

# Beyond THE Tides

The Seasonal Journal of the Blomidon Naturalists Society

WINTER 2026

Vol. 53 No. 1

\$10

Wildfires &  
Industrial Forestry

Sharing Nature  
in Photos

Biocontrol &  
Hemlock Forests

## FROM THE EDITOR: ACTIVE HOPE

I used to wake up and glance at the news headlines to keep up with what is happening in the world. That is a bad idea these days if I want to start the day on a positive and creative note. Checking out the birds at the feeder, or even looking at the hockey scores, makes much more sense. In 2012, Joanna Macy and Chris Johnstone wrote *Active Hope: How to Face the Mess We're in without Going Crazy*. One can't be blindly optimistic in face of daunting realities; that rings hollow, and doesn't help anyone feel better. A realistic sense of hope comes out of feeling good about what you are doing in your life. It is about doing rather than wishing. It means recognizing the broader issues and working actively to make things better where one can. Donna Crossland's interview (p. 3) provides a great example: someone using her expertise to address forestry practices in a very critical and direct manner. Simultaneously, she is out treating hemlocks for hemlock woolly adelgid (HWA), writing to officials to advocate for more positive practices, and doing community education. Kirk Hillier's article (p. 15) on using biological predators to diminish HWA is another wonderful example. In the face of hemlock devastation, Kirk and his colleagues at Acadia are using their research capacity to grow a positive long-term strategy to the epidemic.

Another example is described in Brooke Boutillier's article (p. 24). David Steele and the Friends of Wolfville Trails Committee, like many others, saw the domination of Wolfville Reservoir Trails by invasive plants, but then they took action to address it. They have pulled more than 40,000 seedlings, bushes and small trees from the area in two years and are replanting it with native forest species. Now they have engaged local youth who are learning from and contributing to the community. Larry Bogan (p. 30), in the face of the record drought, continues to observe, shepherd, and report on the monarch populations in his field, while pondering how to learn and do more with new radio technology for tracking their migrations. The articles on sharing nature through photography (p. 10 & 13) offer another path to positive action and spreading nature appreciation to others. In short, I hope this issue inspires you to head out and take action in an area of your interest and passion. The process brings good feelings, and we are all better for it.



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 set 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 in 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

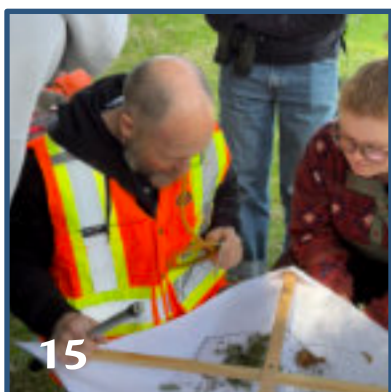
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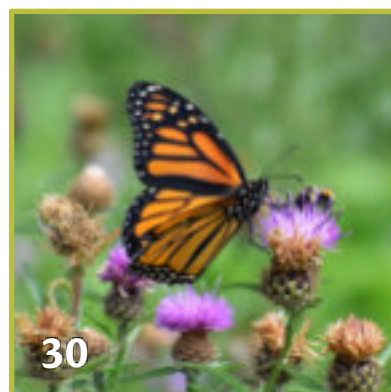
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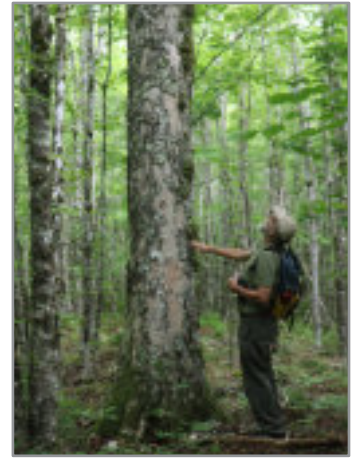
# POSITIVE ACTION

I used to be concerned only with species extinction and habitat loss. Pollution was in there as well. Then I added ozone depletion and climate change, and now right-wing extremism, misinformation, and wars, including Trump threatening to take Greenland by force. Trump's threat to Greenland may be of greater concern to me, because I was born in Denmark and still have cousins there. There is so much to lose sleep over and cause an increase in stress hormones. We have tackled the ozone problem to some degree, but the others seem intractable.

