since then, the wealth of fossils found includes invertebrates, tetrapods, fish, and plants. Chris Mansky has made an extensive collection of fossils from this area and has established the Blue Beach Fossil Museum near Avonport. Chris will share his enthusiasm and experience with the biology and geology of our area as it existed some 350 million years ago.

Monday, November 15 – Walk the Long Walk. Put on your backpack. We are going to hike the 2,658-mile Pacific Crest Trail with Cobequid Naturalists Club member Janet Roberts. We'll cross southern California's searing deserts, rise to glorious heights in the Sierra Nevada, and follow the volcanoes of the Cascades all the way to Canada. Learn about Janet's six-month journey and view some of the spectacular vistas she enjoyed.

Monday, December 13, 2004 – The Geologic Time Scale and Major Events on Earth. Felix Gradstein, from the University of Oslo, Norway, has done extensive research on the construction of the modern time scale to date Earth's geologic history. The geological calendar and record of life on earth are central to his talk, which will include some nice photographs of rock and fossil records. **Please note that this meeting is on the second Monday of December.**

Monday, January 17, 2005 – Annual “Show and Tell” Night. Open to all. Come to view, or bring along slides, pictures, specimens, collections, fossils, videos, computer stuff, favorite books and magazines, or anything that might be of interest to fellow naturalists. This meeting will be held in the biology building, Patterson Hall, on University Avenue.

Monday, February 21, 2005 – Tanzanian Trails and Tales. Jean Timpa will share some of her experiences with slides, prints, and digital photos taken this past July during an eight-day safari to a small portion of Tanzania. It included excursions to Lake Manyara National Park, Ngorongoro Conservation Area, a campground beside the village of Waso, and the Falls Park overlooking Lake Natron, in the shadow of The Mountain of the Gods (aka Ol Doinyo Lengai), the only active volcano in the world that spews out bicarbonate lava (i.e., washing soda).

Monday, March 21, 2005 – Flowers, Birds, Waterfalls, and Volcanoes in Costa Rica. Ron and Carol Buckley will have had a couple of fascinating tours to Costa Rica and will share their experiences with the natural history, geology, and scenery of this beautiful country.

Field Trips

Unless otherwise indicated, all field trips will begin at the Wolfville Waterfront park. Please note we have changed to this location because of congestion at the Robie Tufts Nature Centre during farm market days. Everyone is welcome.

Saturday, September 25, 2004 – Shorebirds. Jim Wolford (902 542-9204) will lead us on a search for late shorebirds, starting at the Windsor sewage ponds before high tide, followed by a walk on the beach and dike at Evangeline Beach or the Guzzle. Bring a lunch and meet at the Wolfville Waterfront at 10 a.m. or the Windsor sewage ponds at 10:30 a.m.

Sunday, October 3, 2004 – Murder on the Mountain. George Alliston will lead a walk on the Clem property, a Nature Trust holding on the North Mountain, to see some fall colours and share some of the mysterious history of the area. Meet at the Wolfville Waterfront at 9 a.m. or the Clem Property at 10 a.m. Bring a lunch and footwear for a casual stroll.

Directions to Clem Property:

1. Take Highway 101 west from Wolfville to Exit 16 (Aylesford).
2. At the stop sign at Exit 16, turn right (north) and continue to the top of the North Mountain where the road intersects with Brow of Mountain Road.
3. Turn right on the gravel Brow of Mountain Road and proceed (east) to the twin microwave towers.
4. At the intersection with the road into the towers, check your odometer.
5. Continue along Brow of Mountain Road 0.8 km to the next intersection on the left, marked with a combination of orange, pink, and blue flagging tape on bushes. Although it looks like a woods road, this is a public road (unmarked but known locally as the Lightfoot Road) and can be driven by car without difficulty by proceeding slowly and carefully.
6. Turn left here and proceed 1.7 km until you see pink and purple flagging tape at a Y in the road.
7. Take the left branch, proceed 100 m, and park anywhere in the open area.

Saturday, October 23, 2004 – Volcanic Pipes and Vents. Did you know that Nova Scotia once had volcanoes? Ron Buckley (902 542-1815) will lead a field trip to the Scots Bay area and explain the features of part of the largest known episode of volcanic activity on Earth dating back to the early Jurassic. Meet at Dee Dee's Canteen parking lot in Scots Bay at 1 p.m. The two-hour trip involves clambering over rocks, so wear suitable clothing and footwear.

Wednesday, October 27, 2004 – Total Lunar Eclipse and Constellations. Roy Bishop (902 542-3992) will show us details of the total eclipse of the moon and give us the opportunity to learn some of the constellations in the night sky. Meet at 10 p.m. at the old parking lot at Grand Pre National Historic Park. Rain date will be March 3, 2007, the next opportunity to see a total eclipse in our area. Bring binoculars or scopes and wear lots of warm clothes.

Sunday, November 7, 2004 – Hennigar's Nature Trail. George Forsyth

will lead us up this picturesque nature trail and show us how to identify trees and shrubs out of season. Meet at the Wolfville Waterfront at 1 p.m. or at Hennigar's Farm Market, half a kilometre west of Wolfville on Highway 1, at 1:15 p.m.

Saturday, December 18, 2004 – Wolfville Christmas Bird Count. Everyone is encouraged to participate. If you would like a designated area or would like to be assigned with a group, call the compiler, Ian Paterson (902 582-1273). There will be a count tally and chowder/chili supper after dusk at the biology building (Patterson Hall on University Avenue).

BNS FIELD TRIP REPORT
BNS 30th Anniversary Walk – Kentville
Ravine
by **Jim Wolford**

July 11, 2004 – The weather cooperated beautifully, with skies clearing in afternoon. At 4 p.m. Ruth and Reg Newell conducted a botanical walk down into the ravine and along Elderkin Brook. On the way down, Pine-sap plants were pointed out (these relatives of Indian Pipe are yellowish, lacking chlorophyll, and are symbiotic with fungi and saprophytic). Someone mentioned a fire through this area at about the time of the expulsion of the Acadians; thus the biggest hemlocks and pines, which have not been cut there since then, would be 250 years old or so. We identified quite a few kinds of ferns along the trail: Bracken, Oak, Ostrich, New York, Hay-scented, lady, Christmas, etc. We also saw flowering Jack-in-the-pulpit, native wood sorrel, Common Speedwell, and Long-awned Wood Grass, plus foliage of Agrimony, violets, [Purple] Trillium, maples (Mountain, Red, Sugar), Yellow Birch, and broad-leaved Helleborine orchid (too bad Bernard Forsythe had to miss this event – he discovered this plant for Nova Scotia at Blomidon Park in the mid-1980s).

A highlight for myself on this walk was Ruth's finding, on some wood on the ground, a nice fruiting colony of "Chocolate Tube Slime" (*Stemonitis* sp.). Slime molds are fungus-like in some ways but are not really closely related to true fungi.

Reg and Ruth mentioned the supposed and real info concerning culinary and medicinal uses of some of our woodland plants. Ruth showed us a beech tree sick with the bark canker disease from Europe (spread by scale insects); there is a fairly healthy large beech that produces lots of beech nuts every year, at the parking lot entrance to the picnic grounds.

