

# *Beyond* THE *Tides*

The Seasonal Journal of the Blomidon Naturalists Society

WINTER 2024

Vol. 51 No. 1

Fostering Forest  
Biodiversity

Vanishing  
Forests

Understanding  
Solar Eclipses

## FROM THE EDITOR

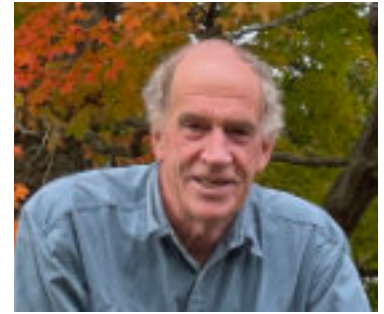
I don't believe the adage that 'you cannot teach an old dog new tricks.' In fact, that's why I enjoy this role. As an editor, I learn so many interesting things before you ever see the issue. This issue has taught me more than most. The theme is *Caring for Forests*, and it takes a deep dive into the realities, feelings, and possibilities for these ecosystems that are so essential to our health and well-being.

I had never heard of a "Medium Retention Continuous Cover Irregular Shelterwood (MIRC) prescription," but this is an important detail, though I wish it wasn't, of Nina Newington's story on our vanishing forests. I need to appreciate the details to have the knowledge to be an informed citizen and advocate for restoring forests. Soren Bondrup-Nielsen's article on the history of forestry in Nova Scotia reinforced for me how important it is to remember the long view. It makes the old mill picture from the 1890s in the Gaspereau River trail description by Peter Wallace that much more powerful. Indeed, ecosystems renew themselves if humans leave them alone for a bit.

Learning is not just for the mind, but also the heart, which Wil Bruner persuasively reminds me in

advocating that we all slow down and appreciate the natural communities of which we are a part. Finally, Patrick Kelly takes us

on an adventure into outer space to appreciate a 'saros' and an 'exilgmos.' You don't know what you don't know, until you do, which is the beauty of editing and reading this issue. I had never given thought to why eclipses turn up when they do. I just assumed the media would tell me when the time was near, and that would be well enough. I was then quite pleased with myself to identify an astronomical inconsistency in the draft version of the article late in the editing process, only to find out that there is another 'messy' layer of understanding to be mastered beneath what I had learned. Learning expands our worldview; we gain confidence and more ability to act on our knowledge. I hope this issue does that for you, and particularly helps you to reflect on and advocate for the health of our forests, and your role in caring for them.



Alan Warner

editor@blomidonnaturalists.ca

## LAND ACKNOWLEDGEMENT AND RECONCILIATION



Blomidon Naturalists Society activities take place in the district of Sipekne'katik in Mi'kma'ki, the traditional, ancestral and unceded territory of the Mi'kmaq. This territory is covered by the "Treaties of Peace and Friendship," first signed in 1726. These treaties did not imply or affirm the surrender or transfer of land to the British, but recognized Mi'kmaq and Wolastoqey title, and a set the rules for what was to be a long-standing relationship between nations.

We are grateful above all to the land, air, water, and countless non-human beings that make life possible and inspire us every day. We recognize that outdoor learning, exploration and recreation would not be possible without access to the natural world, which has been stewarded for thousands of years by the many Indigenous peoples of this land. We have a responsibility to honour and learn about their histories and current cultures, and to actively work in support of reconciliation. We are committed to fostering respectful and sustainable relationships with the Indigenous peoples of this land, with all other organisms, and with the land and the water. We are all Treaty People.

*Beyond the Tides* is committed and working to include Indigenous voices and perspectives in this publication, and we are committed to a process of relationship-building to facilitate contributions from Indigenous peoples. We also recognize the 400+ year history of communities of African descent and the 50 African Nova Scotian communities throughout the region today, and are committed to seeking out their perspectives, and those of others not traditionally included in the work of the Society. We invite you to contribute to this process and/or encourage others to do so. We welcome all comments and suggestions.



# Beyond THE Tides

WINTER 2024, Vol. 51 No. 1

## FEATURES—CARING FOR FORESTS

---

- 3** Planting Seeds for Forest Biodiversity *by Gary Schneider*
- 7** Shady Accounting and Vanishing Forests  
*by Nina Newington*
- 14** Forest Bathing: Connecting with Mindfulness and Care  
*by Wil Bruner*
- 17** Forest Use in Nova Scotia: Past, Present, and a Potential Future *by Soren Bondrup-Nielsen*



## TAKING ACTION

---

- 20** Beyond Repairs—The Pop-Up Bike Hub *by Simone Mutabazi*
- 22** Protecting the Jijuktu'kwejk Watershed: Restoration on the River *by Shauna Forrestall*



## A NEAT PLACE TO EXPLORE

---

- 24** Gaspereau River Trail—A Winter Beauty *by Peter Wallace*

## NATURE WATCH

---

- 26** What's Up in the Night Sky? *by Patrick Kelly*

## NATURE SPOTLIGHT

---

- 28** Metronomes, Windshield Wipers, and Understanding Solar Eclipses *by Patrick Kelly*

## KIDS AND YOUTH

---

- 31** Fun Winter Activities *by Alan Warner*

## REVIEWS

---

- 32** Earthkeeping *review by Wendy McDonald*
- 33** Silent Earth *review by Larry Bogan*



# OLD FORESTS

I feel very fortunate to have lived close to forests my whole life. Being in a forest gives me a sense of peace and tranquillity. We evolved on the savannah, but we share an ancestor with chimpanzees and bonobos that lived in the tropical forests of Africa. In a sense, we emerged from the womb of the forest. What child does not like to climb in trees, or swing from the bars of climbing structures at playgrounds? So, although humans evolved and learned to walk upright on the savannahs, we have an affinity for forests.

Spending time in an old forest, where the trees are several hundred years old, towering way above you, can be a magical or indeed a spiritual experience. In moderate summer temperatures the wind is dampened, and there is an aroma of pleasant earthiness, which is calming. In an old forest, we are dwarfed by age and size; you cannot help but be in awe and feel respect.

Several years ago, I came across a clearcut of a hemlock stand. Traversing this cutover, I was hampered by a tangle of dead branches and ruts from machinery. It had been a magnificent stand; all the stumps were hemlock, measuring a metre or so in diameter. I came across one with no rot in the centre, and counted the growth rings. This tree had sprouted in the mid-1600s, well over 300

years ago. I was saddened; it had probably only taken minutes to cut it down. Who knows what age it could have attained? This seedling had taken almost 50 years for its trunk to reach the diameter of a loonie. Then it exploded in growth, probably due to a sizeable adjacent tree dying, giving it light, and allowing it to grow fast. Hemlocks are shade tolerant; they can survive in very low light. Stands regenerate through a process called gap dynamics. When an old tree dies or blows over, a waiting small hemlock will grow quickly to fill the gap.

We are losing our chance to experience what a forest can be when we primarily encounter young, dense thickets of fast-growing, but short-lived, trees. With all the wood harvesting taking place, it is challenging to find and experience the magic and awe of being in an old forest.



Soren Bondrup-Nielsen

President, Blomidon Naturalists Society



*The primary objective of the Blomidon Naturalists Society is to encourage and develop understanding, appreciation, and stewardship of nature in its members and the interested public. The word 'nature' is interpreted broadly and includes rocks, plants, animals, water, air, and the stars. We are a community grounded in nature exploration, education, and stewardship. We welcome everyone who is curious and wants to learn and share about nature. Our core values are environmental stewardship, building a connection to nature, community engagement and diversity, and collaborative knowledge -sharing.*

## BNS EXECUTIVE

Soren Bondrup-Nielsen, *President*  
soren@bondrup.com

Carolyn Green & Judy Lipp,  
*Co-Vice Presidents*

John Burka, *Secretary*

Doug Muldoon, *Treasurer*

## DIRECTORS

Tim Burns, Guy Stevens, Alison Stewart,  
Kelte MacNeil, Alan Warner,

## PRINTING

Advocate Printing

## COORDINATOR

Spencer Laing

## PUBLICATION EDITOR

Alan Warner  
editor@blomidonnaturalists.ca

Thanks to Janet Alsop, Dave Shutler,  
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## DESIGN

Alan Warner, David Edelstein

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THE BLOMIDON NATURALISTS SOCIETY  
P.O. Box 2350, Wolfville, NS, B4P 2N5  
www.blomidonnaturalists.ca | info@blomidonnaturalists.ca

# Planting Seeds for Forest Biodiversity

We will never have enough time, energy and funding to fix all of our damaged forests. If we put seed sources in place, nature will spread the future seed and help restore biodiversity.

BY GARY SCHNEIDER

The simple act of planting a seed can be a critical step in the restoration of biodiversity in our Wabanaki/Acadian forests. Thinking that you can't make a difference only leads to inaction, and there is already enough of that to go around. Growing and re-introducing native plants is one of the most joyful and inspiring things you can do.

When I think about growing native plants, I see my daughter collecting acorns, my friends gathering seeds of rare plants around their homes, and volunteers who want to take positive action. Collecting seed is a wonderful act, but when you see American robins nesting in a tree you have grown from seed, or northern flickers feeding on a fruiting shrub that you planted, that's when the smiles really break out.

A consistent message that I try to pass along to woodlot owners, conservationists, and students, young and old, is that we can make a difference in the health of our Wabanaki/Acadian forests. Some of the following

articles in this issue look at the broader problems with government policies and industrial harvesting. These challenges have to be addressed and we need to press government and industry to make changes in a wide variety of areas. There are also things we can do as individuals.

Improving biodiversity can only occur when we start looking at healthy forests broadly, including all of the gifts they provide. One of my favourite quotes is by Dr. Ken Lertzman, Forest Ecologist at Simon Fraser University. He says that "New Forestry is an attempt to define forest management with timber production as a by-product of its primary function: sustaining biological diversity and maintaining long-term ecosystem health."

This is such a different way of looking at forests, and makes no sense if you own a pulp and paper company looking to extract as much low-cost wood as you can. Nor does it resonate with some landowners who seek



Gary Schneider exploring a young and flourishing forest.

to maximize profits. Even governments would rather talk about job creation and tax revenues than healthy forests. However, it is absolute wisdom for biodiversity, both flora and fauna. It rings true for the general public concerned with carbon storage, clean air, and clean water. Recreational fishers, tourist operators, hikers, and forest schools can all get behind this philosophy.

## Starting from Scratch

When the Environmental Coalition of Prince Edward Island started the Macphail Woods Ecological Forestry Project in 1991, it was based on the idea that waiting for government to change forest policy was tantamount to giving up. We started a small native plant nursery, concentrating on trees and shrubs—especially rarer plants that no one was growing. Species such as ironwood, witch hazel, and hobblebush were very hard to find in the province. The hunt for seed became a bit of a preoccupation. Gradually, we expanded into wildflowers, and then ferns, both common and rare.

In our initial 12 m x 12 m nursery, we started growing a variety of plants without really having any idea about what we were doing. If we were going to carry out forest restoration and increase biodiversity, we had to have a wide variety of plants available for our work. They simply were not available, so we learned by doing. While we have made mistakes, we have single-handedly had a huge impact on the biodiversity in many forests in Prince Edward Island.

The propagation of witch hazel—one of our rarest and most beautiful native shrubs—provides some insight into our journey. In PEI, it is listed as an S1 species by



Hobblebush berries

the Atlantic Canada Conservation Data Society. That ranking is for species that are critically imperiled in the province, or because there have been sharp declines and it is vulnerable to extirpation here. Witch Hazel has become very rare due to extensive land clearing for agriculture and intensive harvesting of wood. With most of our older forests cut, there are few seed sources left and little appropriate habitat.

We went from scrambling around the base of the few witch hazel plants in the wild—without really knowing what we were doing—to growing thousands of plants that are now scattered across the province and producing seeds.

If you're waiting for government to start growing ironwood, hobblebush, red trilliums, or Braun's holly fern, you're bound to be disappointed. Instead of waiting for someone else to start restoring the



Baby nodding trilliums.

diversity of our woodlands, why not take the initiative? For most plants, it is a simple matter of finding healthy specimens that are producing seed, collecting and processing the seed, and having patience. It could just be a small garden bed or a larger area tended by a watershed group. Some excellent publications, such as Henry Kock's *Growing Trees from Seed: A Practical Guide to Growing Native Trees, Vines and Shrubs*, and our own [macphailwoods.org](http://macphailwoods.org) website, are available to help guide your efforts.

One caution about seed collecting is to avoid the typical pattern of seeing more as better. Follow the guidelines of the "Honourable Harvest," offered by Indigenous biologist and author Robin Wall Kimmerer in her visionary book, *Braiding Sweetgrass* (see adjacent box).

## The Art of Restoring Forests

Once you start growing native plants, then what do you do with them? Restoring forests is an art, not an exact science. We have to understand the needs of the plants, and where to place them, so that they will thrive. This is not math—rows of white spruce regularly spaced. It's more like 'what's missing from this area that could have a positive impact?' Is there winter food available for fruit-eating birds? Are there early flowering plants that are so important for pollinators? Is there a sufficient amount of high-protein nuts and seeds in the area?