It is natural to be concerned about the troubles we face, especially as we are bombarded with news articles and social media posts on our cell phones. As naturalists, we are seeing extinction, habitat loss, and climate change rise to the top, maybe more than for other people. Worrying is debilitating, but what can we do as individuals?

I am not immune to worries about all the issues facing us, and I can get very depressed. But inaction exacerbates my state of mind. But if there is nothing I can do about something, I try not to get weighed down about it. The issues that I can do something about, I

do my best to act on—writing, talking to neighbours, suggesting solutions. Action, rather than inaction, can be empowering. I do my best to not just criticize—criticism without solutions is not very useful. We cannot effect change on a global scale, but we can act locally. Leading by example is powerful and can have a positive effect.



The Blomidon Naturalists Society can show how special the natural environment is; we can take local action on protecting habitats and species, as well as climate change, while knowing that it may not affect the rest of the world immediately, but that is OK. We should do things with positive conviction because we believe in what we do. Doing positive things feels better. Someday, other people will follow because they see how sincere we are, and sincerity is powerful.

Soren Bondrup-Nielsen  
Past 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, water, air, plants, animals, 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.*

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# Connecting Wildfires and Industrial Forestry: An Interview with Donna Crossland

Industrial forest practices “fuel” wildfires in Nova Scotia that grow more frequent with climate change and are made worse from carbon dioxide emissions released from the soils after harvesting—a vicious cycle.

INTERVIEW BY ERIN MOVOLD

**D**onna Crossland is a forest ecologist and long-time advocate for the protection of Nova Scotia’s Wabanaki–Acadian forests. With years of experience working for Parks Canada and conducting independent research on fire ecology, Crossland has become one of the province’s most respected voices on sustainable forestry and biodiversity. Her graduate work revealed how human activity—rather than natural lightning or climate alone—has shaped the region’s fire history and made forests more flammable. In this interview with Erin Movold from Nova Scotia Forests Forever, she speaks candidly about what she’s learned through years of studying forest resilience, why industrial practices are worsening wildfire risk, and how Nova Scotians can help their forests heal themselves. The interview follows below and Erin’s questions are in italics, followed by Donna’s responses.



Donna Crossland in an old forest near her home.

*Q: What first drew you to study fire ecology?*

Donna: I’ve always been interested in the forest. As a little girl growing up in East Dalhousie, Kings County, the forest was what surrounded me—forests and lakes everywhere. I used to go out almost every day, following the cow paths through the pasture beside our house, exploring and trying to understand nature.

When you love the forest, you don’t want to have anything destroying it—like fire. When I joined Parks Canada in 1995, I was asked to do a prescribed burn plan and to research the fire history of the eastern forests of New Brunswick in and around Kouchibouguac National Park. That’s when I began learning more about fire and asking myself: What is the natural role of fire? What have humans done to use fire or cause fire in the forest?

Through archival research—and working with my dear friend, Dr. Elena Ponomarenko, who studies charcoal in the soil—we established that wildfire is quite rare in eastern forests. Human-caused fire saw a huge upswing during early European colonization. That isn’t something we’re taught in school. When I looked deeply into archival documents, I found records of fire after fire caused by humans—clearing forests for fields to grow food, and many accidental blazes, often sparked by steam-engine trains. I examined old maps showing wildfires running along railway tracks, and of course those fires would spread. It even reached the point where a crew would follow each train to extinguish the fires it caused. None of this appears in history lessons. I realized there had been a huge upswing in fires in the late 1700s and early 1800s. At that time, the only way to stop wildfires was to hope they ran into a natural firebreak—a lake, river, ocean, or bog. In that era, much of the forest was lost through fire rather than to axes and logging.

*Q: What role does climate change play in influencing wildfires now?*

Donna: Climate change is exacerbating the frequency and intensity of wildfires—not so much wind, although the wind is drying out the forest—but climate change is slowing the jet stream down. We’re getting these sustained, lengthy patterns of either intense rain or no rain, which we saw in the summer of 2025, when none fell. When we have periods of drought—which are linked to climate change—we can get these very intense fires that burn deep down into the soil. They can follow roots and then travel underground, popping up somewhere else. So it’s all intertwined.

I feel like climatic warming is coming at us like some kind of huge bus, and we’re not going to step out of the way in time. We’re not even talking about the bus! It’s now just meters away from us. We’re still not acknowledging that it’s affecting everything: wildfires, how we live our everyday lives, human health, forest health—everything.