She also showed us the new plaque commemorating the academic and conservation efforts of two deceased mycologists, Dr. Ken Harrison and Dr. Darryl Grund. Ken was the plant pathologist at the research station for many years (and was partly responsible for the stewardship of the wildness of the ravine) and planted many kinds of trees on the grounds there. After "retirement" he became a research associate of Darryl's in Acadia's Biology Department.

We also heard a singing Ovenbird and a Blue-headed (Solitary) Vireo.

Then we walkers went back up to the picnic and joined the others – there was a huge turnout for this momentous occasion, about 90 people – for the meal: roast pig, pizza, various salads, pies and other desserts.

NOTICE

BNS is Searching for Your Talents!

Our October meeting is preceded by the short business of filling any vacant positions on our executive. If you can (or want to) help in any way, please contact the nominating committee:

George Forsyth, 542-7116 or <george.forsyth@ems.ednet.ns.ca>
Mike McCall, 678-6273 or <mikemccall@ns.sympatico.ca>

NEW BOOK

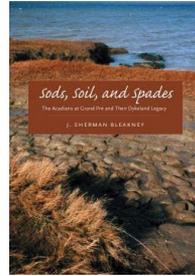
Sods, Soil, and Spades: The Acadians at Grand Pré and Their Dykeland Legacy

by J. Sherman Bleakney

McGill-Queen's University Press

320 pp, 90 illustrations

List price \$49.95



Longtime BNS member Sherman Bleakney sent us this note: “The McGill-Queen’s University Press autumn catalogue is out, and my book is advertised in it. Publication and release will be in October-November 2004.” Looking forward to reading the book, we offer the following from the catalogue – and our sincere congratulations to Sherman:

French Acadians began settling in the Grand Pré area of Nova Scotia, a region plagued by salt-soaked tidal meadows, in the seventeenth century. By the middle of the eighteenth century, a complex system of sod barriers had enabled them to convert thousands of acres of what had been tidal marshes into rich cropland. Four hundred years after the Acadians’ arrival in the Bay of Fundy region, the physical presence of their legacy is still intact.

Sherman Bleakney, a marine biologist, examines the unusual physical and biological features of this region of the Bay of Fundy, home to the only successful pioneer culture in North America to farm below sea level. Using original photographs, diagrams, and graphs, Bleakney shows how and why the Acadians were successful. *Sods, Soil, and Spades* examines the unique and elegant engineering principles and practices used by the Acadians and how their culture influenced their success.

“This is a priceless work that seamlessly blends historical and contemporary documentation into a unique interdisciplinary study of ‘natural history,’ technology, environmental change, and the flux of human environmental interactions across more than three centuries. Bleakney skillfully interweaves information with superb illustrations. This is an exemplary and accessible study.” —Karl W. Butzer, Department of Geography, University of Texas.

BOOK REVIEW
by Sherman Bleakney

*A Place Between The Tides: A Naturalist's Reflections
on the Salt Marsh*

by Harry Thurston
Greystone Books, Vancouver

Here is another literary gem from the pen of Harry Thurston. There are 12 chapters, one for each month of the year. This is not your usual nature lover's diary; in fact, each chapter is unusual, a delightful essay full of surprises. The author uses his intimate knowledge of Bay of Fundy tidal marshes as a unifying theme, but when you least expect it he cleverly transfers to some other geographic locale, or to a relevant experience in his youth, or to a scientific explanation. You could read the book quickly cover to cover, but it really should be savoured. Read only one or two chapters at a time, then close the book, sit back, and enjoy the afterglow. This is a book you will want to return to again and again.

When I finally finished this poetic rendering of observations and reflections, I realized then that I would want to keep this little tome handy because each chapter is a literary unit, and I will, for example, when in a September mood or December doldrums, want to indulge myself in Thurston's poetic imagery and person perspective.

For example: September – "The spartina is now russet topped. In the waning light, it seems to glow with its own incandescence, illuminating the night marsh like thousands of low-burning votive candles.

"In the morning, after the first of fall's frosts, the river and marsh are shrouded in mist. But the last of the summer heat soon tears away this caul of nighttime, and out of this mysterious ether emerges a great blue heron – like the mist given form, congealed and animated."

December: – "It has always excited me merely to apprehend another living thing. I now recognize I am most like that heron – eye-hungry, ever watchful, predatory, listening. This hunting for stimuli feeds a spiritual hunger."

You many not know why Harry is such a successful naturalist author, poet, and playwright, but I do. He majored in biology at Acadia! (I taught him everything he knows about dissecting cats.) But seriously, imagine the advantages he has – equipped with that scientific background – compared to the average naturalist journalist. When Harry consults science specialists, he already understands the basic concepts and knows the terminology. He can immediately ask pertinent incisive questions and thoroughly understand the answers, and this, in my opinion, is a contributing factor to his many award-winning books, such as *Tidal Life: a Natural History of the Bay of Fundy*, with his superb poetic journalism, yet scientifically accurate in every detail. More recently, Harry spent a year at Acadia University as the invited author-in-residence – not too bad for a biology major.

Many BNSers love the marshes and tidal flats for their own personal reasons, but could any express their feelings on paper in this manner?

My attachment to the salt marsh is more than nostalgic or cultural. It is visceral and instinctive. As for the herons, the foxes, and the fishes, this is my habitat, or that is how I feel about it when I look out at its green mantle of saltwater grasses, the dark eyes of the marsh pools, and the tidal river, the salt marsh’s nourishing umbilicus to the mothering sea.

Kodak EasyShare D6490
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Light Pollution in Kings County: The Issue and Some Success

by Roy Bishop

A columnist for the Chronicle-Herald once wrote, “It surprises me how someone who would never think of leaving a plastic bottle on the ground at a picnic site will pay extra money each month to illuminate half the neighbourhood with unnecessary, distracting light.”

Many people erect such lights without a second thought, and towns and municipalities install unshielded streetlights that inundate communities with a bright fog of poorly directed light. The intent is to provide useful illumination for back yards, pedestrians, and drivers, but in most cases the result is less than satisfactory because of the poor design of the light fixtures used. As a consequence, blinds have to be drawn to darken bedrooms, drivers’ ability to see roads and pedestrians is compromised by the harsh glare of streetlights, and as night falls our villages and towns take on a trashy appearance because of their many dazzling light fixtures. Lights are also installed for security, although in instances when lights are turned off the crime rate falls. Criminals need light too, and are better able to do their dirty work hidden by the glare of unshielded lights.

Light fixtures exist that direct all their light downward, where it is useful. Called “full-cut-off” or “flat-glass” fixtures, the light they emit is cut off from spraying sideways. Not only do they provide superior illumination, but because none of the light is wasted by spraying sideways and upward, these fixtures require only about half the power of the old-style lights: a 100-watt full-cut-off light can provide better illumination than a 200-watt unshielded light. Calgary is on its way to saving \$2 million per year on the operating costs of its streetlights as it replaces its old-style lights with full-cut-off units, while providing better lighting for its drivers and pedestrians. The test for a bad light is simple: if the light fixture shines directly in your eyes from a block away, it’s bad.