Acorns for planting

## The Honourable Harvest

The Honourable Harvest, as defined by Robin Wall Kimmerer, is "a practice both ancient and urgent, applies to every exchange between people and the Earth. Its protocol is not written down, but if it were, it would look something like this:

- Know the ways of the ones who take care of you, so that you may take care of them.
- Introduce yourself, be accountable as the one who comes asking for life.
- Ask permission before taking. Abide by the answer.
- Never take the first. Never take the last.
- Take only that what you need.
- Take only that which is given.
- Never take more than half. Leave some for others.
- Harvest in a way that minimizes harm.
- Use it respectfully. Never waste what you have taken.
- Share.
- Give thanks for what you have been given.
- Give a gift, in reciprocity for what you have taken.
- Sustain the ones who sustain you, and the Earth will last forever."<sup>1</sup>

A healthy Wabanaki/Acadian Forest has all of these things and more, but the numbers of this or that plant are really not that important. This is where art comes into play. If I have fifty painted trilliums to plant, do I want them in a single block or ten blocks of five plants? We want to put them in places where they will thrive, but at what rates? I learned some of this from visiting a watershed planting that had seventeen lovely, tall yellow birch. The group had done a great job planting and tending these trees. Yet I couldn't help but wonder if three or five wouldn't have been enough, with the rest going to other places along the river that had no seed sources for yellow birch. This got me thinking about developing a partnership with nature. We will never have enough time and energy and funding to fix all of our damaged forests. If we put seed sources in place, nature—through wind, water, or wildlife—will spread the future seed and play a critical role in restoring biodiversity.

Coming across a beautiful red oak that I have grown from seed is an empowering experience, but the real reward is seeing that tree producing seed, with young oaks scattered across the forest floor. When we start understanding that we are planting future seed sources, that's where real progress can happen.



Butternut in flower

In a large woodland, try to make sure to plant blocks of native species throughout the area that will in the future seed into neighbouring areas (including surrounding properties). The spacing will depend on the species—white ash seeds will be carried by the wind much further than ironwood seeds. Red oak acorns are ably assisted in their travels by blue jays and red squirrels. Species such as black ash and jack-in-the-pulpit are regularly moved along waterways. Since trillium seeds are dispersed by ants, plant them much closer together than blocks of red oak.

There is no blueprint for the exact spacing of plants within a block, or blocks within a particular woodland, though we do use approximate spacings depending on the species.<sup>2</sup> Remember—it's art, not math. As a culture, we worry too much about getting things exact, instead of getting things done.

Plantings should be based on the present health of the forest. I rarely enter a woodland without thinking about what kind of species I can plant. Some old growth forests need nothing, they are still full of life and biodiversity. That is not the type of forest that I typically encounter. I see stands of old field white spruce, conifer plantations, early successional hardwoods, or thickets of balsam fir left over from clearcuts. All lack species diversity and contain

little in the way of high-value trees. These are places where adding even small numbers of native species can create dramatic changes over the long term.

If there are plantations where trees have died (or are of such poor quality that they can be removed without remorse), add high-value trees such as red oak, white pine, and sugar maple. Where there are no long-lived species in the stand, add some that are appropriate to the area. Look at any openings as places to help restore diversity.

In these times of economic uncertainty, it is especially important that we become true stewards of the land. The goal of ecological sustainability should frame your forest practices, while a love of native plants will help give direction to your rehabilitation efforts.

**Gary Schneider is the founder and Supervisor of Macphail Woods. For more information on ecological forestry and native plants, visit [macphailwoods.org](http://macphailwoods.org). He provided the photos.**

## Notes

<sup>1</sup> Quoted from page 183 of *Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants*, by Robin Wall Kimmer, Milkweed Editions, 2015. See the Spring 2023 issue of *Beyond the Tides* for a review of this book.

<sup>2</sup> Here are some ballpark spacings that we have found work well when carrying out enhancement plantings in a forest: plant trees 5-6 m apart; large shrubs (hawthorn, serviceberry, etc.) 3 m apart; small shrubs (wild rose, bayberry, etc.) 1 m apart; fern, 1 m apart; and wildflowers at .3 m apart.



Trout Lilly in the spring



# Shady Accounting and Vanishing Forests

The NS Government claims it is close to having fully implemented the Lahey Report's recommendations. In reality, many have been ignored. This article examines the new 'ecological' approach to harvesting on most Crown land.

BY NINA NEWINGTON

In 2023 Nova Scotians got a taste of what is to come: drought, fire, flood, polar vortex. UN scientists are clear: climate breakdown and nature loss have to be tackled together. Protecting forests is vital. In 2021, Nova Scotia committed to protecting 20% of our lands and waters by 2030, but progress is minimal. Old forests are still being logged. Crown land has been identified for a new round of clearcutting and spraying, but not for conservation. The government's long-promised "Collaborative Protected Areas Strategy: An Action Plan for Achieving 20%," is long on aspirations, short on actions.

There have been changes. After years of pressure from environmentalists, and mounting public outrage at the tracts of stumps and slash where forests once grew, clearcutting is no longer touted as the only economically viable harvest strategy. Government and forestry companies have seemingly embraced "ecological forestry" as recommended by the 2018 *Independent Review of Forest Practices in Nova Scotia*, otherwise known as the Lahey Report.

The government claims it is close to having fully implemented Lahey's recommendations. In reality, many have been ignored. This article examines some changes that have been made, specifically the new 'ecological' approach to harvesting on most Crown land. I'll use specific examples from Goldsmith Lake in Annapolis County to illustrate key issues, but first bear with me as I hack a path through the thicket of jargon, acronyms, and concepts surrounding forestry practices on Crown land.

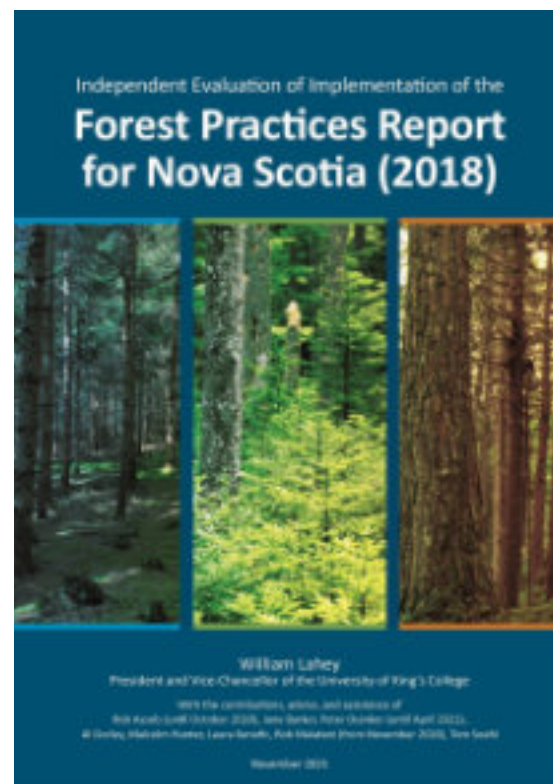
## The Triad Model

The Lahey Report calls for public forest lands to be divided into three zones, a "triad":

- 1) protected areas, called the conservation zone
- 2) the ecological matrix, i.e., "ecological forestry"
- 3) high production forestry (HPF)

The public land in question includes existing protected areas (overseen by the Department of Environment and Climate Change) and Crown land (managed by the Department of Natural Resources and Renewables (DNRR)). The total land base for the triad is a bit over 1,824,000 hectares, or about a third of the province. Protected land currently makes up 35% of total public triad lands; the ecological matrix is 55%; high production forestry is 10%. In their 2021 report,<sup>1</sup> DNRR states:

*The Conservation zone, with no resource extraction, serves as a benchmark for ecological integrity, biodiversity, and natural processes. The Ecological Matrix zone (the largest zone) has the goal of sustaining and/or enhancing natural forest ecosystem conditions and function through a focus on biodiversity*



Cover of Lahey's 2021 evaluation of the Nova Scotia government's implementation of his report, which illustrates the triad. <https://novascotia.ca/natr/forestry/>

management, but where some timber harvesting can occur. The [High Production Forestry] HPF zone is intensively managed for timber production to provide high yields from a relatively small portion of the land base. (p.2)

The triad model for public lands has been accepted in principle and the *Silvicultural Guide for the Ecological Matrix* zone (S-GEM in forestry speak) has been defined and is in use. In their 2023 progress report,<sup>2</sup> DNRR states that “90% of Crown and protected areas land will always be committed to the two zones that prioritize biodiversity” (p.3). The conservation zone as established does protect biodiversity, but is biodiversity really prioritized in the ecological matrix zone?

The *Silvicultural Guide for the Ecological Matrix* is the critical factor, since all harvests in the one million hectares currently assigned to the ecological matrix are based on it. The Guide generates a specific “harvest prescription” for any parcel of land proposed for logging within the ecological matrix, based on information supplied from a “Pre-Treatment Assessment” of the land in question. The medical language, I suppose, is intended to indicate surgical precision and a focus on “healthy outcomes.”

## Forest Accounting 1: An Ecological Rule of Thumb

Do the harvest prescriptions of the *Silvicultural Guide* actually prioritize biodiversity? To answer this,



Moose Country Clearcut, Digby County, 2020. PHOTO: NINA NEWINGTON.



Asitu'li'sk, formerly Windhorse Farm, near New Germany, N.S., provides a superb example of ecological forestry at its best. PHOTO: ULNOOWEG EDUCATION CENTRE.

one needs to know what kinds of forests are best for biodiversity.

The very best forests for biodiversity are old growth forests that have experienced little human activity (excepting Indigenous peoples' traditional practices). Old growth forests contain a rich variety of species. They are complete forests that include every age of tree, from seedlings to fallen ancients, rotting slowly back into the forest floor. With only natural disturbance to contend with, they have had time to develop a complex structure with numerous nooks and crannies, otherwise known as microhabitats. Less than one percent of our forests currently qualify as old growth. The best way to enhance biodiversity in our forests is to leave enough old forests alone to rebuild the stock of old growth.

The worst forests for biodiversity are tree plantations, created by planting one species all at one time after a forest has been clearcut. The result is an even-aged monoculture. These are the sort of forests planned for the 10% High Production Forestry leg of the triad.

What should occur in the mixed-use zone, the ecological matrix, where some timber is to be harvested? Is it possible to do light touch forestry over many decades in a forest, and still have that forest support significant biodiversity? Yes. There are quite a few examples on private land in Nova Scotia. Asitu'li'sk (formerly Windhorse Farm) in Lunenburg County comes to mind.<sup>3</sup>

As a rule of thumb, ecologically acceptable harvests take no more than a third of the forest cover at a time. For forest ecologists, one-third is the absolute maximum removal, already a compromise between the needs of biodiversity and the demands of industrial forestry. If less than two-thirds of the forest is left standing, too much sunlight streams into the forest floor. Soil metabolism speeds up, releasing the carbon that has been stored in the soil. The species that depend on humid, shady, interior forest conditions wither in the wind and sun. Pioneer species, which tolerate a lot of sunlight, crowd out the young of the long-lived, shade-tolerant species. By taking no more than a third of the forest, many of these ill-effects can be avoided.

The forestry industry and DNRR recognize the importance of this limit. For example, WestFor, the consortium of mills that hold the license to manage Crown land forests in southwest Nova Scotia, made this statement regarding their plans for logging around Goldsmith Lake:

*In the 10,000 acres of Crown Land that WestFor manages in the area, about 8 percent (846 acres) has been approved for Partial Harvests over the next several years after much analysis by the experts at the Nova Scotia Department of Natural Resources and Renewables (DNRR). Even in those blocks designated for harvest, two-thirds of the trees will be left standing. The planned harvest is based on Ecological*



New road at Goldsmith Lake, 2022.  
PHOTO: NINA NEWINGTON.

*Forestry guidelines recommended in the Lahey Report, leaving most of the trees in the area unharvested with no clearcuts. (WestFor op-ed in The Chronicle Herald, also submitted to DNRR, November 29, 2022)*

WestFor’s statement signals that they support the Lahey Report’s ecological forestry guidelines, and that these guidelines will result in what are accepted as ecological harvests. On blocks “designated for harvest, two-thirds of the trees will be left standing” with “no clearcuts.” I will use the recent DNRR approved harvest plans around Goldsmith Lake as a way to examine the veracity of WestFor’s statement, and the kind of forestry practices currently being implemented in the ecological matrix.

## Forest Accounting 2: Roads Don’t Count

In October 2022, a month or so before WestFor’s op-ed, a group of citizen scientists hiked into the forest immediately west of Goldsmith Lake to document biodiversity in the area. We discovered a brand-new logging road (pictured above and at left). A passage 30 m wide had been clearcut. Down the middle of it ran a 5.5 m wide road. Logs were still piled to either side, some of them large yellow birch and white pine. Boulders and ditches made it extremely



Drone image of the new road at Goldsmith Lake, 2022. PHOTO: NINA NEWINGTON.



Extraction trails near Goldsmith Lake, 2023.  
PHOTO: NINA NEWINGTON.

difficult to cross from the forest on one side to the other. It turns out that the road had been built three months earlier. It is two kilometres long. Six hectares were clearcut, creating a 30 m wide break in the forest. The new road runs almost entirely through areas proposed for harvesting.