*Q: So what are the traditional disturbances in Nova Scotia’s forests that facilitate regeneration?*

Donna: Traditionally, it’s been wind and insects—they are the main disturbance agents that renew and regenerate the forest. Fire was always present, but much less frequent until Europeans came. For the most part, dry lightning strikes do not cause fires in Nova Scotia. Nova Scotia’s forests are not fire-driven ecosystems. In fact, sugar-maple or eastern-hemlock forests don’t need disturbance at all—they can self-

perpetuate for centuries, seeding beneath their own canopy under the mother trees.

*Q: How has industrial forestry altered fire behaviour?*

Donna: Industrial forestry has altered fire behaviour in several ways. First, our forests—what remains of them—tend to be much younger. Younger trees have thin branches and foliage with more surface area; they dry faster and ignite more easily. Branches closer to the ground can carry flames up into the canopy. Older forests lack these “ladder fuels”. The forest industry has made our forests younger, and we have almost no old growth left in Nova Scotia.

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Industrial forestry practices have transformed forests as natural, carbon-sequestering, climate solutions into net carbon emitters.

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They’ve also changed forest composition. The industry prefers to grow more conifers, especially in the pulp-and-paper era, when red spruce was the most sought-after species. Conifers are resinous and burn more readily than deciduous forests. I joked for years that the pulp and paper industry would drive by deciduous forests and not know what to do with them—they couldn’t make as much paper from them. So, they tried to convert deciduous forests into red spruce forests, which didn’t work very well. If a land base wants to grow sugar maples, it will grow sugar maples. Even if they cut them down or spray them, it will still



In Western Nova Scotia, older hardwood-dominant forests with a full canopy have less undergrowth (above left) than younger softwood-dominant forests that are regenerating from clear cuts. Fire will move through the hardwood without destroying the tall trees. The resinous and fire-prone small conifers will fuel the fire across the landscape. PHOTOS: DONNA CROSSLAND (LEFT); ALAN WARNER (RIGHT).

try to grow sugar maples—because no one was paying attention to the soil condition underneath the forest.

Industry has changed the age, the composition, and the structure of the forests. Instead of large trunks full of sap that don't burn readily, we now have forests composed of smaller, drier, thinner trees that burn easily. I like to give the analogy of trying to light a campfire or a fire in a wood stove. We don't start with big round logs—we start with kindling, maybe paper or bark. Fine, dry fuels catch fire first. It's the same in nature. It's much easier to start a fire with fine fuels than with big, damp wood that's still full of sap and shaded under a closed canopy.

*Q: How do today's industrial forest practices produce fire prone conditions?*

Donna: Industry is opting more for “quantity over quality” in forest products. Now that they've switched to a biomass economy, any tree can make wood chips.

In the early 1800s, people prided themselves in selectively cutting high-quality yellow birch and white pine—wood that was smooth, straight, and free of knots. It was shipped to Britain for fine lumber. Those trees grew more slowly, the wood was denser, and it made better-quality material for building and carpentry.

Now, they harvest whatever's in front of them. Many people working in the industry today don't know the difference between a red maple and a sugar maple, or a red spruce and a black spruce—and it doesn't really



A clearcut in Digby County. PHOTO: DONNA CROSSLAND.

matter to them. There's no selective harvesting anymore; it's indiscriminate harvesting. Industrial forestry takes more than it leaves behind. It's about taking all that it can now, without thinking of future generations or the forest's future.

The fact that so many people live in towns and cities now—on phones and devices, removed from nature—means they don't think about the flying squirrel that may be living in a hollow tree. Industry cuts the hollow ones and the crooked ones along with the fine trees. They're not thinking about wildlife or the ebb and flow of nature. It all adds up to terrible forestry.

*Q: Could you speak on the importance of canopy shade in a forest?*

Donna: This is the most important issue. I used to give lectures where I'd say, forestry doesn't have to be that complicated—it's just about managing the shade on the forest floor. If the forest floor is shaded, it's going to remain moist and retain its carbon stores. Most mature, natural forests store 50% of all the carbon they sequester in the soil under their roots. To keep



The pink area above indicates areas in and around the proposed Chain Lakes Wilderness area in Kings County that have lost their forest cover between 2001 and 2024. The bluish area in the bottom left is the Cloud Lake Protected Area.