Since light that sprays horizontally or upward is wasted, this also means needless air pollution at the associated electrical power plant, and the fossil fuel involved is being wasted. Nova Scotia Power is currently wondering

where it can find a few hundred more megawatts of generating capacity to cope with the growing electricity demand. If it began converting the lights in the province to modern designs at half the wattage, not only would street and highway intersection illumination be improved, but the need for additional generating capacity would be considerably reduced. Perhaps not surprisingly, reducing electricity demand seems to be foreign to the thinking of organizations that sell the product.

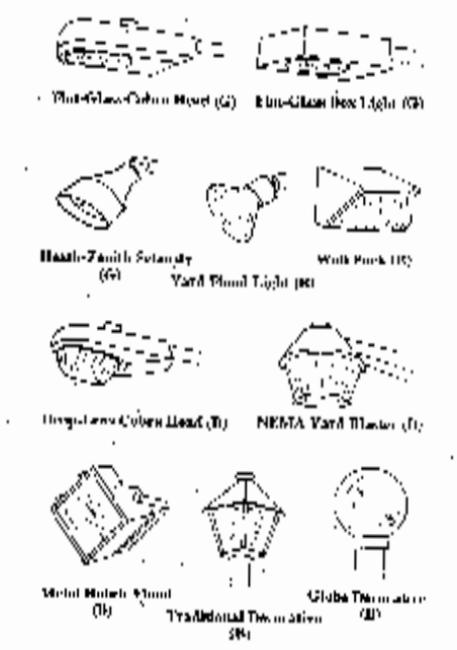
Modern, efficient, full-cut-off lights are beginning to appear around Nova Scotia, but they are the exception. For example, the Merks feed mill in Avonport has excellent lighting, as does the road leading into the Halifax airport. In both cases the light fixtures are practically invisible until you are almost under them, yet both the feed mill and the airport road are well-illuminated. Paradoxically, the many lights on the Merks feed mill pose no hazard to drivers on nearby Highway 101, yet a short distance away the Department of Highways streetlight at eastbound exit 9 shines its unshielded, dazzling glare directly into the eyes of drivers. A full-cut-off light at this exit would make the exit easier to see and the highway safer. A similar hazardous light exists at exit 5 near Windsor for drivers entering Highway 101 to proceed westward.

For the past five years one of the worst lights in Kings County has been an unshielded floodlight at Blomidon Provincial Park. Aimed out across Minas Basin, it spoiled the nighttime profile of Cape Blomidon, upsetting many residents living within sight of this famous landmark. In response to a formal complaint, last July the light was relocated so it no longer shines across the eastern end of the Annapolis Valley. Special thanks are due to Richard Harley and Webster Andrews of the Department of Natural Resources for their action on this matter.

Two of the brightest lights in North Grand Pre, at the church in that community and at the entrance to Pheasant Road, were old-style, unshielded lights that posed a glare hazard to drivers, particularly on stormy nights when rain or snow exacerbated the glare. Both lights also sprayed much of their light needlessly across the Grand Pre dikelands, likely disturbing the nocturnal life cycles of insects in that area and disorienting nocturnal and migrating birds. Last June, the North Grand Pre Community Association under Ed Murphy's leadership had these two lights replaced with full-cut-off units, requiring only half the power

and eliminating the wasteful, dangerous glare. Special thanks are due to Barry Walker at Nova Scotia Power for making these lights available.

Among the various types of pollution, light pollution is unique in that it is simple to correct. There is no downside to good lighting. It is a “win-win” situation. The problem is education – to make people aware of the cost, hazards, and environmental impact of poor lighting, of the inconsiderate aspect of light trespass, and of the trashy aesthetics of old-style, unshielded lighting. Until people demand good lights, building supply stores and power companies will continue to provide the type of light fixtures they have always provided.



Several styles of light fixtures are shown in this drawing. The three marked (G) are good in that they direct all their light downward where it is useful, thereby minimizing glare and energy use. These light fixtures give good ambiance and are environmentally correct.

The other seven fixtures shown are bad (B) because they send one-third to one-half of their light sideways and upward into the sky. Such light fixtures are costly, produce a trashy ambiance, and are environmentally damaging.

BNS FIELD TRIP REPORT

Rare Plants

by Bernard Forsythe

July 18, 2004 – The hiking trail along the Gaspereau River up from the White Rock bridge has lots to offer any time of year. As expected, the river did not let the dozen participants of this outing down on this beautiful summer day. Our destination took twice as long as expected to reach, due to the rich intervale life we explored. Plants of all types were present. Many fern species, from Oak Fern, looking like small bracken, to showy Ostrich and Royal Ferns, covered the forest floor. Damselflies courted around Meadow Rue in full bloom, while Ground-nut grabbed whatever it could reach for support.

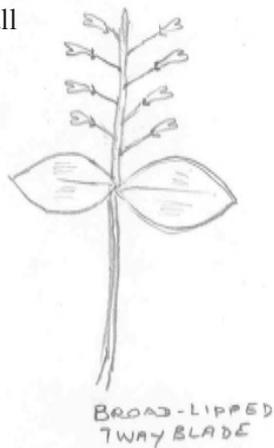


By mid July, bird song tends to drop off, but several species of warblers, vireos, and a Hermit Thrush were still singing, while an Eastern Wood Peewee perched in full view. Several kinds of mushrooms, slime molds, and a Spring Peeper added to the variety of subjects to observe. We even had a couple of geologists along to point out various geological formations. For those interested in orchids, Broad-leaved Helleborine, Spotted Coral-root, and Tall Leafy White Orchid were common.

A bit of the past human history of this stretch of the Gaspereau River was discussed. We stopped at Joe Smith's old logging camp. With cables, Joe had constructed a swinging bridge to reach his home across the river. All that remains are rectangular ridges of earth, which had served as banking for his cabin and horse stable. Legend has it that Hank Snow, along with Lloyd Corkum, spent a winter or two at this isolated cabin practising guitar and singing at the beginning of Snow's career.



Our search for the only known Kings County location for Broad-lipped Twayblade and Pointed-leaved Tick Trefoil, as well as the uncommon Rattlesnake Fern, was successful. However, the trefoil flowers were not quite open, while the twayblade was past best flower. A good find was American Spikenard, an uncommon Aralia not often noticed. As leader I was pleased to note that everyone enjoyed themselves, and we all experienced several personal firsts with our enjoyment of this magical river.



BNS FIELD TRIP REPORT
Fossil Hunting at Blue Beach
by Jack Forsyth

August 1, 2004 – We met with about 40 people at the fossil museum at Blue Beach. Sonja Wood told us lots about the tetrapod tracks and ancient fish bones and teeth found there. The fossils were very well displayed according to their eras, which were millions of years apart. I really enjoyed looking at the bones of fish and tetrapod tracks that were 350 million years old. After looking around for half an hour or so we headed out to the beach, about half a kilometre walk from the museum. We were given a paper at the museum with information about the most common things found on the beach. For example, worm tubes, mud cracks, rain drops, and bug burrows. At the beach many of the rocks we looked at contained fossils.