When I called Ryan McIntyre, DNRR’s Resource Manager for the Western Region, to protest, he allowed that the roadway was wider than DNRR likes to see (they prefer 20 m). He also stated that the forest lost to that six-hectare clearcut would not be included in the harvest removal tallies. One hundred percent tree removal for a road somehow equals zero percent removal from the forest. His explanation was that other contractors might use the road too, so it wouldn’t be fair to count the cutting for the road as part of the allowed harvest for whoever had the contract to log the areas adjacent to the road. DNRR sees things from the point of view of forestry contractors, rather than the forests and all the life they support. This much is clear, but it still looks like a blatant wood grab. Why else make the roadway so ludicrously wide? From a biodiversity

point of view, it simultaneously creates a wind tunnel, an obstacle to wildlife, easy access for poachers, and wide seedbeds of disturbed soil for invasive plant species to colonize. This is ecological vandalism.

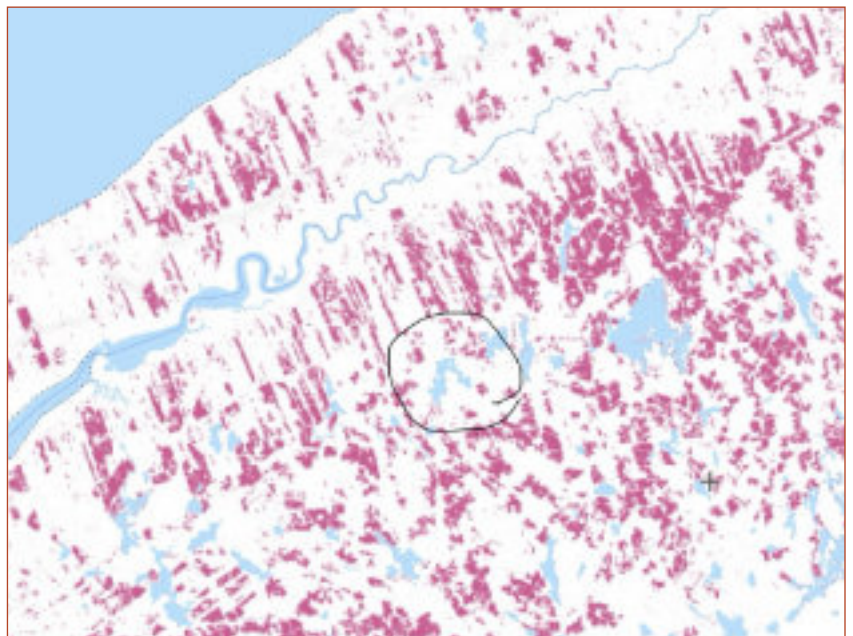
### Forest Accounting 3: Extraction Trails Don’t Count Either

When Ryan and I first talked about the harvest plans at Goldsmith Lake, he told me that none of the plans approved for the area would result in the removal of more than 35% of the trees. I repeated his figure to other people. In July, 2023, someone sent me a field card created by DNRR. It was a summary of the different Silvicultural Guide prescriptions. For the first time it was clear that some harvest prescriptions included the extraction trails in the figures for how much of a forest would be retained—and others did not.

Extraction trails are not roads. They are the trails cut into the forest so the equipment can get in and cut more trees from the ‘leave strips’ in between the trails.

Last winter, logging took place west of Goldsmith Lake in cutblocks near Stailing Lake and Tupper Brook. The prescription for the areas was “Commercial Thinning.” The field card from DNRR for this prescription states: “Remove 1/3 of the basal area (within plus or minus 5%) uniformly from the area between extraction trails (excluding trails).”<sup>4</sup>

Basal area is a way to estimate how much wood is in a forest. Imagine a clearcut forest. Measure the area of



Map showing clearcuts in the last 20 years in Annapolis Co., with the area around Goldsmith Lake circled. SOURCE: WWW.GLOBALFORESTWATCH.ORG



Commercial thinning prescription near Goldsmith Lake, 2023. SOURCE: GOOGLE EARTH.

the cut surface of each tree stump, then add up all those figures, and that is roughly the basal area of that forest. Of course, there are ways to estimate the basal area of a forest without cutting it down first. The Commercial Thinning prescription calls for taking one third and retaining two thirds of the basal area between trails.

How much of the basal area of the forest was removed when cutting the extraction trails? The Silvicultural Guide's prescription standards for all the harvests proposed at Goldsmith Lake state that the trails should not require the removal of more than 25% of the forest. How does that work out in practice? According to DNR's Harvest Inspection Information in April 2023,<sup>5</sup> the actual amount of the forest removed for trails in the Stailings Lake cut was just under 23%.

Removing a quarter of the forest to reach the rest is about average, according to Ryan McIntyre. The one-third that is being removed between the trails is one third of the remaining 75% of the forest after the road was built and the trails went in. A third of 75% is 25%. The total amount of the forest removed in a Commercial Thinning then is 25% for the extraction trails + 25% from the strips between the trails, which equals 50%, otherwise known as a half, not a third.

Not all the harvest prescriptions in the Guide are so complicated. There is one where the prescription is simply to "Remove 1/3 of the basal area (including trails)."<sup>6</sup> None of the harvest prescriptions at Goldsmith Lake fall into that category. Of the 462 hectares

of harvest plans proposed for the area in 2022, 256 hectares are approved for Commercial Thinning. The other 'prescriptions' are: Uniform Shelterwood with Reserves (102 ha), Single Tree Selection, (50 ha), and Medium Retention Continuous Cover Irregular Shelterwood (MIRC) (44 ha). All of these result in the removal of at least 50% of the forest. The MIRC prescription doesn't bother with the trails game, saying simply "Remove one-half of the basal area (including trails)."

It is depressing to conclude that DNR and WestFor lie to the public about what is being done to our public lands. It seems they tell us what we want to hear: "Two-thirds of the trees will be left standing," with "no clearcuts."

There is a great deal more to explore in the Guide. The prescriptions approved for Goldsmith Lake are not 'one and done.' All assume future harvests. The interval between harvests is crucial. The plan for the MIRC harvest prescription, for example, is to take half the forest now, then come back in 30 years and take 80%. After that second harvest, 10% of the trees in the forest will be over 30 years old, 10% will be 30 years old and the rest will be gone, aside from a scattering of reserve trees. Does that sound like prioritizing biodiversity?

One of Lahey's recommendations, which has clearly not been implemented, is his call for a culture change in DNR. There has been some change. I doubt I could have talked with previous DNR regional managers the way I have been able to talk with Ryan. He returns my

phone calls, for a start. We continue to talk. However, in the end, it seems to me that he cannot fathom making biodiversity the priority. The voice of the forestry industry is still so much louder than the voices of scientists across the world sounding the alarm about nature loss, let alone the voices of environmentalists here in Nova Scotia.

## Where Do We Stand?

Lahey's triad model is a trade-off. In return for doing only ecological forestry in the ecological matrix, the forestry industry will be permitted to have their way with 10% of our public lands. Knowing that most Nova Scotians are sick and tired of clearcutting, and detest spraying, DNRR is going to great pains to assure us that the bargain is being kept.

The bargain is not being kept. Biodiversity is not the priority on 90% of the triad. Until it is, High Production Forestry must remain on the back burner. In the ecological matrix, biodiversity should be prioritized on the ground.

- When trees are removed from forests, they count, regardless of whether they are removed to make roads, or extraction trails, or from the strips between the trails.
- As WestFor and DNRR have themselves indicated, leaving two-thirds of a forest standing after a harvest is the minimum for the sort of forestry that can be permitted in the ecological matrix.
- Another limit is to wait for a forest to recover between harvests. The rule of thumb, based on the regrowth rate for Nova Scotia, is to wait a year for every percent taken. Take 25% then you can go back in 25 years. Take 50% and it must be 50 years before you go back for more.<sup>7</sup>

The Guide is a living document. It can and must be improved.



Commercial thinning near Goldsmith Lake, 2023. PHOTO: NINA NEWINGTON.

## An Overarching Priority

Anyone looking at a map of the forest cover lost to clearcutting on the South Mountain in Annapolis County over the last 20 years could have identified the area around Goldsmith Lake as an excellent candidate for protection, solely because it has not yet been chopped to pieces (see map on the page 10). In fact, the retired head of the Protected Areas Branch of the Department of the Environment, John LeDuc, did submit such a proposal to protect the area in February, 2022, however, DNRR went ahead and approved supposedly ecological harvest plans for the Goldsmith Lake area in June, 2022. In July, they allowed the clearcutting of that huge roadway, which runs through old forest and into what turned out to be the 100 m buffer zones around two of species-at-risk lichens. DNRR did not identify any species-at-risk concerns in any of the harvest plan areas. In just over a year, we have identified 31 species-at-risk occurrences around Goldsmith Lake, most of them in approved harvest areas. None of the harvest plans for Goldsmith Lake meet the threshold for ecological forestry. Even if they did, they would not be appropriate in an area that should be assigned to the Conservation zone.

The first step in implementing the triad system must be to designate the Conservation zone throughout the province. The legal commitment to protecting 20% of Nova Scotia by 2030 means that approximately 330,000 hectares will be transferred from the Ecological Matrix zone to the Conservation zone. The Ecological Matrix will shrink from 55% of the triad to 37%.<sup>8</sup> It makes no

sense to allow forestry activities, ecological or not, on lands that should and will be protected in the next seven years. Identifying the areas to be protected requires the broader, landscape level planning that Lahey recommended. Without it, the kind of damage to biodiversity that we have already witnessed at Goldsmith Lake will be repeated. In 2023, DNRR began posting maps identifying potential sites for clearcutting and spraying on Crown land (the High Production Forestry zone), but they have not yet posted any maps showing potential areas for conservation.

The Guide, quoting the Department of Lands and Forests (now renamed DNRR), who in turn was quoting the Lahey Report, states that:

*The Government of Nova Scotia has committed to implementing a triad system on public land that will 'protect and enhance ecosystems and biodiversity as the overarching policy priority, as they are the foundation for other values' (Nova Scotia Department of Lands and Forests, 2018).*

It's been five years. We need action, not obfuscation.

**Nina Newington is a member of the Citizen Scientists of Southwest Nova Scotia.**

## Notes

<sup>1</sup> *High Production Forestry (HPF) in Nova Scotia: Phase 1*, document published on line in 2021. <https://novascotia.ca/ecological-forestry/docs/HPF-phase1-report.pdf>

<sup>2</sup> *High Production Forestry (HPF) in Nova Scotia Phase 2*, document published on line in 2023. <https://novascotia.ca/ecological-forestry/docs/HPF-phase2-guidance-for-implementation.pdf>

<sup>3</sup> See the article on Asitu'li'sk in the Spring 2023 issue of *Beyond the Tides*, volume 50, No. 2, p. 6-7.

<sup>4</sup> Harvest IDs AP0121015 A and C

<sup>5</sup> Dated April 23, 2023, in the case of the Commercial Thinning at Goldsmith AP021015C

<sup>6</sup> High Retention Continuous Cover Irregular Shelterwood (HIRC)

<sup>7</sup> See Karen Beazley's 2021 report: [nsforestnotes.ca/wp-content/uploads/2021/02/Beazley-submission-to-SGEM-review.pdf](https://nsforestnotes.ca/wp-content/uploads/2021/02/Beazley-submission-to-SGEM-review.pdf) and the article by R. A. Seymour, A. S. White, and P. G. deMaynadier (2002). "Natural disturbance regimes in northeastern North America—evaluating silvicultural systems using natural scales and frequencies." *Forest Ecology and Management*, 155, 357-367.

<sup>8</sup> This assumes that of the more than 6% of the remaining NS land still to be protected to reach the 20% target, almost all of it will be public land. Some private land will be bought or donated but it is likely to be minimal. Following the most recent announcements, 13.45% of NS is protected.



# BLOMIDON NATURALISTS SOCIETY

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Members receive three issues of *Beyond the Tides* per year plus the monthly e-newsletter and the opportunity to participate in a range of nature programs and field trips. As a registered charity, BNS issues receipts for donations. The membership fee is not tax deductible. Annual membership fees are due Dec. 1. Visit [blomidonnaturalists.ca](http://blomidonnaturalists.ca) to join, or use this form and send an e-transfer, or cheque or money order payable to Blomidon Naturalists Society at its address (see bottom right).

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	Postage: \$4.00 (calendar), \$6.00 (parcel)		\$ _____
	Tax-deductible donation (registration number: 118811686RR0001)		\$ _____
	<b>TOTAL PAYMENT</b>		\$ _____

Please send membership dues and purchases by e-transfer to [treasurer@blomidonnaturalists.ca](mailto:treasurer@blomidonnaturalists.ca), or cut out this form and make out a cheque or money order payable to Blomidon Naturalists Society and mail to:

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# Forest Bathing: Connecting with Mindfulness and Care

Extraordinary things can happen when humans are mindful in nature. We become more aware of, and present with, the more than human world.

BY WIL BRUNER

**B**ack in the summer of 2021, I began guiding introductory forest bathing walks in the wilds of southwest Nova Scotia. In the last third of my training, I was getting more and more comfortable taking adults on one and a half hour sensory experiences, where the only tools of the trade are perhaps a magnifying lens and a cup of tea. A mosaic of thriving Tobeatic beauty also helps, but I can't take credit for that!