SOURCE: GLOBALFORESTWATCH.ORG

that carbon there—to stop it from escaping back into the atmosphere, where there is already far too much carbon dioxide and methane, the shade on the forest floor must be protected. It’s the most important thing. Keep it closed, or only open small gaps. To grow a high-quality sawlog, there must be “side shade” so the tree grows straight and tall—it reaches for the sky and doesn’t grow broad and limby.

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The 2018 Lahey Independent Forest Review needs an update... Under the current climate stressors... the proposed plantation areas are the worst idea of the century.

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*Q: What happens to the carbon in a forest when it’s clearcut?*

Donna: Two decades ago, below ground carbon stores were not widely understood. The focus was on above-ground carbon—the carbon stored in wood and foliage. Now it is recognized that about half of the carbon is underground. Expose that soil to the sun, the sun heats the soil, the microbes speed up their activity, and suddenly all that stored carbon is released.

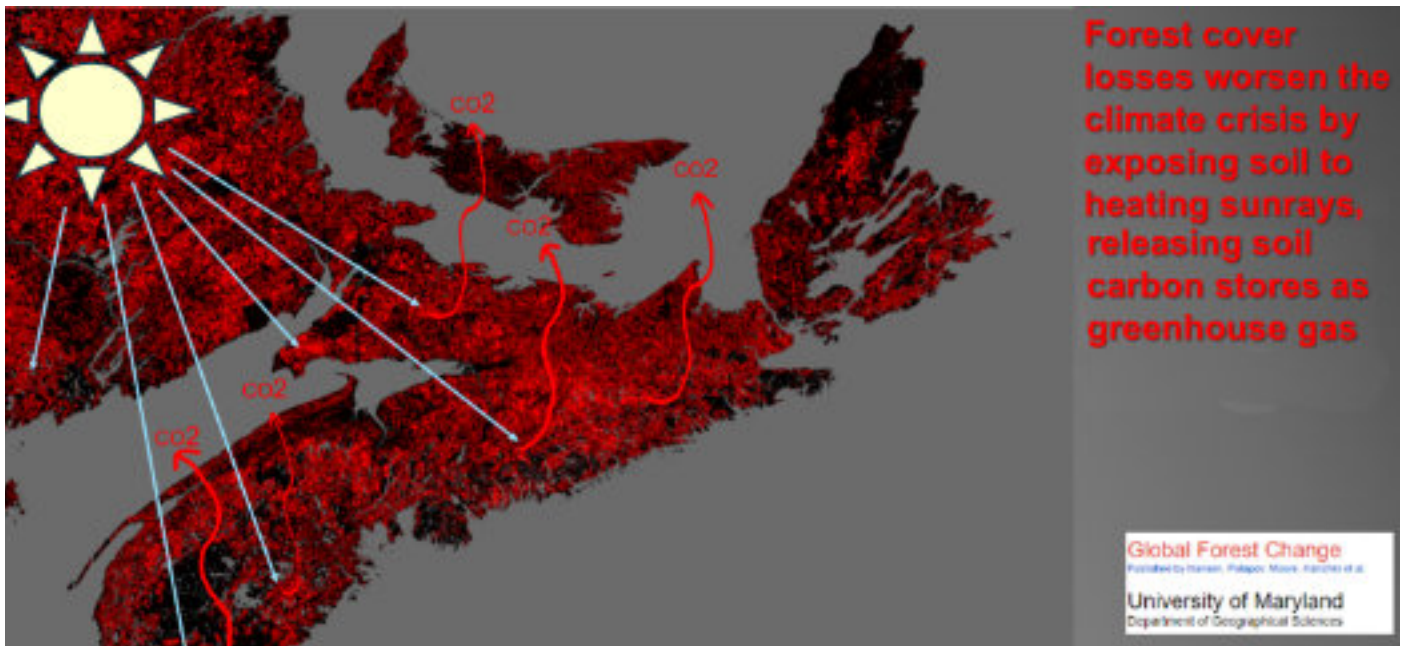
What’s so terrifying now in Nova Scotia—and such dreadful mismanagement—is that this province was traditionally covered in forest. Most of it was mature,

much of it was old growth, and it sequestered a lot of carbon. Over the last 20 or 30 years, so much of that forest cover has been lost. After a clearcut, the exposed soil emits carbon for two to three decades. A clearcut isn’t just damage for today—it’s damage for decades to come. That’s something to shout from the rooftops. Industrial forestry practices have transformed forests as natural, carbon-sequestering, climate solutions into net carbon emitters. It’s a crime of incredible proportions; a crime imposed by humanity.