Summer Bird Sightings

by Mike McCall

John Belbin and Jim Wolford have been faithful Chimney Swift counters at Middleton High School and the Robie Tufts Nature Centre (RTNC) this spring and summer. John reported the first swift of the year on April 29 when two birds were sighted at Kingston, but it wasn't until May 10 that Jim was able to report swifts at RTNC, when a round dozen birds entered the chimney at dusk. Attendance was spotty all year – unpredictable as usual. For instance, on May 22, 235 birds were seen entering at dusk, but on the previous evening only 41 had been counted. The highest numbers recorded were on May 31 and June 1 when 350 and 480 dived into the chimney. From June 12 to the end of July, the evening numbers ranged from 50 to 140.

Merlins hunted swifts successfully at both Middleton and Wolfville, single birds being taken at the RTNC on three occasions, while John Belbin reported a “resident” Merlin that enjoyed good hunting using the Middleton Regional High School chimney as a perch. (“Good” is the Merlin’s word, not the swifts’).

When I visited RTNC on August 18, the posted record showed that no swifts had been sighted after August 11. But while I was enjoying a Raven Ale (this is a bird column, after all) on Rosie’s patio, a single swift dived into the chimney at 8:42 p.m.

In keeping with several thousand years of tradition, migratory shorebirds once more used the Fundy shore-side cafeteria en route to their wintering grounds, er, shores. The usual suspects showed up at the usual times, but some birders thought the numbers were lower than usual. Reports from Judy Tufts and Richard Stern confirm that nothing was amiss.

Judy’s report on shorebird activities on September 1, for example, notes: “High tide minus one hour at the Guzzle – tide very high – 5,000 peeps on the last bit of exposed beach or rocks at eastern tip within a few feet of several anglers. Mostly Semipalmated Sandpipers with a few Dunlin, Least Sandpipers, and Semipalmated Plovers. Counted about 30 White-rumped Sandpipers in various fly-pasts and noted good numbers of

Sanderlings in just about every small flock arriving or shifting positions around the beach. Also found one Hudsonian Godwit, one Ruddy Turnstone, and one yellowlegs. A Northern Harrier was hunting the nearby ditches.”

Richard reported thus: “Last week (mid-July) I saw a flock of several thousand birds way out on the mud flats on the receding tide. Next day I went to East Point, Grand Pre, and there were hardly any. However, I was on Brier Island for the last three days and there were thousands of Semi and Least Sandpipers, many Sanderlings (some still in alternate plumage), several thousand Short-billed Dowitchers, many Greater and Lesser Yellowlegs, a few turnstones, many Willets, more Killdeer than I have ever seen in one spot, and so on – but, unfortunately, no rarities.”

Richard got his rarity on July 28. He observed the White Ibis that spent a few days on Brier Island and was seen on several occasions, attracting a number of birders. Not as many, though, as the mob of eastern U.S. birders – including the estimable David Sibley of (recent) field guide fame – that apparently flooded into Martha’s Vineyard in Massachusetts in early August, all a-twitter to catch a glimpse of a Red-footed Falcon, the first recorded North American visit of the Kestrel-sized falcon normally resident in eastern Europe and Russia.

A tip of the hat and a rousing chorus of cheers for the people who conceived, financed, and executed the recently opened shorebird-viewing platform and information display at Evangeline Beach. It is wonderfully well done, providing a superbly located roomy, open platform, excellent pictorial displays, accurate information presented clearly and completely, and, for old eyes, in an eminently readable good-sized typeface. I encourage those BNS members who have not yet visited to do so; I’m sure those in our number who contributed directly do so as well.

Ian McKay reported a Laughing Gull at Scots Bay July 24.

July 5, Liz Gidney reported a call from a Bear River landowner who had a Northern Bobwhite calling. When he sussed it out, it proved to be approachable. I have no news of subsequent, if any, bobwhite activity.

A gathering of young families of Common Grackles on Judy Tufts’ back

yard July 7 didn't hang around to chat with a Goshawk that dropped in for a snack. Judy didn't see a successful attack; her last sight of the bird was as he zipped past her about 7 m away, in hot pursuit of the fleeing grackles. Judy also shared this on June 28: "Just after 4 a.m. I awoke to hear a Whip-poor-will calling near our house on Wolfville Ridge. For almost five minutes (I timed it on the clock) its rolling song stirred the darkness and the stillness of the lingering night like a continuous bugle call. It was mesmerizing. On the previous Thursday (June 24) around 5 a.m. I had heard a very brief Whip-poor-will song, about 30 seconds worth, but thought I was probably dreaming. Monday's songster just confirmed the species, possibly a bird seeking a mate."

Richard Stern reported a Wood Thrush near his Kentville home on July 5 and 7 and also reports that a couple of Great Egrets were at the Annapolis Royal marsh all summer.

As I write this on a bright September morning, the trees and bushes are aquiver with small birds – most of which are warblers – flitting from tree to bush to tree as they feed on insects and larvae in preparation for the day's flight to the south. Which means our fall birding season is upon us. I wish you all a fine autumn viewing experience and hope that you will send me your observations so I can pass them on to BNS members.



Are We Really Getting Global Warming?

by Ron Buckley

During the last billion years of the history of the earth there have been at least six periods when the globe has warmed, and in between those warming periods the earth has cooled to the point where a portion of the surface has been covered with at least a kilometre of ice. Examination of geological maps for this area of Nova Scotia provides evidence of the presence of these ice sheets – geological features such as kames, drumlins, outwash plains, eskers, raised beaches, and large erosional valleys such as our own Annapolis Valley and the adjoining Gaspereau Valley.

Figure 1 (from *The Last Billion Years*, by the Atlantic Geoscience Society), shows relative worldwide temperature variation over the last billion years. Six ice periods are recorded, with warmer periods separating each ice age.

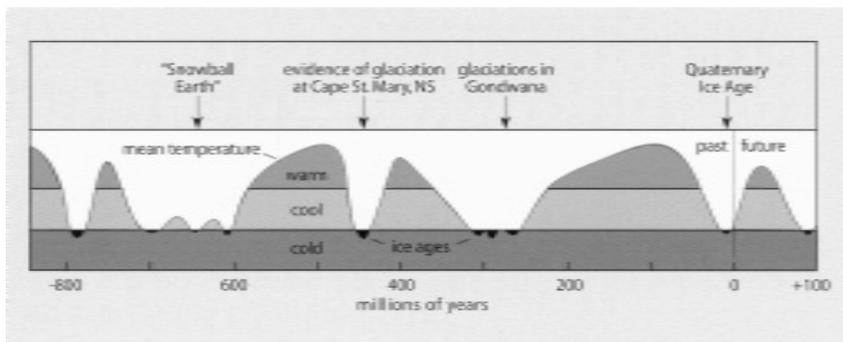


Figure 1: Changes in climate from icehouse to greenhouse over the last 800 million years, with a prediction for the future (from Atlantic Geoscience Society 2001, p. 19)

Ice advances and retreats can be attributed to a number of causes, such as changes in continental locations due to sea floor spreading; subduction of one continent under another, resulting in uplift of mountain ranges; changes in atmospheric CO₂; changes in the earth's orbit; tilt and precession of the earth's axis; and sunspots and cosmic radiation.