After the first few nervous sessions, I began witnessing little bits of magic. Here and there, I heard folks share special memories or details about their lives back in 'the real world'. For some, it had been ages since they had allowed themselves the opportunity to completely unwind. A few even shed some tears. Many of us carry baggage around with us, and it seemed these participants were lightening their loads after only a handful of activities and communal sharing. They were perceiving nature in a brand-new way. Even with my training, I was taken aback.

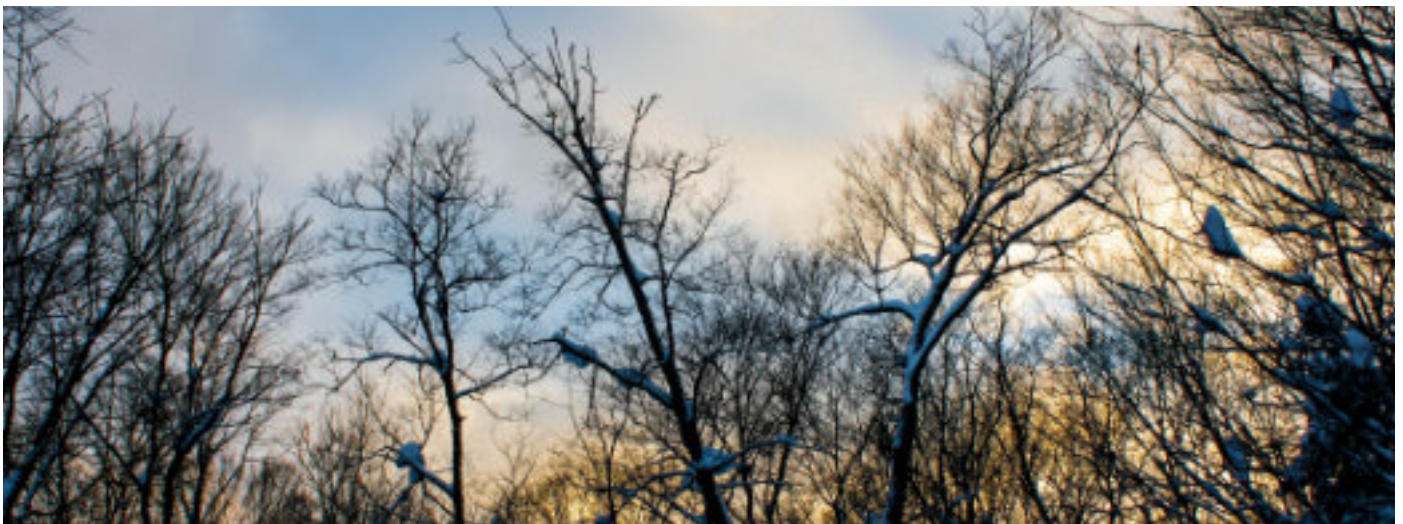
I've learned that extraordinary things can happen when humans are mindful in nature. Allowing the

## *A Simple Invitation*

*I invite you to find a window during daylight hours and take a look outside. For the next few minutes, perhaps you'd like to notice the tips of the tree branches as they reach up towards the sun. What's happening there? Are there other creatures to witness? Do the trees have their own distinct rhythm?*

mind to settle and tune in, we begin to observe and sense things that are easily missed. For example, the shimmering of a spider's web high up in a tree, or the nuanced sound of a little brook. We become more aware of, and present with, the more than human world.

This carefully crafted presence can offer many benefits. Observing nature's constant renewal and resilience can affirm the same processes in humans. Or, we might release our expectations for the day and be more open to new possibilities as they arise.





Perhaps we notice how our body feels in a different way. The fruits of forest bathing are endless, and one never knows what might be experienced in a given moment.

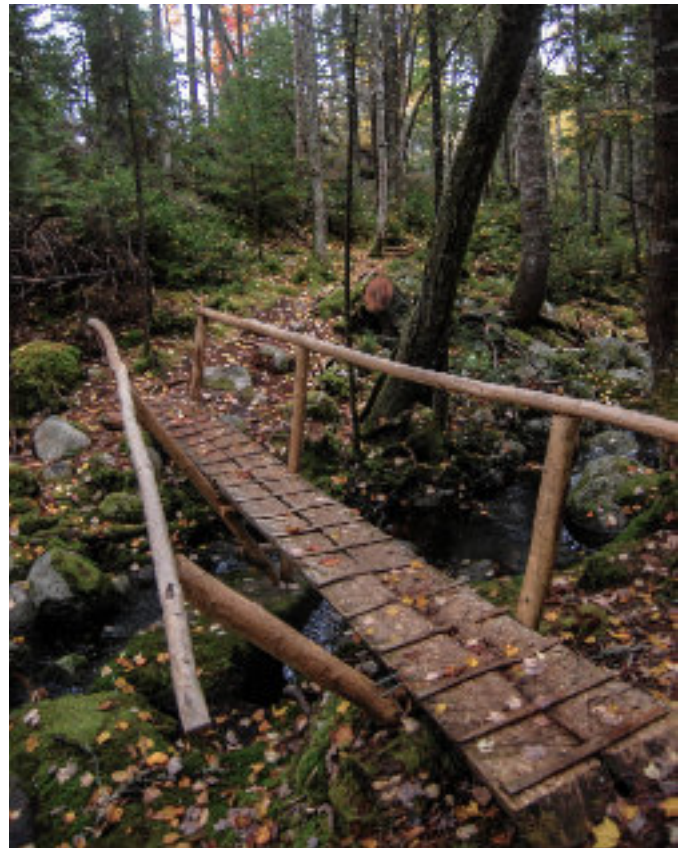
What is forest bathing? Well, it started in Japan back in the 1980's, and has spread across the world since then. No, it doesn't require biodegradable soap and your birthday suit! It's not even really about water. "Shinrin yoku," as the Japanese call it, means bathing or washing one's senses in the natural environment: the sights, sounds, feels, smells, and even tastes. It's a mindful and meditative practice often done in forests, where the only real goal is to slow down and notice what's happening around you. It is a simple thing in theory, but getting to those rich moments in practice can be quite challenging.

I'm trained by the Association of Nature and Forest Therapy, whose approach is based on this Japanese process, and focuses on the heavily researched health benefits of nature exposure to the human mind, body and soul. It's designed for Westerners because many of us experience our own type of nature deficit disorder and a fractured relationship with the natural world. World-wide, forest bathing has become a positive response to addressing chronic illness, overworking, overspending, natural resource depletion, tech dependency, and more. It's one of many pathways to reclaiming, or remembering, humans' innate attunement and bond to the natural world—to the land, waters, and creatures.

### ***A Mindful Walk***

*The next time you find yourself outside and walking a routine path, take a few steps with intention and focus. Maybe you can sense the earth below you? How do you move through this space? How might nature support you?*

For me, the idea of offering forest bathing and nature therapy experiences came after years of working towards healthy landscapes and people in the separate fields of watershed conservation and mental health counselling. Discovering the practice was a lightbulb sort of moment, because it addressed seemingly independent needs via the single and simple act of mindful attention in nature. I felt particularly called to



it, and have been formally guiding community forest bathing walks and nature therapy experiences over the past couple of years.

I hear a lot of folks say, "I spend much of my time outside, travelling and hiking the backwoods of Nova Scotia. I probably wouldn't benefit from a nature therapy experience." And maybe they're right. But the thing is, it's not the what or the where that matters, it really is the how.

One of the first activities I might offer during an experience is to walk very slowly—think a giant snail's pace—and to simply attend to what's moving around you. Avoid thinking; it's about the doing. This can be super straightforward, but many people have a tough time with it. For me, I'm always checking my 'ecologist mind,' and avoiding the habit of recalling species names and their specific traits. There's a saying about that—not seeing the forest for the trees? How can we truly make a connection with a red oak, a blue jay, or a green snake, if we don't pay it the attention it deserves?

I also wear another hat which involves offering environmental education programming for youth and professional development for educators. I've been

extremely lucky, and feel very grateful, to learn about Mi'kmaw and Indigenous ways of knowing related to nature and the environment. As a non-Indigenous person with settler roots, I feel a duty to read, listen, and watch, so that I can treat all beings of this world with more respect and appreciation. Learning how to be thankful for what the Earth gives us, and how to reciprocate that generosity, is something all humans can do in this age of climate crisis and social inequity. I hope that my forest bathing and nature therapy experiences can encourage opportunities to practice the respect and responsibility that Mother Earth needs and deserves.

### **Sit Spots**

*Sometime soon, find a quiet place a little way off the trail. Let yourself wander to a spot you'd like to sit. Take a few deep and slow breaths. What smells might be floating your way? In this place you've found, I wonder how nature might be noticing you? Maybe the trees have their own eyes? And if they do, I wonder what they might see?*

Maybe you have a favourite creature, a nearby nature spot, or an activity that manifests your individual relationship with nature. Perhaps there's a pesky squirrel or garden plant that is at first annoying, but you eventually come to adore. It could simply be the heartwarming feeling you get when the first few stars appear at dusk.



I believe that nature is constantly, unceasingly, and passionately letting you know it's there, and that its support and inspiration is present for you as a home. With all of its diversity and magnificence, the natural world is constantly knocking on your door. I invite you to let it in often and take notice when you do.

**Wil Brunner, creator of Soft Pine Wellness, offers nature therapy and forest bathing experiences based out of his home outside Greenwood, and throughout Nova Scotia. Originally from the Muskoka region of Ontario, his fondest childhood memories of nature involve fishing for bass and waterskiing with his grandpa on Mary Lake. Wil contributed the photos. For more information, visit [softpinewellness.ca](http://softpinewellness.ca).**



# Forest Use in Nova Scotia: Past, Present, and a Potential Future

What is happening in Nova Scotia forests and where might it all lead?

BY SOREN BONDRUP-NIELSEN

Nova Scotia, part of Mi'kma'ki, has a long history of forest use, from clearing forests for agriculture, to sending timbers to France and later England for ship building, to supplying the wooden ship building industry in the 1800s, to large-scale extraction by the pulp and paper and lumber industries, starting in the late 1800s. Just about all of Nova Scotia has been cut over during the last 300 years, and more than just once or twice. Only the most inaccessible areas of the province have not seen an axe, crosscut or chain saw. Government policies with respect to the pulp and paper industry have been frequently criticized since the early 1900s. This history is summarized in the *Halifax Examiner* in a thoughtful 2019 article by Linda Pannozzo.<sup>1</sup>



The "Kings County" was one of the largest wooden ships built at Kingsport in 1890. Here it is in dry dock at Hobarts Wharf, Summerville, Hants West. From Conrad Byers Collection, picture enhanced by Mark Elderkin.

Short-term economics are often prioritized over environmental health in the management of natural resources. The pulp and paper industry enticed governments, liberal, conservative, and NDP, to sweeten their deals, guaranteeing wood supply without considering forest sustainability. In fact, the provincial Department of Lands and Forests, now called the Department of Natural and Renewable Resources, was created back in the early 1900s to support the forestry industry, not to conserve or protect forests.

In the 21st century, massive clearcuts dominate the forest landscapes. There are still trees to support some pulp and paper and lumber production, but much wood is being chipped and shipped overseas

for burning for 'green' energy or fibreboard.

This article provides a statistical snapshot of the trends in forest use and value over the last thirty years, and considers future directions.

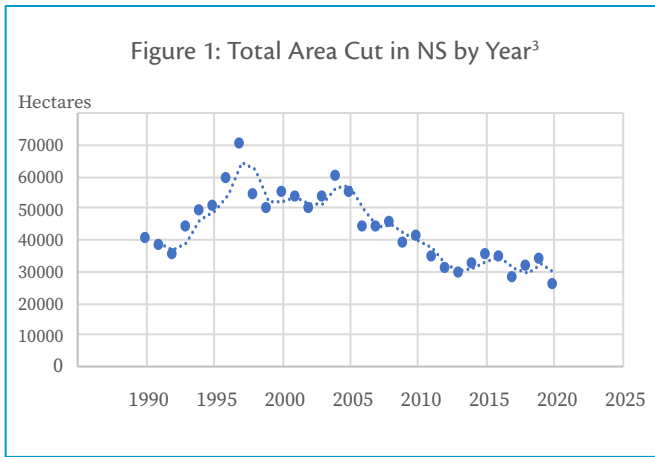
## The Last 30 Years

Nova Scotia is a little over 5.7 million hectares in size, with the largest proportion of land covered by forests. Since the early 1900s, the amount of forested land has increased by more than fifty percent, which is largely a result of marginal agricultural land reverting naturally to forests as many small farms and farmlands were abandoned. The total forested landbase in 2016, excluding protected areas, was approximately 3.8 million hectares. The private and public lands

currently being managed for forestry, the working forest landbase, is a bit over two million hectares. The working landbase excludes forested areas that have other uses.<sup>2</sup>

The following analysis of forestry impact from 1990 to 2020 is based on data obtained from Statistics Canada.<sup>3</sup>

The total forest area cut each year in Nova Scotia peaked in 1997 at almost 70,000 hectares, dropping to 30,000 hectares a year by 2013 (see Figure 1 on the next page). It has been relatively stable since then. Harvesting at a rate of 30,000 hectares per year means that the equivalent of the total working forest landbase would be cut in just over 68 years. On average, a forest stand would be cut every 68 years. A tree this old, regardless of species, is not very large.