*Q: How do we see that forest loss at a landscape scale?*

Donna: Satellite imagery from Global Forest Change shows the truth (see the map below). Red areas indicate forest cover loss over the past 24 years—staggering losses. Black areas show no change in forest cover detected during this period: protected lands, like Kejimikujik, the Tobeatic, and Cape Breton Highlands, are areas where forest cover has not changed. Examining these maps that show vast expanses of forest cover loss, we realize the gravity of the situation—when sunlight hits those cleared areas, soil warms, carbon dioxide releases. The loss continues for decades, yet this contribution to atmospheric carbon dioxide is omitted from carbon models.

The map from Global Forest Watch (see the previous page) makes the same point at a local level. This map of the area in and around the proposed Chain Lakes



Satellite imagery from Global Forest Change shows forest cover loss across Nova Scotia in red over the past 24 years. Black areas indicate no change in forest cover detected during this period. Protected lands like Kejimikujik, the Tobeatic, and the Cape Breton Highlands are examples where forest cover has not changed. SOURCE: GLOBAL FOREST CHANGE.

Wilderness Area in Kings County shows extensive pink patches—areas which lost their forest cover between 2001 and 2024. Anyone, even without training, can see that this is not sustainable forestry by any stretch of the imagination. Proposed protected zones are being logged before they can be designated as protected—so, even if they are protected, they will continue emitting carbon. Nova Scotia’s pattern has been “log first, protect later”. It’s always nature that pays the price.

The worst part is that these carbon losses aren’t being reported. One must ask—why? It’s beneficial for the forestry industry not to talk about it. The industry has a powerful lobby. Carbon is a nebulous thing—carbon dioxide and methane gas can’t be seen in the air—so it’s easy to ignore, yet it is critical. The carbon losses from industrial forestry are the second leading cause of climate change after the burning of fossil fuels. Canada needs to get real about its carbon accounting—not just the emissions from fossil fuels and wildfires, but from harvesting.

*Q: The Nova Scotia government recently approved High Production Forestry (HPF) Zones. What does that mean ecologically?*

**Donna:** Just when I think it can’t possibly get worse—it does. The 2018 Lahey Independent Forest Review report proposed a triad approach to forest management, with public forests divided into three different zones: 1) plantations (or HPF zones), 2) an ecological matrix portion where biodiversity considerations are placed over economic interests, and 3) protected areas.

HPF zones were meant to be implemented slowly, proving their economic viability over time. I’m not remotely convinced that they can be viable. When I start dissecting how much it costs to plant and tend a plantation—to farm trees for decades—it’s not likely profitable. Plantations cost huge sums to establish and maintain, and they’re farming for a market forty years away. Who knows what the world will need then?

Worse, plantations are appearing where citizens are seeking land protection and within moose core habitat

*Captions at right. Top:* Young trees with low, resinous branches fuel the fire among more fire-resistant trunks of mature trees (Queens County, 2021). *Middle:* The Long Lake fire (Annapolis County, 2025) burned most severely in extremely dry, heavily harvested sites, leaving bare rocks with little soil. *Bottom:* A yellow-bellied sapsucker no longer finds sap on burned trunks, one of many creatures impacted by wildfire. .PHOTOS: DONNA CROSSLAND.



areas. Instead of using existing plantations, clearcut lands, or abandoned fields, they're choosing many biodiverse, forested sites, a departure from the official plan. Add a worsening climate situation and there is a perfect storm: dense, resinous, fire-prone forests. High Production Forestry Zones are then inappropriately placed in the middle of a protected land base, which is analogous to adding a pile of matches and tinder to a dried-out patch in the heart of a high-value forest area. This places surrounding forests at higher fire risk and jeopardizes ecological integrity and species at risk. It's disastrous.

Most importantly, the 2018 Lahey Independent Forest Review needs an update! As always, new information comes to light. Under the current climate stressors—especially in 2025, with prolonged drought and fires that burned for weeks on end—the proposed plantation areas are the worst idea of the century. Economically, it never made sense. Ecologically, it's catastrophic. The provincial government must stop trying to please an industry that's clearly broken and has not managed to evolve past antiquated ideas.