As the continents move over the globe, seawater currents and air currents are modified and either enhance or prevent exchange of tropical and polar waters, leading to either buildup or melting of the polar icecaps, depending on the currents and the positions of the continents. Oceanic and continental plate subduction creates mountain ranges, with the development of alpine glaciers. Volcanic eruptions release into the atmosphere large quantities of CO₂ and ash. After a particularly large eruption of the Indonesian volcano Tambora in 1815, large volumes of CO₂ and dust circled the earth, causing what was known as “the year without a summer.” The increase in CO₂ and ash effectively filtered out sunlight, preventing the Sun’s rays from reaching the Earth’s surface during 1816.

Perhaps the greatest variation in the amount of solar radiation hitting Earth is caused by changes in the Earth’s orbit around the Sun (eccentricity, every 100,000 years), the tilt of the axis of rotation (obliquity, every 23,000 years), and the wobble of the axis (precession, every 41,000 years). With each variation of these parameters, a different amount of solar radiation is directed to the Earth’s surface, causing unequal heating. This variation in heating alters the atmospheric and ocean temperatures to such a degree that climate is varied to the point where the north polar icecap sometimes extends southward for an ice age or melts for an interglacial warm period.

Sunspots have probably the greatest impact on Earth’s climate. Sunspots have been counted and recorded by scientists since the 1600s. Dark spots were observed to occur on the surface of the Sun, and they appeared to rotate across that body. We now know that these spots are magnetic “storms,” when large-magnitude flares erupt from the Sun’s surface. Sunspots have a very regular cycle of 11 years, and in periods of high sunspot frequency, magnetic fields detected on the Earth affect radio communication and create our brilliant northern lights. Magnetic activity influences the intensity of the cosmic radiation reaching Earth; that in turn modulates cloudiness and therefore temperature.

The Intergovernmental Panel on Climate Change (IPCC) published a somewhat empirical temperature chart in 1990 (see figure 2).

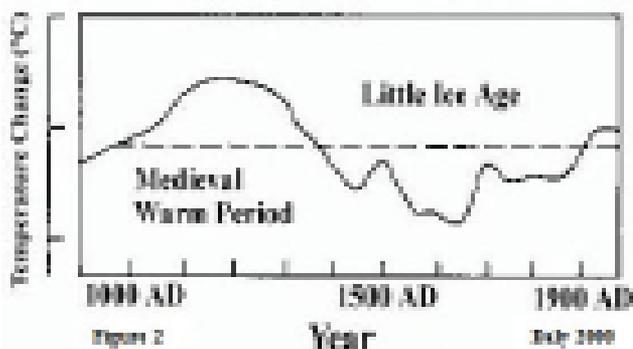


Figure 2: Global temperatures since AD 900 (after Daly 2000)

This chart indicates that temperatures during the medieval warm period were higher than today (probably by as much as five degrees). Vineyards flourished in Scotland and in the York district of England. It was much colder during the “little ice age” all over Europe and Greenland, when the oceans remained frozen, preventing regular Viking supply ships from arriving in Greenland and Newfoundland. John Daly, in *The ‘Hockey Stick’: A New Low in Climate Science*, writes:

The colonisation of Greenland by the Vikings early in the millennium was only possible because of the medieval warmth. During the Little Ice Age the Viking colonies in Greenland collapsed, while the River Thames in London often froze over, resulting in frequent “frost fairs” being held on the river ice (Daly 2000).

Other accounts record that the canals of Venice remained frozen during the winter months.

The Friends of Science write:

We know that CO₂ from the burning of fossil fuels was not the cause of dramatic historical climate changes, for example, 1,000 years ago, in the Medieval Warm Period or in the Little Ice Age, that followed from about 1350 to about 1860. We are still emerging, in an oscillating fashion, on the warming trend that came after the Little Ice Age. (source: <www.reveal.ca/friendsofscience/ScienceBackground.html>)

What is the cause for these events of warming and cooling? The probable candidate is the variable amount of solar energy that arrives by radiation to the Earth, caused by both the variation of the Earth's orbit and tilt and the variation of the 11-year sunspot cycles. Solar energy varied not only with the 11-year cycle but also in intensity and makeup of the energy that was radiated, from ultraviolet through the infrared spectrum. The disproportionate enhancement of the ultraviolet part of the solar spectrum affects the ozone layer and other atmosphere chemistry. Variation in magnetic activity on the Sun correlates to the amount of cosmic radiation

reaching the Earth, probably a major factor in the amount of cloud over the Earth, and therefore temperature.

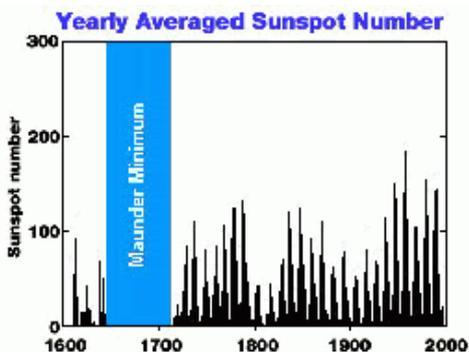


Figure 3: Average numbers of sunspots (from Daly 2000)

Figure 3 is a plot of the sunspot count beginning in the 1600s. The Maunder Minimum was a 70-year period when there were no or few sunspots. It occurred at exactly the same time as the coldest point of the little ice age. It would appear that sunspot counts do relate to earth temperature. Additional data from carbon 14 isotopes, used as a proxy for solar activity prior to 1600, indicate a high level of solar activity, and therefore surface temperature, during the medieval warm period (see figure 2). Solar science suggests that the Sun, not the so called "greenhouse gases," would be responsible for the warming trends during the past 1,000 years.

But is it actually warming in the world today? One can't run out to the neighbourhood thermometer and have a look. Land-based thermometers are just that – land based. Four-fifths of the Earth's surface is water, and there are relatively few temperature measuring stations in the ocean. The land-based stations are usually in urban areas, or "thermal islands" with "hot" buildings that have been heated by the sun, and the rest are at airports, where there are acres and acres of black, paved runways and parking ramps. (Hansen et al. 1999). The best thermal records come from satellites, as the entire globe is mapped and the measurements are made

above the surface in the lower troposphere. Thermal measurements are taken from a number of Tiros-N satellites using Microwave Sounding Units (MSU), highly accurate (to 0.1°C) microwave radiometers.

“The satellite (MSU) temperature data set is the only one that is truly global, highly accurate, and uses a completely homogeneous measurement over the entire planet” (Spenser & Christy 1992). These satellite data have been independently validated by high-altitude balloon radiosonde data. Unfortunately, satellites have been in orbit only from about 1979.