Between 1990 and 2020, almost 1.4 million hectares have been cut in total, mainly by clearcutting, representing 70% of the working forested area of Nova Scotia. The volume of wood cut per hectare was highest in 1999, and appears to be decreasing (see Figure 2). Additionally, revenue from the wood cut per cubic metre per hectare dropped from just under \$50 in the early 2000s to \$30 in 2016, with a subsequent increase to about \$40 in 2020 (see Figure 3).

Changes in the structure of the forest industry in Western Nova Scotia were brought about by the closure of the Bowater-Mersey Paper Mill in Liverpool in 2012. This resulted in the Nova Scotia Government acquiring a large amount of forested land previously owned by the Mill. In 2016, WestFor Management Inc., consisting of twelve lumber mills, was created to harvest this newly acquired Crown land. Subsequently, the Lahey Report (*An Independent Review of Forest Practices in Nova Scotia*<sup>4</sup>), published in 2018, called for a significant shift toward more sustainable practices in forest policy on Crown Land. It proposed a division of lands into three categories for forest management purposes, a triad consisting of high

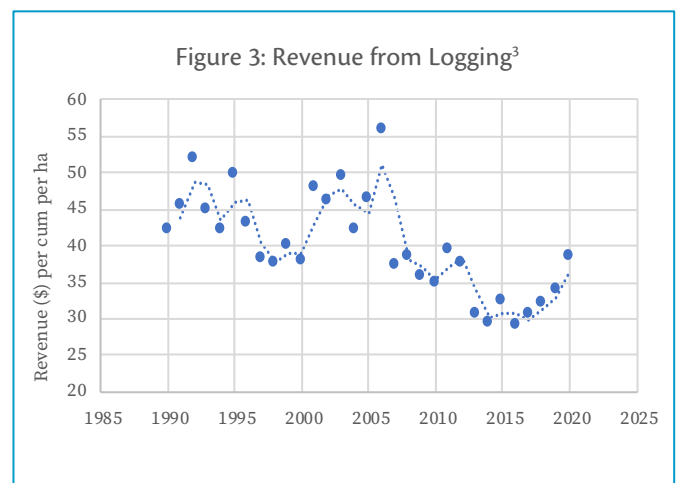
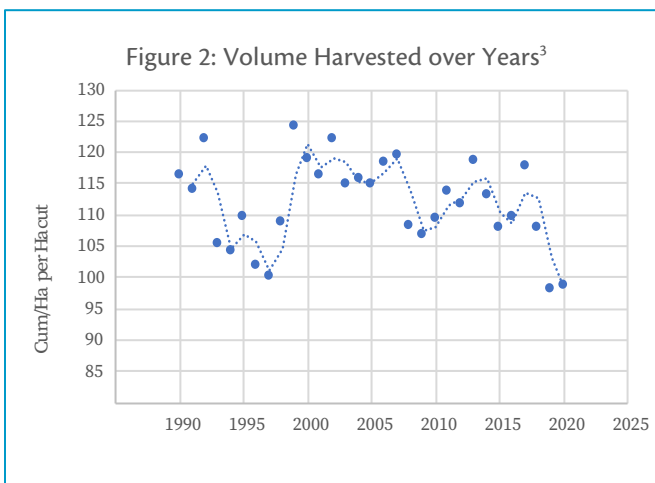


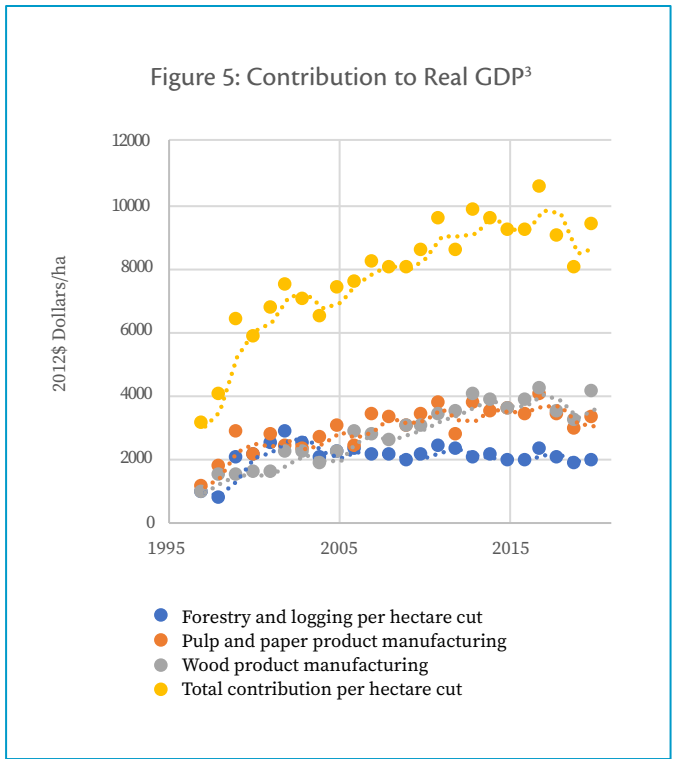
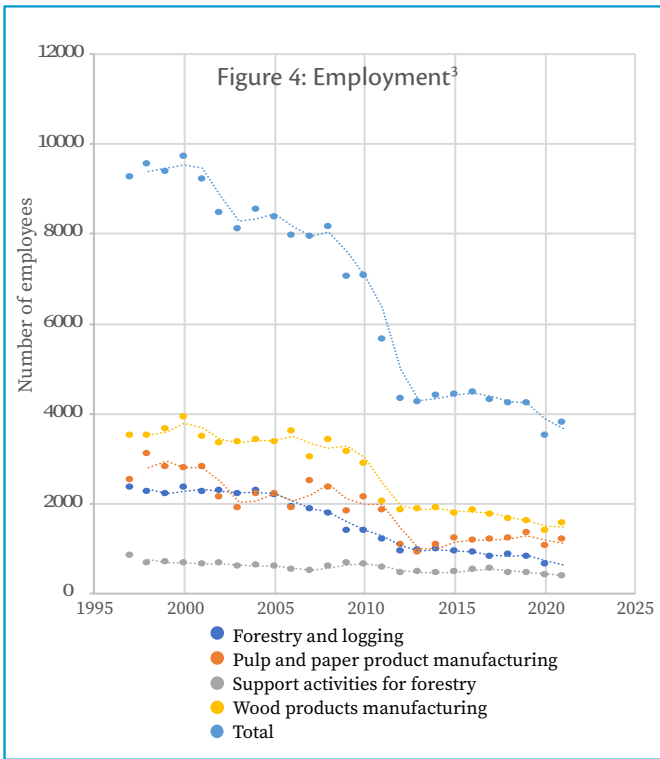
Wood chips waiting to be shipped at Northern Fibre Mill, Sheet Harbour, 2016. PHOTO NORRIS WHISTON.

production forestry, ecological forestry, and protected areas. In examining the charts from 2016 onward, there appears to be some decrease in volume cut per hectare, and an increase in revenue generated per hectare (see Figures 2 & 3), possibly indicating somewhat more selective cutting of trees per hectare. The Nova Scotia Government has been very slow in accepting the Lahey Report, and many question if it actually is implementing the recommendations (see article on page 7).

## Forestry Contributions to the Economy

The economic importance of jobs in forestry is frequently proclaimed by business and political leaders. Yet the data show that increasingly, fewer people are working in the forestry sector. According to Statistics Canada, employment across all forest products industries and services has plummeted from a high of almost 10,000 people in the late 1990s, to 3,800 workers in 2020 (see Figure 4). Only 650 people were specifically employed in forestry and logging across Nova Scotia in 2020, likely due in part to mechanization.





The forestry contribution to what is termed real gross domestic product (GDP) increased up to about 2010, and has then fluctuated in the past decade, averaging around \$9,000 per hectare cut (see Figure 5). GDP is the traditional parameter used to indicate the health of an economy. However, it does not capture the social or environmental impacts of current forestry practices, such as hardship due to loss of jobs, or deterioration of forest health and biodiversity. Last year, with the forest fires in the spring and flooding in summer, the incurred costs resulting from the disasters increased economic health as measured by GDP. How does that make sense?

### What are the Possibilities?

Currently, forest resources are either turned into lumber, chips, or pulp and paper, mostly for export (see table on the next page).<sup>5</sup>

There are limited value-added wood product industries in Nova Scotia. However, with proper forest management, we could have older forests with a mix of tree species of the right size and shape to support value-added wood industries. Just imagine that a single large maple and a single large spruce could be used to build a hundred violins, each sold for hundreds of dollars. Nova Scotia tree species are diverse, and with the correct management regimes, could be used for hundreds of other value-added wood

products, such as furniture. These trees would be selectively cut, leaving intact forests. So instead of fewer people (corporations) making a lot of money, based on the lowest value forest products (chips), more people could be employed practicing specialty



There are many possibilities for selective harvesting and value-added forestry. PHOTO: SOREN BONDRUP-NIELSEN.

talents. We could turn out innovative wood products with a few trees, providing the same monetary value as a whole stand of trees under current practices.

It is encouraging to read about an emerging hardwood lumber business in Cape Breton trying to carve out a niche.<sup>6</sup> In the past, two hardwood flooring plants in

**NS Forest Product Exports, 2019<sup>5</sup>**

Product	Exports \$mil	Primary Destination
<b>Pulp</b>	241	China
<b>Paper</b>	205	
Super-calendared paper	180	US
<b>Wood</b>	185	
Lumber	140	US
Pellets	16	Denmark
Hardwood Chips	11	China
Fibreboard	9	UK

the province have closed, citing a lack of access to Crown Land. It is time for a change.

**Soren Bondrup-Nielsen is President of the Blomidon Naturalists Society and Professor Emeritus in Biology at Acadia University.**

**Notes**

<sup>1</sup> See the historical summary and analysis article of Nova Scotia forest policy by Linda Pannozzo in 2019 in the *Halifax Examiner*. She surveys previous analyses over the past century including the work of Fernow in 1912, and Bissix and Sandberg in 1992. Access at: <https://www.halifaxexaminer.ca/government/province-house/pulp-culture/>

<sup>2</sup> <http://nsforestnotes.ca/stats/>

<sup>3</sup> <https://cfs.nrcan.gc.ca/statsprofile/>

<sup>4</sup> [https://novascotia.ca/natr/forestry/forest\\_review/Lahey\\_FP\\_Review\\_Report\\_ExecSummary.pdf](https://novascotia.ca/natr/forestry/forest_review/Lahey_FP_Review_Report_ExecSummary.pdf)

<sup>5</sup> <https://novascotia.ca/forestry-sector-support/docs/Forestry%20Export%20Opportunities%202020.pdf>

<sup>6</sup> <https://newdawn.ca/2018/02/25/breton-forest-innovation-co-op-aims-to-raise-industry-from-the-ashes/>

# Beyond Repairs— The Pop-Up Bike Hub

Active transportation must be more than an idea. Free, convenient, bike repair in communities in need is important.

BY SIMONE MUTABAZI

It was a humid and overcast day this past June in Annapolis Valley First Nation, and the Ecology Action Centre’s Pop-Up Bike Hub had set up shop for two days, offering free bike repairs, tune-ups, and safe cycling accessories such as helmets, lights, and locks. On the first day, immersed in conversation with community members, we happily tuned up bikes with little thought to the weather. Dark clouds gathered, but we pressed on, with the kids joyfully riding their newly-repaired bikes in the adjacent parking lot. Thunder finally got our attention; it was time to pack up. With the help of community members, we quickly folded the bike stands, stowed the tools, and collapsed our tents. The rain arrived before we could finish, but the sheer adrenalin of the moment carried us through

to



The Pop-Up Bike Hub in Acadia First Nation. PHOTO SIMONE MUTABAZI.



Jessie Crawley from the Bike Hub working with a community member.  
PHOTO SARA FARIAS.

the wet ending. Participants and facilitators alike were committed to the Pop-Up Bike hub, even in the face of inclement weather—it was important to us all.

Experiences such as this one bring the ethos of the Pop-Up Bike Hub to life. It's a solution born of necessity—a mobile bike repair space equipped with tools, supplies, and bike repair knowledge. The project began in 2020, driven by the significant barriers that exclude people from the joy and freedom of cycling: distance to a repair shop, cost, lack of bike repair knowledge and skills, and no way to get a bike to a shop. These barriers prevent people from repairing and maintaining their bikes, which in turn prevent them from riding. The Pop-Up Bike Hub addresses these barriers by offering free and convenient bike repair directly in communities in need.

The project primarily collaborates with Mi'kmaq communities on the mainland and Unama'ki (Cape Breton), as well as African Nova Scotian and other rural communities. Through this work, we've witnessed just how well communities respond to services that make cycling a viable option. To date, we have collaborated with 31 communities and repaired over 1700 bikes!

In Glooscap First Nation this summer, two scorching days were met with an overwhelmingly positive response.

Several community members told us how wonderful it was to have this service, and many remarked that they wished they had it decades earlier. On both days, we were greeted on arrival by people waiting with several bikes. Parents expressed thanks for enabling their children to continue riding, and community members rolled up their sleeves to work alongside us, turning the oppressively hot days into a joyful, collective effort to increase accessibility to sustainable transportation.