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The forests must be allowed to recover. Any harvesting needs to be done very carefully and with a light touch. That doesn't mean nothing can be harvested, but the canopy must stay largely closed.

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*Q: What can be done differently moving forward with respect to forests?*

Donna: Well, the simplest, “low-hanging fruit” is this: keep forest cover intact wherever and whenever possible. That's the first priority for conserving and sequestering carbon.

Ten years ago, I opposed assisted migration—helping tree species from other regions grow in our Wabanaki-Acadian Forest. I felt it was too intrusive, too much like farming; I don't like applying an agricultural



Acadia Community Development students pose as trees and tower over the regrowth in a clearcut in the proposed Chain Lakes Wilderness Area. PHOTO: ALAN WARNER.

mindset to forests and natural ecosystems, but things have changed. We're going to lose eastern hemlock and American beech due to invasive pests—two foundational species that make dark forests and can live for centuries. They'll be gone, except in a few chemically or biologically protected stands. Forests are losing black ash, white ash, green ash as well. So much is being lost. Meanwhile, the climate is changing rapidly—droughts, warming. With the climate changing, boreal species, such as balsam fir, white and black spruce, will also struggle to live here.

The question needs to be asked as to whether and if Carolinian Forest species should be introduced here? The Carolinian Forest is also endangered, and in Canada, it's mostly in southern Ontario. Could some of those species flourish here—American basswood, for instance, a fast-growing hardwood that can outgrow most Acadian Forest hardwoods? What about sycamore trees? With the climate changing faster than trees can migrate naturally—and Nova Scotia being almost an island, with sea level rise perhaps making it one—maybe it makes sense to help do what the birds and mammals would have done, only faster.

Desperate times demand rethinking. There is a need to change the essence of what is being done with

forests. The government loves to talk about “managed forests”. I hate that term. Managed forests have belched the most carbon—they are the driest, most fire-prone. I prefer letting nature look after herself. Give her all the pieces—protect her integrity—she’ll do the rest. I don’t have all the answers. I just hope the next generation will have the chance to continue learning, experimenting, and expanding on the science and ecology of our forest ecosystems.

*Q: What do you think is the most important thing for Nova Scotians to know about their forests right now?*

Donna: Our forests have been over-harvested for centuries. They’re degraded—and not just the trees themselves, but the soil beneath them. Nova Scotia’s soils are among the poorest in Eastern North America—more nutrient-depleted than those in Prince Edward Island or New Brunswick. They’ve been weakened by acid rain, over-harvesting, and earlier wildfires. Because of that, people have to step lightly in the forest now. The forests must be allowed to recover. Any harvesting needs to be done very carefully and with a light touch; the canopy must stay largely closed.

Most of what’s growing now is early-successional forest, but late-successional forests are needed: long-lived, shade-tolerant species that sequester immense

amounts of carbon and anchor ecosystems. Right now, young forests mature in open sun and are then cut down—resetting the cycle. They never reach the late-successional stage. That’s what is missing. The most important role of our forests right now is to mitigate climate change. Forests are a natural climate solution. Forest cover must be kept intact—no matter what.

**Erin Movold is a journalism student at Kings College in Halifax, Nova Scotia, and contributes to the Nova Scotia Forests Forever social media campaign that advocates for restoring and protecting forests in the region and province.**

*Editors Note.* Visit Nova Scotia Forests Forever to learn more and take action to help protect Nova Scotia’s forests (<https://sites.google.com/view/nsforestsforever/home>). To share your thoughts directly with the decision-makers shaping forest policy, write to the Nova Scotia Minister of Environment and Climate Change ([minister.environment@novascotia.ca](mailto:minister.environment@novascotia.ca)), Minister of Natural Resources ([mindnr@novascotia.ca](mailto:mindnr@novascotia.ca)), and the Premier ([premier@novascotia.ca](mailto:premier@novascotia.ca)). You can also contact your local MLA, whose email can be found at [nslegislature.ca/members](http://nslegislature.ca/members). A thoughtful message—however brief—can make a difference.