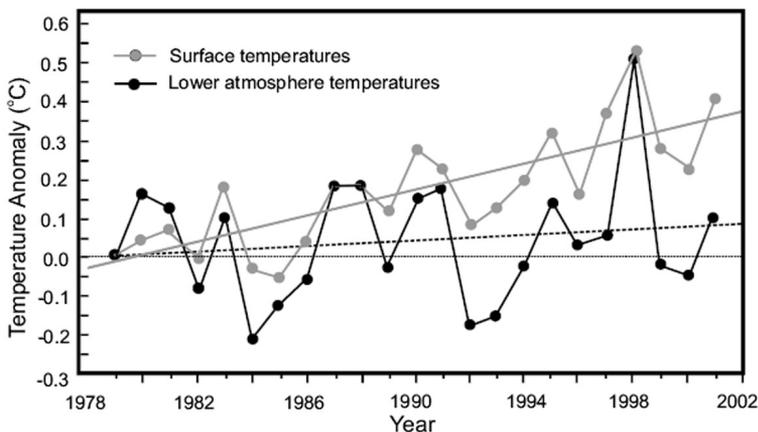


FIGURE 4 Global Temperature data comparing surface and lower atmosphere temperatures (from de Freitas 2002, p. 307)

Figure 4 is a plot of surface temperatures largely made from thermal islands (upper curve) and from MSU satellites (lower curve). C.R. de Freitas (2002) writes in the *Bulletin of Canadian Petroleum Geology*, “The natural variability of the satellite record matches changes in the surface record, but no trend is obvious . . . These fluctuations are from ‘normal’ influences such as El Nino episodes and atmospheric dust from volcanic eruptions, and the temperature returns to ‘normal’ after each fluctuation” (p. 306). Comparing temperature records over the past 60 years, de Freitas concludes that there has been no significant temperature increase on Earth since 1940.

Our evening news broadcasts keep us well posted with items to the effect that “greenhouse” gases (they usually quote the culprit as CO₂) are

increasing and global warming *is* occurring and that these effects will cause the oceans to rise and it would appear that if we are not drowned in the rising ocean then we will be able to grow bananas in Nova Scotia within the next few years. What are the facts?

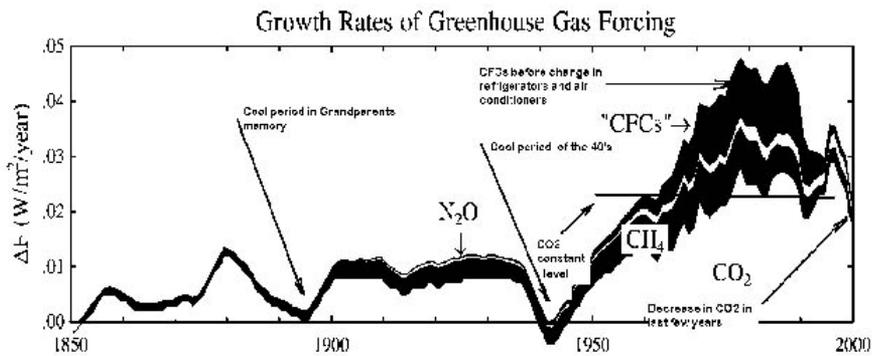


FIG. 5 Growth rates of greenhouse gas forcing (from World Climate Report, 7/10, 2002, annotated by Buckley)

Figure 5 is a plot of the various greenhouse gasses in our atmosphere. Carbon dioxide content was relatively flat since the 1850s, then increased rapidly after 1960, peaking in 1980 along with CFCs and methane. On average, CO₂ content has been flat since the 1970s up to the late 1990s, probably due to emissions controls in factories and vehicles. Note the sharp decrease in CO₂ since about 1990. On the other hand, temperature remained relatively constant up to 1950 (rise of 0.5°C), then decreased after that by 0.2°C at the same time that we had a dramatic increase in CO₂ content in the atmosphere. Published papers document that CO₂ content follows and does not precede temperature change. (de Freitas 2002). Does that sound like our TV broadcasts on the evening news?

We are familiar with much shorter changes in our atmosphere every time we watch the daily TV weather maps. The movement of high and low pressures and their associated warm and cold fronts changes our weather as moist, dry, or cold air is transported across our continent. These changes are in terms of days. The atmosphere redistributes only about half the energy that the Earth receives from the Sun (Gagosian 2003).

We are gaining a better understanding of el Nino, where warm waters

move eastward toward South America, and its effect on the weather (moisture and temperature and the occurrence of annual hurricanes in the Atlantic) in terms of seasonal variations in North America.

A similar process is taking place in our oceans. Ocean currents continuously bring warm, saline water that is less dense from the tropics. As the warm tropical water cools, giving up its heat to the atmosphere, it moves northward and sinks to the deeper portion of the ocean pulling more tropical warm water from the south. This phenomenon, known as the “conveyor belt,” not only moves needed nutrients around the globe but also balances the warm waters of the tropics against the cold polar water of the globe. The oceans account for the other half of the heat redistribution system, but act on a much slower rate than the atmosphere (Gagosian 2003). The ocean can store 1,000 times more heat than the atmosphere. Ocean circulation is responsible for some of the long-term and large-scale climate change.

The president and director of Woods Hole Oceanographic Institute Robert B. Gagosian (2003) suggests that with global warming the northern ice masses melt, diluting the imported warm tropical waters so that the sinking process could stop or be deflected to another area. The resulting cooling would affect the temperature (perhaps lowering the annual temperature by 5°C) in Europe and North America, plunging the northern hemisphere into another ice age. The change to a cooler climate could come quickly (in the order of 10 years) and take perhaps 1,000 years to be restored. This appears to have happened several times in relatively recent history as observed in cored ocean-bottom sediments.

While we can't change abrupt climate shifts we *can* study the causes, using science and throwing out bad science so we will not be led down the garden path. An informed science community can perhaps adapt to either a warmer or a colder climate.

Again quoting the Friends of Science:

Astrophysical factors (the variation of solar radiation reaching the earth), and variations in global deep and shallow ocean currents are in large measure responsible for changes in the planet's climate.

A new paper published by NASA, titled “A Chilling Possibility,” reviews the process outlined in Gagosian (2003). The paper then continues to describe current research being carried out by NASA to confirm if in fact the ocean conveyor is slowing down. This paper is available on line: <http://science.nasa.gov/headlines/y2004/05mar_arctic.htm?friend>.

The conveyor belt might indeed stop again as it probably has in the past. NASA has several satellites keeping watch over the Arctic ice mass. A Japanese-built sensor using microwaves is able to “see” through clouds and to monitor the melt rate of the polar ice cap. A British-supported research ship has been setting current monitoring sensors in the Atlantic Ocean to check the Gulf Stream for signs of slowing.

The American Association of Petroleum Geologists (AAPG), with more than 30,000 members, has published a policy on climate change. Here is the Background statement:

Geologists know:

1. Climate is constantly changing, and has varied significantly over human history. Climate changes over any time scale chosen, whether as small as a decade or as long as a geologic era.
2. Natural variability has been demonstrated to exceed any supportable estimate of human-induced variability.
3. Earth is still emerging from the Little Ice Age (AD 1250–1850). Significant rises in global temperature are a predictable consequence. The current level of global warming is real and natural.
4. Geologic controls on climate are significant. Long term changes can be demonstrated to occur congruently with geologic tectonic changes. Little is truly understood of the controls on short term changes. Solar variability, for instance, is significant in centennial to millennial changes, among other possible controls that should be examined.
5. Attempts to engineer Earth’s very complex climate before understanding natural controls on climate are risky, if not impossible. (from the AAPG website: <http://www.aapg.org/gac/papers/climate_change.html>)

The AAPG summarizes its findings in the following points:

- Science requires that all aspects of theory be investigated and that assumptions be tested.
- Human-induced global temperature influence is a supposition that

can be neither proved nor disproved. It is an unwise policy to base stringent controls on energy consumption through taxation to support a supposition that cannot be substantiated.