By collaborating with communities, meeting them where they are, and connecting beyond the bike, we have

been able to foster meaningful relationships that endure beyond the bike repairs. Active transportation must be more than an idea. The power of accessible services and their relation to environmental and community wellbeing cannot be underestimated.

**Simone Mutabazi is the coordinator of the Ecology Action Centre's Pop-Up Bike Hub project, based in Halifax. She is inspired and invigorated through this work by her love of community-based projects and the joy of cycling.**



The Pop-Up Bike Hub in Millbrook First Nation. PHOTO SIMONE MUTABAZI.

# Protecting the Jijuktu'kwejk Watershed: Restoration on the River

We must recognize that while restoration is rooted in the past, it is designed for the future, and that includes working with the landscape as it stands today.

BY SHAUNA FORRESTALL

Many people living in the Annapolis Valley are keenly aware of the beauty within the Jijuktu'kwejk (Cornwallis) Watershed. Human activities have changed the natural communities in the Watershed in many different ways. Restoration is a way to acknowledge these changes and our role as designers of the ecological landscape. Through restoration, we can tell a story about how we once lived on the land and how we wish to leave it for future generations. The Jijuktu'kwejk Watershed Alliance (JWA)—an environmental non-profit completing restoration work from Berwick to Wolfville—had the opportunity to apply this lens throughout the 2023 field season.

In many ways, this was a typical season for the JWA. We completed bi-weekly water quality monitoring, planted trees, completed riparian assessments, and monitored wildlife through trail cameras. However, this past year also presented the team with new opportunities and unique challenges. Aside from the weather, which impeded much of our work throughout the season, we were also tasked with initiating projects entirely new to the JWA.

Our most notable undertaking was the completion of our first in-stream restoration project. We achieved this project with the support of Adopt-a-Stream, a program led by the Nova Scotia Salmon Association to improve watercourses and fish habitat across the province. As a team of four, we installed seven hardwood digger logs spaced across a 390-meter stretch of Rochford Brook in Waterville. Historically, this stretch of Rochford Brook experienced flooding due to logging operations. Flooding, coupled with agricultural activities, shaped the landscape over time, altering stream morphology and the organisms that

live there. For example, activities that straighten and widen streams significantly affect the speed, temperature, and depth that fish, such as salmon and trout require for spawning, rearing and migration.

Digger logs improve habitat by creating pools and restoring natural meander patterns. The structures are placed on a 30-degree angle, and supported by an upstream rock ramp that encourages water to rush over one side. Over time, the stream flow causes a deeper pool to form downstream as the log sorts the substrate, resulting in a buildup of sediment on the opposite side. The creation of holding and resting pools along the stream improves migration for fish in



Harrison Basquill and Jonas Gow building up the rock ramp on one of the seven digger logs. PHOTO: WILL CHAPPLE.





Harrison Basquill and Shauna Forrestall collecting data for JWA's adapted CABIN protocol. PHOTO: WILL CHAPPLE.

the watershed. The digger logs that we installed this past summer will hopefully improve conditions for anadromous fish in the years to come.

It is important to consider what future restoration looks like in the Jijuktu'kwejk. Returning ecosystems to a "correct" state is challenging because ecosystems are dynamic. We must recognize that while restoration is rooted in the past, it is designed for the future, and that includes working with the landscape as it stands today. As such, the JWA continues to identify growth areas as we learn more about the watershed and all of its intricacies.

To expand our knowledge of the watershed and how we can best protect it, the JWA has implemented a riparian restoration project, and an adapted Canadian Aquatic Biomonitoring Network (CABIN) protocol, to augment our work in the stream. During the 2023 field season, our small team targeted two properties along the river to develop

riparian restoration plans. On the advice of JWA board members, we took this opportunity to experiment with different species and planting strategies to determine what works and what needs to be adjusted for future planting projects in the watershed. We have also started to collect CABIN data for several of our sites. CABIN data, such as numbers of aquatic insects, provide information on stream conditions that standard water quality parameters do not. Over time, we will add to this database, which will indicate which sites may be experiencing greater pollution input or habitat degradation.

Expanding our data collection to include different communities in the watershed helps us to develop our ecological literacy and be better equipped to implement effective restoration plans. It is important to acknowledge that social change and social structures, much like the JWA, have the power to mediate ecological outcomes for the better. Restoration allows us to make positive impacts that ultimately leave a more positive story on the landscape. I encourage anyone interested in learning more about the JWA, or anyone wanting to get involved, to reach out to [jijuktukwejk@gmail.com](mailto:jijuktukwejk@gmail.com).

**Shauna Forrestall is a recent graduate of Dalhousie University's Environmental Science program and a member of the JWA.**



Jonas Gow, Will Chapple, Shauna Forrestall, and Harrison Basquill, joined by staff from Clean Annapolis River Project during a digger log installation day. PHOTO: WILL CHAPPLE.

# Gaspereau River Trail— A Winter Beauty

BY PETER WALLACE

**V**enturing out on a hike in winter with snow on the ground can be an exhilarating experience. One of the best trails for this is along the Gaspereau River. It is relatively flat and has the river in view most of the way. It is sheltered from the cold north winds, and is wide enough to easily chat with friends walking with you. It is beautiful, with attractive features for kids and adults alike. Many people take their dogs on this trail because there are no leash conditions, but if you have a dog, please be cognisant that lots of folks, especially children, are afraid of dogs. Only let well-behaved dogs off leash. The trail is four kilometres, a simple in-and-out return, and you can turn back at any time. One sensible turn around, if the conditions are slippery, is when it starts to narrow and cling to the river bank for the last half of a kilometre. The trail ends at a stream that enters from the north at a left bend (see yellow lines on satellite image). Beyond this point, the river bank becomes a cliff and cannot be negotiated without climbing and bushwhacking up to the top. As always, respect others, and pack out all that you pack in—especially dog poop.

## Directions

The trail starts at the bridge over the Gaspereau River on Deep Hollow Road, a short distance down from the



An easy trail to follow in all seasons.

flashing light where Deep Hollow Road intersects the White Rock Road. There is a parking for two or three cars on the northwest side of the road, just before the bridge. The trailhead is just to the right at this point. In addition, there is a parking lot across the bridge for seven or eight cars on the southeast side of the road. It is well-used in all seasons, and is easy to follow.

From the southeast parking lot, you must cross the bridge to get to the trailhead. There is no sidewalk or shoulder. It is narrow and dangerous if cars, and especially trucks, are on the road. Walk facing traffic, and look drivers in the eye so they note your presence. Do not attempt to cross when large trucks are approaching. The road slopes down to the bridge from both directions, and large trucks cannot stop suddenly.



Ice blocks strewn along the river shore (above left), and small circular ice disks in the water (above right).

## Trail Description

The most difficult and tricky section is the first 200 m. It goes along the water and onto stepping stones, or alternatively up and along the steep, slippery river bank. If the water is low, take the river route, because it is easier, but be wary of thin ice on the river's edge. It is this section that gives the trail a moderate rating.

It is hard to realize now, but the far bank here, just to the north of the bridge, was the site of a bustling saw mill in the 1890s (see photo at right). It was relocated elsewhere in 1904 because all of the accessible wood had been taken from the upper watershed.

After the difficult section, the trail continues as a wide, former, ox-cart trail, initially built in the early 1900s for an ill-fated attempt to install a power turbine upstream. The ox-cart portion at the start was destroyed by river erosion and building of the bridge.

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There are so many neat surprises on this trail in the winter, whether it is snow sculptures, animal tracks, or ice structures.

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From here, the trail gently edges along the river bank, including some short muddy sections that are often frozen in the winter. Eventually you come to evidence of the ox-cart trail, namely the dry-stone retaining wall, which keeps the trail high along the bank. This section crosses a few small side brooks, which have many picturesque icicles in winter. The trail then



The old mill, just above the bridge, was a bustling place in the 1890s. SOURCE: WHITEROCKHALL.EDNET.NS.CA/HISTORY.HTM

opens onto the river plain where there are abundant large hemlock and hardwood trees in a very open forest. In the understory, there are multitudes of low-lying ground-hemlock, or Canada yew, one of the best examples of these shrubs in Kings County. The trail is normally not cleared of fallen trees, especially the large ones, so go over or under them, which is great fun for children. The kids also enjoy watching the adults do the limbo, duck walk, or four-limbed crawl. After this large open area, the trail narrows, and winds its way up and along the north river bank past a right curve, and then a left curve, eventually ending at a small input stream. This last part is tricky and not advisable with children.

One of the beauties of the open area is that there are many fallen trees that you can sit on to contemplate your surroundings and have a snack or drink. The other cool thing is that if the river, or the adjacent swampy areas, are partially frozen, you can walk back part way off trail. This is fun for children. You may see distinctive high snow drifts along the north bank packed in by the winds. The cold temperatures can also freeze parts of the river, and then the melt causes the crustal ice to be thrust up by the current into high ridges or small circular ice disks (see photos at left). Neat surprises abound here in the winter, whether it is snow sculptures, animal tracks, or ice structures. Enjoy!

**Peter Wallace is a retired geologist and leads a weekly hiking group of retirees to areas of natural beauty and interest in the region. Peter contributed the photos and map specifications.**



# What's Up in the Night Sky?

BY PATRICK KELLY



## Highlights for February to May

Feb. 16: First Quarter

Feb. 23–24: Full Moon\*

Mar. 3: Last Quarter

Mar. 10: Daylight Silly Time Starts

Mar. 10: New Moon

Mar. 11–13: Large Tides (Moon nearest Earth Mar. 10)

Mar. 14: Moon 1.5° from Pleiades (11:55 PM)

Mar. 17: First Quarter

Mar. 19: Equinox

Mar. 24: Full Moon

Mar. 24: Mercury Greatest Elongation East (7 PM)

Apr. 2: Last Quarter

Apr. 6: Saturn & Mars close to Moon

Apr. 8: New Moon and Solar Eclipse

Apr. 11: Mars 0.5° from Saturn (6 AM)

Apr. 15: First Quarter

Apr. 23: Full Moon

May 1: Last Quarter

May 8: Full Moon

May 10: Mercury Greatest Elongation West (5:30 AM)

May 15: Last Quarter

\* The Moon is full at 8:30 AM on Feb. 24, so you will see an almost-full Moon on both nights.

*Moon:* The big lunar news story for this period is the total solar eclipse on April 8, whose path will cross New Brunswick, P.E.I., and Newfoundland. It will touch the northernmost tip of Cape Breton. See page 28 for details. In more humdrum news, the Moon will have two events of note. On March 14th, look for the Moon to pass very close to the Pleiades star cluster.

The Moon will be low on the horizon, midway between west and northwest. The crescent will be five days old and easy to spot. Find the Moon as soon as it is dark, and watch it slowly move closer to the Pleiades as the night progresses (see graphic at right). It will be 3° away at 9 PM, closing to about 1.5° by midnight. The Moon will set shortly after 1 AM on the 15th. Binoculars will definitely make for a nicer view.

*Mercury:* For this report, Mercury has two noteworthy elongations, the angle of separation between the Sun and the planet, with Earth as the reference point. It reaches its greatest elongation east on March 24, and then speeds between the Earth and Sun to reappear in the morning sky, reaching its greatest elongation west on May 10. For the March event (see above graphic), the Sun will set due west, the equinox having been only a few days earlier. Look for a star about 12° above the horizon in this western locale, starting at 8 PM. There are no other bright objects nearby, so if you see one, that's Mercury! By 8:30 PM, Mercury will have dropped to about 6° above the horizon, but with the sky even darker, it should be a lot easier to see.

On the morning of May 10, you will need a good eastern horizon. Mercury will be due east, well to the right of the Sun, and only 4° above the horizon. The best way to find Mercury is to look between east and southeast for two "stars." The leftmost one should look reddish (Mars), and the other may show a hint of yellow (Saturn). Draw a line from Saturn, through Mars, and continue back along that line towards the brightening area on the horizon. Stop a bit less than the distance between Mars and Saturn. That should get you in the right vicinity. Binoculars will help.

*Venus:* Venus will be disappearing into the bright sky near the morning Sun, and will not reappear in the evening sky until the end of summer.

*Mars:* Mars will slowly get higher in the morning sky as the spring progresses. As it is still on the far side of its orbit, it is not that bright, and will remain dim well into the year. On the morning of April 6, there is a chance to see Mars, the Moon, and Saturn in a tight grouping just at sunrise. This will be a tough observation, because the event occurs just before sunrise, and the Moon will just be rising. You will need a very low east horizon. Start looking at 5:50 AM. Look about about 35° to the right of where the rising Sun is brightening the sky (see graphic below). With binoculars, a sweep along the horizon should show Mars and Saturn. The Moon will rise by 6:00 AM to join the pair. Enjoy the view while you can because the brightening sky will soon overwhelm it.

Five days later, on the morning of April 11, there is another chance to see Mars and Saturn. Since April 6, the Moon has moved on from this part of the sky, because it has an appointment with the Sun on the 8th to produce the total solar eclipse. The two planets will

be much closer than they were on the morning of the 6th. In fact, if you look for them each morning from the 6th to the 11th (as if we could have six clear days in a row in April!), you can watch them come together. Follow the same instructions as for the previous event. They will still be close for a few days, so if the weather is not suitable on the 11th, the 12th will have the planets nearly as close.

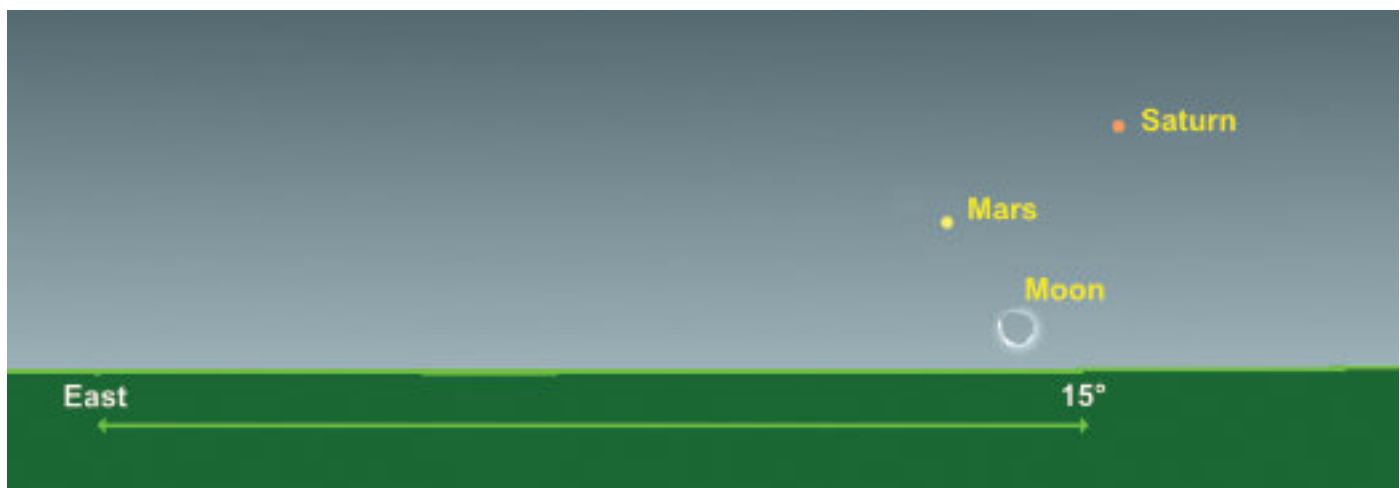


Crescent Moon approaching Pleiades star cluster, March 14, 2024.

*Jupiter:* Jupiter is still dominating the evening sky, but will appear closer to the Sun as the months progress. By early May, it will disappear into the evening twilight. At the end of June, look for it in the morning sky as it starts to rise before the Sun.

*Saturn:* Saturn is already near the Sun at the start of the period covered by this report. It will get too close to the Sun to see by mid-February, and will show up in the morning sky by the end of March. In April it will have two close encounters, one with the Moon and Mars, and one with just Mars.

**Patrick Kelly has had a life-long interest in astronomy and has taught first-year astronomy for over 20 years, as well as presenting many shows at the Halifax Planetarium. He generated the graphics.**



Mercury, Saturn and the Moon grouped together, April 6, 2024.

# Metronomes, Windshield Wipers, and Understanding Solar Eclipses

If you miss the April 8 total solar eclipse, don't worry. There will be another one, following the same track, but a bit farther south, on May 11, 2078! Here's why...

BY PATRICK KELLY

Many folks will be traveling up to New Brunswick on April 8 to watch the first total eclipse in this region in 54 years. I was eleven years old for the last total eclipse in 1970, which crossed Halifax. It was totally overcast, but it got so dark that the streetlights came on. To date, that is the only total solar eclipse that I have "seen," because my plans to go to Patagonia in 2020 were thwarted by the pandemic. Hopefully, the sky will be clear on April 8. If you miss this eclipse, don't worry. There will be another one, following the same track, but a bit farther south, on May 11, 2078!

So is it just coincidental that the gap is 54 years? Of course not. Many people understand that lots of things repeat in cycles in the night sky. The same constellations return each season. The Sun is high in the summer, low in the winter, then high again the next summer. The Moon goes through a set of phases every month. What about eclipses; how do we understand their cycles and predict their patterns? Let's take a dive into the heavens to gain an understanding of eclipse patterns.

The times it takes for astronomical cycles to repeat are not perfect integers, at least not using the units of time that we have adopted! In many cases, we can approximate them with a fraction, which seems to work, but the approximate rounding can have long-term consequences. The most familiar approximation is the number of days in a year: 365.25. Throw in an extra day every four years and the night sky, at a particular time, on a particular date, will be the same year after year. Nope, astronomy

is never that simple! The actual amount of time it takes the Earth to go around Sun is not exactly 365.25 days. There are several different ways to measure the year, but the one most frequently used, from one March equinox to the next, is called the tropical year, and is 365.2422 days.

The rule of adding one day every four years was introduced by Julius Caesar and resulted in the Julian Calendar. It worked well, but as the centuries rolled by, people noticed that the stars at a particular time, on a particular date, had slowly drifted, and were no longer as they had been in antiquity. The Catholic Church needed to be precise about dates because many important liturgical dates, especially Easter, depended on the March equinox "being on time," which it no longer was. By the 16th century, the discrepancy was up to eleven days! Pope Gregory XIII had many experts

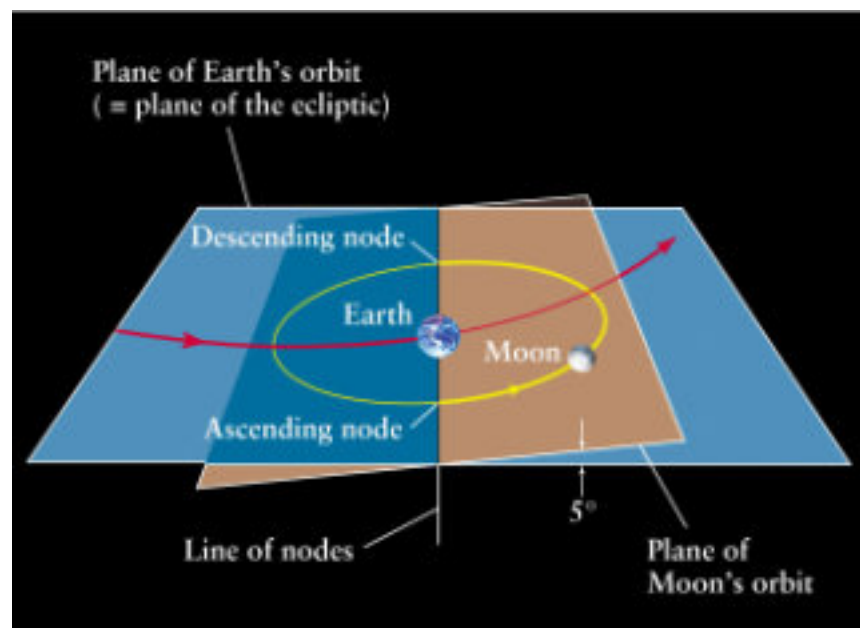


Figure 1. The Moon crosses the ecliptic (plane of the earth's orbit) twice a month as it orbits the Earth. Its orbit is tilted 5° relative to the Earth's orbit of the Sun.

look at the problem, and the net result was the Gregorian Calendar. This new calendar put the dates and the sky back in synch—Thursday, October 4, 1582, was followed by the first day of the Gregorian calendar, Friday, October 15, 1582. To keep the sky and calendar in synch in an ongoing way, it also added the century leap day rule. This means that the “normal” one in four leap year is skipped at the turn of a new century unless the year is evenly divisible by 400. So, the years 1700, 1800 and 1900 were not leap years, but the years 1600 and 2000 were.

This brings us to the main topic. Just as there is more than one way to measure the year, there is more than one way to measure the month, the time it takes the Moon to orbit the Earth. The one most people know (the one close to the 30 days most people think of when they hear “month”) is the synodic month, the time it takes the Moon to go from one New Moon (or Full Moon) to the next. It is 29.530589 days long.

Another month, the draconic month, is how long it takes the Moon to go from one of the nodes of its orbit, back to the same node. A node is where the plane of the Moon’s orbit of the Earth and the Earth’s orbit of the Sun intersect (see Figures 1 and 2). For any type of eclipse to occur, the Moon must be at one of its nodes, so that the Moon, the Earth and the Sun all lie in the

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If there is either a solar or lunar eclipse, after one saros there will be another eclipse, almost identical to the one that occurred one saros earlier.

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same plane. As you can see from Figure 2, eclipses can only occur at nodes during two eclipse seasons, which are six months apart. The line of nodes moves in a full circle around the Earth in just over 18 years. Thus, the months during which eclipse series occur slowly drift, coming somewhat earlier from year to year. The draconic month is 27.212221 days long.

Two metronomes that are set with periods that are almost the same start off appearing to move in synch.

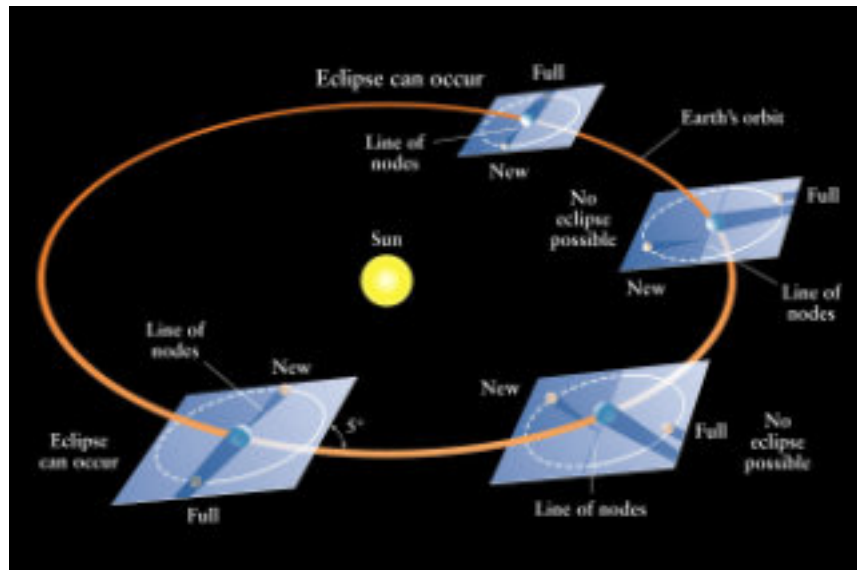


Figure 2. Eclipses can only occur when the line of nodes points towards the Sun because those are the only times when the Sun, Moon, and Earth all lie in the same plane. At those times, note that the Moon is either new, or full.

Inevitably, the difference between the two periods is noticeable, and eventually the two are doing the opposite of each other before coming back to act as one. In my younger days, I observed the same effect in the windshield wipers of Halifax Transit buses. Unlike a car, each wiper on a bus has its own motor, and their speeds are not exactly the same. The wipers would cycle through meeting in the middle of the windshield, to both being on a given side of their sweep, and then back to meeting in the middle. Clearly, between the times when they meet in the middle, one is making more “trips” than the other.

Now comes a bit of math:  $223 \text{ synodic months} = 223 \times 29.530589 = 6585.3213 \text{ days}$ . Keep this number in mind! This is one saros and has a length of 18 years, and either 10.3213 or 11.3213 days, depending on how many leap days occur in a given saros. Thus, whenever you have a New Moon, or a Full Moon, after one saros, the Moon will be at that phase again. The saros cycle has been known since antiquity and was useful for predicting eclipses.

More math!  $242 \text{ draconic months} = 242 \times 27.212221 = 6585.3575 \text{ days}$ . Notice that this number is almost identical to one saros! This means if there is either a solar or lunar eclipse (which only happen when the Moon is at a node), after one saros there will be another eclipse, almost identical to the one that occurred one saros earlier.

Now, we have a similar problem to that with the leap years. The saros is not an integer; it has an extra 0.3213 days. That means that if you have a total solar eclipse, one saros later, the Earth, Sun, and Moon are back in almost exactly the same locations and you will have a similar total solar eclipse, but in that extra 0.3213 days (7.7 hours) the Earth will have rotated an extra 120°. The path of the new eclipse will occur about one-third of the way westward around the Earth. After a second saros, the eclipse path will have moved a farther 120° west, and after a third saros, it will be roughly back where it started. This time interval of three saros cycles is called an exilgimos, which is about 54 years.

Now consider Figure 3 showing the tracks of four total solar eclipses. Notice that the dates are just over 18 years apart (one saros), and the path of totality is almost identical in each one. In the 2024 eclipse, the track is over New Brunswick, not Nova Scotia. While you might expect that every exilgimos will bring an eclipse back to the Maritimes, that is not the case due, in part, to the two numbers (6585.3213 and 6585.3575) not being exactly the same. Given enough time, the slow change in the relative positions of the Earth and Moon will cause these eclipses to no longer happen. These four eclipses are all part of Saros 139, a series of eclipses that started with a partial solar eclipse on May 17, 1501, when the eclipse was visible only near the North Pole, and will end with a partial solar eclipse on July 3, 2763, visible only from near the South Pole. The eclipses in between generally move southward over the centuries.