- Climate naturally varies constantly, in both directions, at varying rates, and on many scales. Warming events have been historically good for most human society, while cold events have been deleterious to much of society. It is vital that climate research to examine the effects of a colder climate also be supported. Critical target areas of this research should include the potential impact of climate change on food production. Further research should concentrate on mitigation techniques to combat any serious effects of either colder or warmer climate, naturally or artificially caused, on the ability of the world to feed itself.

The AAPG urges that any actions to implement or to ratify the Kyoto Protocol and any future declarations of climate policy be delayed until there is better understanding of present climate and the impacts of policy implementation, as well as some provision for mitigating errors in policy. There is no current viable substitute for petroleum-based fuels in the world's energy budget and economy.

In a similar manner, the Canadian Society of Petroleum Geologists (CSPG) has published a position paper on its website: "CSPG Position on Global Climate Change Science." This organization of 3,500 members across Canada and the world has taken a strong position, stating that expert opinions expressed by the CSPG "focus entirely on the science of global climate change, and do not address the political and economic issues which dominate the media. . . . We must say very strongly, however, that the science is the basis of the entire climate change debate – arguments built upon a poor understanding of the science are doomed to be wrong." (<http://www.cspg.org/CPSG_Climate_Change_Backgrounder.pdf>)

The "CSPG Backgrounder" concludes:

1. Global climate change has been a constant throughout the history of the earth . . .
2. . . . there is not a good correlation between atmospheric CO₂ and global temperatures.
3. . . . GCM (global circulation model) predictions of warming trends through the 21st century have decreased systematically as the models

have become more sophisticated.

4. These observations suggest that global climate change is a natural and fundamental part of earth history and that the effects of human activities on global climate are no more than a poorly understood fourth-order factor.

The CSPG website lists many references on the subject (see <http://www.cspg.org/body_climate_change.html>).

I have recently found a very interesting paper that presents another factor to climate change: the galactic cosmic ray flux (CRF) and the effect of CRF on climate during the Phanerozoic (the past 545 million years) climate (Shaviv & Veizer 2003).

Another recent item appeared in the May 13, 2004, Halifax *Herald*. In “Kyoto: the motion picture and the big picture,” columnist Bogdan Kipling quotes Richard B. Alley, professor of geoscience at Pennsylvania State University. At last some of the members of the press are becoming knowledgeable in these matters.

So, to answer my question in the title of this paper – Are we really getting Global warming? – I hasten to say Yes, a little, but not as much as we are led to believe. In fact, the IPCC has revised downward its published warming change several times since it first published its predictions (de Freitas 2002, p. 313).

It is now widely understood by the scientific community that CO₂ is not the cause of any detectable warming. In fact, CO₂ content *follows* warming trends, so one can only conclude that CO₂ is not the cause of warming. I submit that climate change is caused by the factors outlined in this paper, such as orbital changes of the Earth, radiation from the Sun, and, more recently, the amount of cosmic radiation falling on the Earth (Jones 2002). These are the factors that cause temperature changes in the atmosphere and the ocean currents.

Focusing our attempts to curtail CO₂ at great cost (at the risk of our taxes in Canada) will not stop or curtail or reverse climate change. Shaviv and Veizer (2003) suggest that we should be saving our money being spent on

the Kyoto Accord and spend those funds on human poverty worldwide.

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Eastern Annapolis Valley Weather

Summer 2004

by Larry Bogan, Cambridge Station, NS

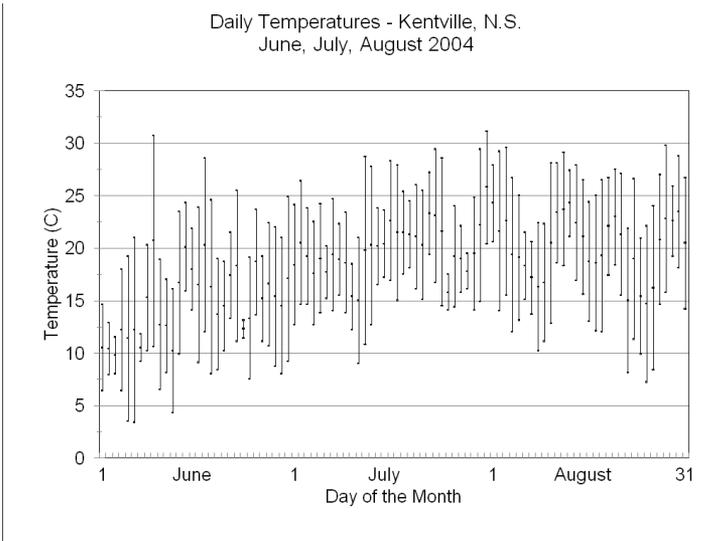
Overall it has been a humid summer. Although there are no average humidity statistics for Kentville, when considering the distribution and size of rainfalls and general cloudiness, I think it is a safe assumption. The humidity is available for Kentville on an hourly basis. If you would like to look at it, go to the Environment Canada Climate Archives at <www.climate.weatheroffice.ec.gc.ca/climateData/menu_e.html>.

	Mean temperature (deg.C)	Rain (mm)	Bright sunshine (h)	Degree-days above 10 deg.C
June	14.8	56	220	143
(43 yr. average)	(16.1)	(67)	(220)	(184)
(5 yr. average)				(212)
July	19.8	62	176	305
(43 yr. average)	(19.4)	(69)	(233)	(289)
(5 yr. average)				(307)
August	20.1	65	164	314
(43 yr. average)	(18.7)	(90)	(217)	(271)
(5 yr. average)				(308)
Season	18.3	183	560	762
(43 yr. average)	(18.1)	(226)	(670)	(744)
(5 yr. average)				(827)

Source: Food & Horticultural Research Centre, Kentville, NS.

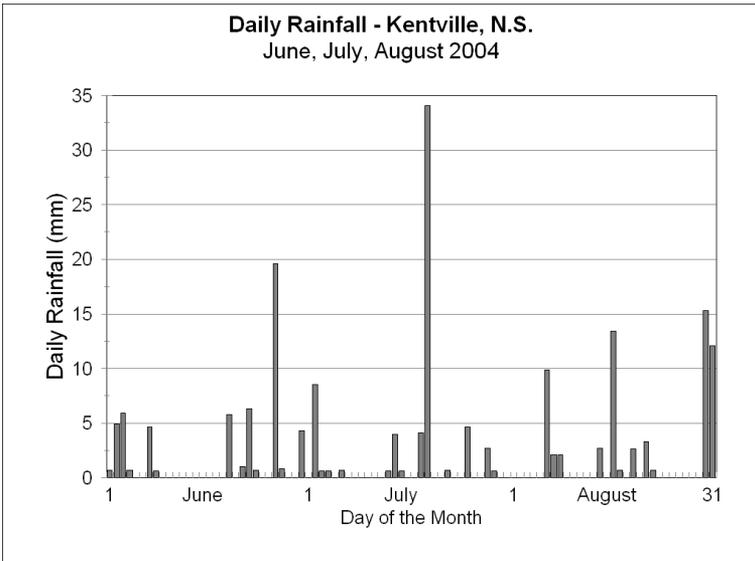
Temperature

We have had a very normal summer in terms of temperature. The mean maximum, minimum, and average temperatures for the season are all close to those over the last 43 years. I have included the temperature chart to show the rather uninteresting spread in temperatures for the season. If you count the number of days with maximum temperatures above 25°C you will see that 36 of the 92 days were that warm. Only three days were 30°C and above.