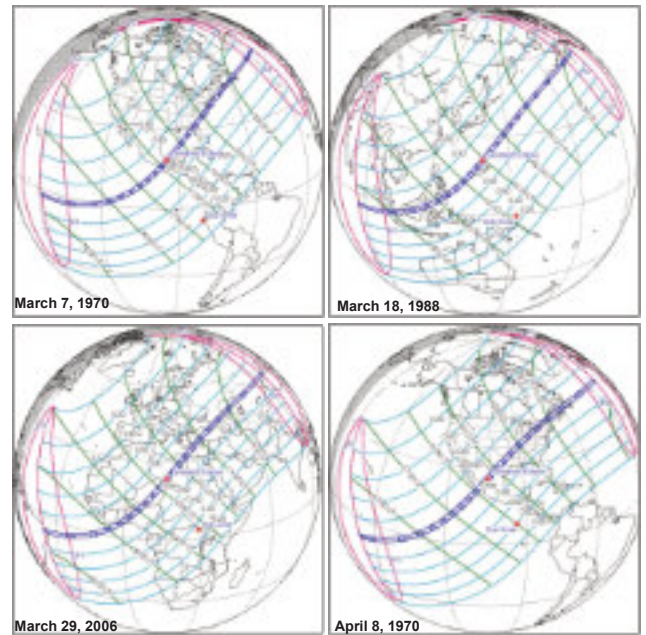


Figure 3. The paths of a set of four eclipses forming an exilgimos. From Fred Espenak's web site, mreclipse.com.

A saros cycle starts and ends when the shadows miss the Earth. The reason maps show many tracks of total solar eclipses over a period of time (see Figure 4), is because there are many saros cycles going on simultaneously. Look and see how many pairs you can find that are just over 18 years apart. Each of those pairs is part of a different saros cycle. Each pair occurs at the same month, but different pairs occur at different months. If you miss this year's eclipse, there will be another one, following the same track, but a bit farther south, on May 11, 2078!

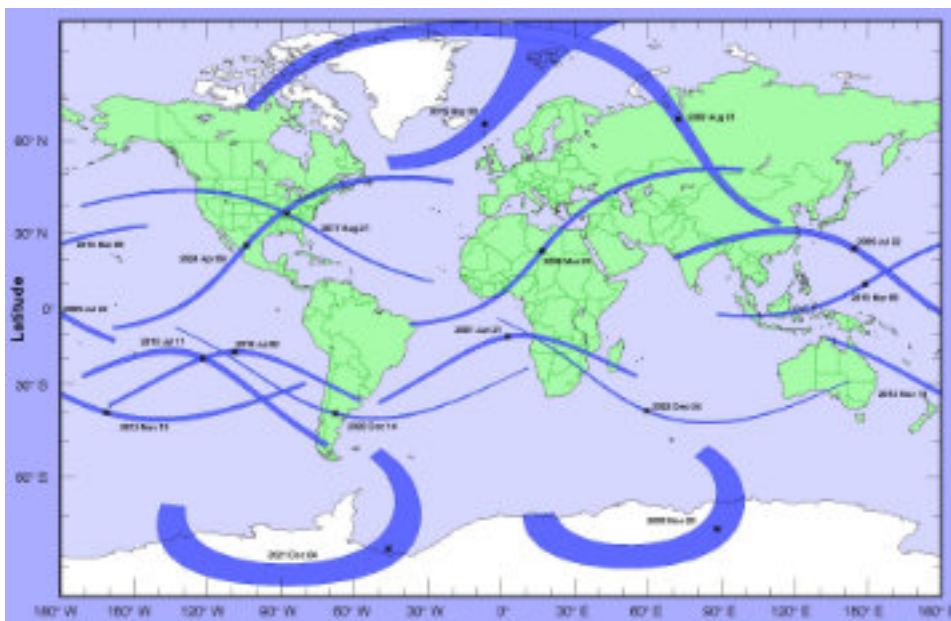


Figure 4. Paths of Total Solar Eclipses 2001–25. From NASA website.

Patrick Kelly has had a life-long interest in astronomy and has taught first-year astronomy for over 20 years, as well as presenting many shows at the Halifax Planetarium. He generated the graphics.



# Fun Winter Activities

BY ALAN WARNER

**W**inter is a beautiful time to explore in nature. It is only special though if everyone is dressed to keep warm. Here are some fun activities<sup>1</sup>...

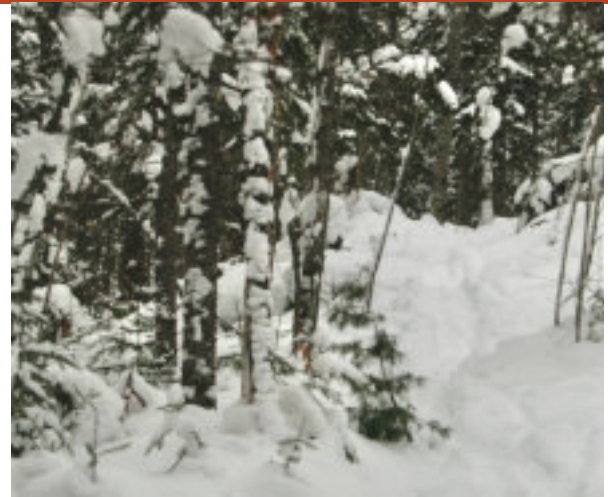


**Whiffs:** Create a snow sundae for smelling. Start with a scoop of snow, then add smells on top—needles, berries, leaves, sticks, etc.

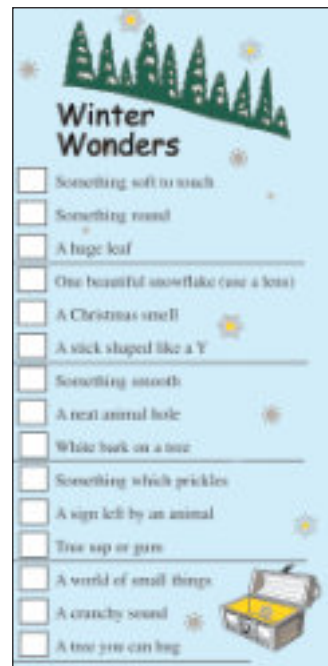


**Secret Skeletons:** Mark two lines on your hand, lie on your back at the base of a big old tree and look at the patterns in the branches of the “skeleton.” Find your hand pattern while looking up into the arms of the skeleton.

<sup>1</sup>These activities are from *Earthwalks*, by Steve Van Matre. Institute for Earth Education, 2019.



**Snow Steps:** After a fresh fallen snow with no tracks down, everyone steps exactly in each other’s footprints so there is only one track. The leader creates a circle, and everyone turns to face out. Each person then takes 20 or 30 steps straight out and looks to see neat things at the terminus for a minute. Then everyone rotates to the next person’s spot around the circle at the same time. Everyone stays in the one set of steps!



**Scavenger Hunt:** Create your own hunt.



**Treasure Finder:** Throw the “treasure finder” frisbee through the forest, run to it. Dig to discover the cones, frozen leaf patterns and weird-shaped sticks beneath the snow.

# Earthkeeping:

## Love Notes for Tough Times

REVIEW BY WENDY MCDONALD

Outdoor adventures may be more difficult during the winter months depending on our weather. However, as an armchair naturalist, you can enjoy the most recent book by Gary Saunders, a local author, forester and nature educator. Over the years he has influenced so many through his writings, journals and field sketches. All ages have read his educational and nature-based stories, whether in local magazines or books. Gary's latest offering is appropriately titled *Earthkeeping: Love Notes for Tough Times*. Many people can relate to this given the events of the past year in Nova Scotia and around the world.

This is a wonderful book, illustrated with his own line drawings, which reflects on Gary's lifelong relationship with the natural world. The collection is divided into eight themes that will catch your attention, including topics such as "The Life Rural," "Ecology," "Work & Play & Food," and "Remembering." His closing section is titled "Mars, Anyone?" Here, he briefly challenges us to think further about climate change.

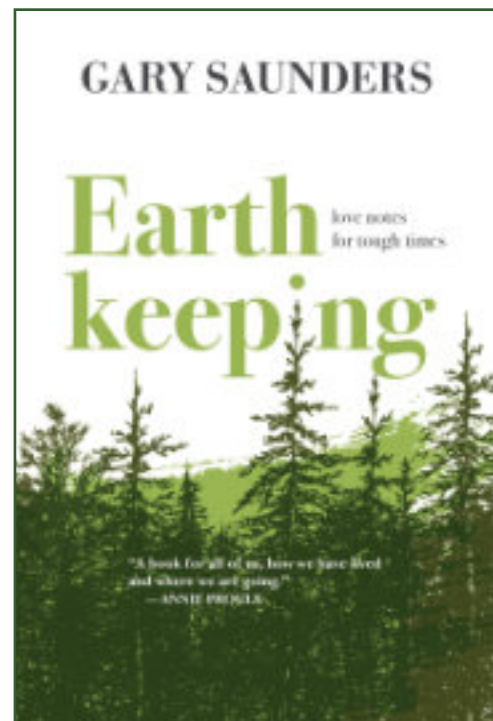
Gary, now retired, shares many special moments experienced both at work, at home, or in leisure time over the years. The book is a collection of personal essays, many short, others lengthier. It is a book to return to for brief snatches of time for a 'nature fix' from the woods, wetlands or wildlife. Lyrical titles, including "Cariboo Caper" and "Bumblebee Hotel," allow us to appreciate both the large and small creatures in the natural world.

As an amateur botanist, I particularly enjoyed his essay, "A Calendar of Roadside Flowers," which is a journey through the wildflowers we might find along the roadsides, meadows, ponds, and woodlands through the seasons. In early spring, we discover nature's first blossom, the lemon-yellow coltsfoot, often confused with dandelions. The name comes from the hoofprint shape of its leaves that linger all summer. Not to be left out are the tall lupins from the

pea family, an array of pink, purple and blue, depending on soil acidity, often lining our highways and byways. And later in August and September, over twenty native species of goldenrods can be found at the seaside, along marsh edges, and roadsides. They are joined by the many aster species with mauves and purples, adding to nature's rainbow of colour.

If you come to the end and still are looking for more, Gary lists two pages of articles submitted to his favourite journals and books in the acknowledgements, dating all the way back to 1992! Always the storyteller, Gary has crafted art and science together in this book to complete nature's bountiful quilt. I hope you enjoy his writings as much as I do.

**Wendy McDonald is an amateur naturalist and citizen scientist who enjoys local trails and sharing her finds on iNaturalist. She is a volunteer with the Friends of Blue Mountain, advocating for an Urban Wilderness Park in Halifax.**



# Silent Earth:

## Averting the Insect Apocalypse

REVIEW BY LARRY BOGAN

In the last decade, I have noticed a distinct decrease in the numbers of insects. Fewer moths are coming to my night lights, and fewer varieties of butterflies are in our field. The populations of birds who are dependent on insects (e.g., nighthawks), have dramatically decreased. Research cited in *Silent Earth* supports my impressions and reveals the seriousness of the problem.

Unfortunately, many people ignore or dislike most insects, yet they are an essential part of ecosystems. *Silent Earth* lists the many economic values of insects, but points out that if these marvels were to disappear, the earth would be a poorer place in far more than financial terms. Consider the honeypot ant of Australia, which has a unique method of storing nectar for lean periods. Individual ants provide storage by consuming such copious amounts that their bodies become extended like golden grapes, and they can't move. Hanging from the roof of their underground nest, they regurgitate nectar when needed by hungry ants. Insects are fascinating.

Dave Goulson, the author, a professor of biology in the United Kingdom, writes informative, easy-to-read stories and descriptions. By the time I had finished reading, I better understood the value of insects in our lives. It was obvious that we have made too much of an effort to eliminate insects in our environment, and if we don't change our practices, not only insects, but all life on earth will be threatened.

Goulson details several studies that conclusively show the decline of insect populations. A 2017 study trapped flying insects in nature reserves across Germany over 26 years and showed a 75% decline in insect biomass. Subsequent long-term studies in German grasslands and of British butterfly transects gave similar results. The decline of insects is a worldwide problem and may be as much as 2.5% per year. It is difficult to get a figure for the long term decline since there is little data on insect populations, and none before 1970.



*Silent Earth* explores the causes of insect decline. They are the usual culprits: habitat loss, chemical poisons, agricultural practices, invasive species, climate change, and other human activities. The biggest factor is the poisons, specifically the neonicotinoids (neonics). These have caused a dramatic decrease in bee populations, which Goulson has personally documented. Because insect research is not prioritized, his research group had to use crowdsourcing to get support for this work. The results were influential in several neonics being banned from field crops in the European Union.

After a brief view of what the future could be if no action is taken to save our biodiversity, the book ends with hope, but only if there is action from individuals and governments. He suggests ways for us to help increase insect numbers, including to become a wildlife recorder, join a pollinator program, and collect valuable data on the changing populations of insects. This book is an alert to a serious biodiversity problem that can seriously damage world ecology and our lives sooner than the climate crisis.

Larry Bogan is a long-term member and contributor to the Blomidon Naturalists.

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Blomidon Naturalists Society  
P.O. Box 2350  
Wolfville, N.S. B4P 2N5