Rain

The chart of rainfall throughout the season shows good distribution throughout the summer, but this was still below the long-term season



averages (80% of the 43-year average). In the rainfall chart you will notice that there are only three days with more than 1 cm of rain. Most of the rain days had less than 5 mm per day.

Sunshine

June had average sunshine hours for the month, but July and August were excessively cloudy (without rain), which reduced the sunshine hours to only 75% of the average for those months.

Summer is the growing season, and we have been having good warmth for growing plants these last few years. As you would expect by looking at the temperatures, the growing degree-days above 10°C was only a little above the long-term average this year. If you look at the last five years, you will see that June, July, and August averaged respectively 212, 307, and 308 degree-days. The total of 827 for the season is 11% above the 43-year average, which means that this summer was below the average for the previous five years.



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What's In The Sky?

by Roy Bishop

New Moon: October 13, November 12, December 11, January 10

Full Moon: September 28, October 28, November 26, December 26,
January 25

Winter begins on Tuesday, December 21, at 08:42 AST

A Cookie and the Great Pumpkin (October 27)

On Wednesday, October 27, there is a total eclipse of the Moon. Thus, four days prior to Halloween, Charlie Brown's "Great Pumpkin" will float above farmers' fields. The photo for October on your BNS Calendar is of an earlier appearance of the Great Pumpkin.

The Moon will be well into the penumbral shadow of Earth by 22:00 that evening, and the eastern side of the Moon will be noticeably dimmer than its western side. At 22:14 the Moon begins to enter the dark umbra and during the next hour will resemble a cookie that has an increasingly large bite taken out of it. Around 23:20 the last part of the cookie gradually disappears and is replaced by the Great Pumpkin, which casts its spell for more than an hour, with mid-eclipse occurring at 00:04. At 00:44 the Moon begins to leave the umbral shadow as a white sliver of a cookie reappears and slowly becomes whole again by 01:54. The Moon is not out of the penumbra until 03:03, but it will appear to be back to normal by 02:30. (CORRECTION: The eclipse times given on your BNS calendar are for ADT, not AST as stated on the calendar.)

During a total lunar eclipse, in the lunar sky Earth covers the Sun. Thus an astronaut on the Moon would see a total solar eclipse. The only appreciable light illuminating the lunar surface is that from a ring-like sunset surrounding Earth. Depending on the amount of cloud and dust in Earth's atmosphere, the sunset light reaching the Moon will be orange or reddish in colour, and can be quite bright or very dim. There have been no major volcanic eruptions in the past year or two, so likely there is not much dust in Earth's atmosphere, and the upcoming lunar eclipse is expected to be fairly bright and colourful.

A total lunar eclipse is one of nature's most beautiful and unusual sights. Be sure to view it in binoculars, and show it to a child. The best time for a quick look is around 23:20.

Bright Planets in the Morning Twilight (November 4, 5, and 9, 10)

Venus, the brightest star-like object, is unmistakable in the pre-dawn sky this autumn. On the mornings of Thursday, November 4, and Friday, November 5, the two brightest planets, Venus and Jupiter, appear close together in the morning sky. This is a relatively rare occurrence and presents a great twilight photo opportunity, especially if the photo includes a foreground object such as a tree. The planetary pair will be low in the southeastern sky. Set up your camera on a tripod by 5:30 a.m. and take several photos as the sky brightens over the next hour or so. Use 100- or 200-speed film, an f-stop of 2.8, and time exposures ranging from 20 seconds down to one second.

On the mornings of Tuesday, November 9, and Wednesday, November 10, the waning crescent Moon joins Venus and Jupiter to make an even more attractive grouping, although the two planets will not be as close together as they were a few days earlier. The Moon passes directly in front of Jupiter, but this "occultation" occurs at noon on November 9, so it will not be visible without a telescope.

December Meteors (December 13)

The Geminids are one of the best meteor showers of the year. This is a good year for viewing these "shooting stars," since the Moon is near its new phase. The peak of the shower is expected on Monday night, December 13/14. If the sky is clear that evening, bundle up and take a walk far away from bright streetlights to watch these meteors decorate the frosty heavens. Over two thousand years ago the Roman poet Virgil wrote these lines about meteors:

Oft shalt thou see, ere brooding storms arise,
Star after star glide headlong down the skies,
And, where they shot, long trails of lingering light
Sweep far behind, and gild the shades of night.

A Moonlit Christmas (December 24–27)

With Full Moon on Boxing day, a bright Moon will decorate the clear evenings of Christmas 2004. It has been eight years since we have had a Full Moon so close to Christmas. Near midnight each evening the Moon will also be very high in the sky. Two aspects of celestial geometry are responsible for the Full Moon's being almost overhead at these times:

- Because it is the winter solstice, the Sun is low in the south in our noontime sky. Thus the Full Moon (which is opposite the Sun in the sky) will be high toward the north in our midnight sky.
- The Moon's orbit is tilted to that of Earth, and slowly wobbles with an 18.6-year cycle. We are approaching the point in the wobble cycle that most augments the high northerly position of the Moon.

In the same way that identifying birds on a Christmas Bird Count adds a special touch to the yuletide season, understanding why the Moon will be riding high in the midnight sky will add to a naturalist's enjoyment of Christmas 2004.

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Sources of Local Natural History

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Information	Source	Office	Home
Amphibians & Reptiles	Sherman Bleakney		542-3604
	Jim Wolford	585-1684	542-9204
Astronomy	Roy Bishop		542-3992
	Sherman Williams	542-3598	542-5104
	Larry Bogan		678-0446
Birds – General	Bernard Forsythe		542-2427
	Richard Stern	678-4742	678-1975
	Gordon & Judy Tufts		542-7800
	Jim Wolford	585-1684	542-9204
	Jean Timpa		542-5678
Butterflies & Moths	Jean Timpa		542-5678
Fish	NS Dept of Natural Resources	679-6091	
Flora – General Fungi	Ruth Newell	585-1355	542-2095
	Nancy Nickerson	679-5333	542-9332
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Mosses & Ferns			
Mammals	Tom Herman	585-1469	678-0383
Rocks & Fossils	Geology Dept Acadia U.	542-2201	
Seashore & Marine Life	Sherman Bleakney		542-3604
	Jim Wolford	585-1684	542-9204
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