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_____	Natural History of Kings County	\$10.00	\$_____
_____	Wildflowers of Nova Scotia	\$20.00	\$_____
	Postage: \$2.00 (calendar), \$6.00 (parcel)		\$_____
	Tax-deductible donation		\$_____
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# Sharing Nature Together in Photos

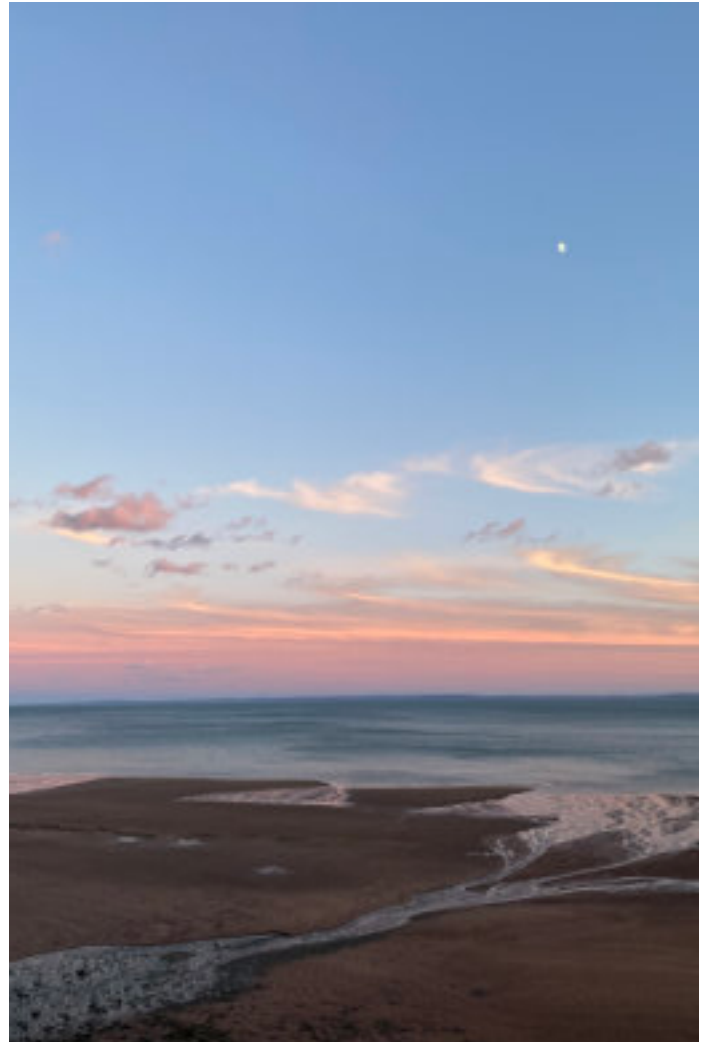
Here are some of the most popular photos from the 2025 BNS Photo Exhibition along with reflections on using photography to appreciate nature.

BY ALAN WARNER

The Sharing Nature Together Photo Exhibition organized by the Blomidon Naturalists Society (BNS) this past November was widely embraced by photographers, attendees and sponsors. The feedback was very positive— everyone seemed to appreciate it—including those who were not BNS members, particularly younger folks. For me, photography is not simply a tool to document and share nature, but more importantly is a way to increase one's appreciation of nature.

In that spirit, this photo essay is a way to more widely share a few of the most popular images from the photo exhibition, but more importantly it is also a way of encouraging folks to more deliberately use photography for nature appreciation. The next article by Garry Conway, a professional photographer, provides tips on how to improve your photos. I hope these articles encourage you to take photos for next year's exhibition, and in the meantime you can consider if and how the photos pictured here incorporate the tips that Garry outlines in the following article.

Infinite Shore, Margaretsville.  
PHOTO: SHAUNIE PALLOT.



Sandpiper Murmuration at Blomidon, The Guzzle.  
PHOTO: JERRY LOCKETT.



Enjoying the Incoming Tide, Harbourville Beach.  
PHOTO: KATHERINE MACLEOD.



Blackburnian Warbler, Foleaze Park, North Mountain. PHOTO: RICHARD STERN.



Bumbled Tease, Church Street, Port Williams. PHOTO: BOB SHIELDS.



Snowshoe Hare, Lower East Pubnico. PHOTO: JENNA AMIRALTY.



Pixie-Cup Lichen and Soldier Lichen on Basalt Rock, Gaspereau Lake dyke. PHOTO: LESLEY-JANE BUTTERS.

## Photography as Nature Appreciation

Framing aspects of natural settings to take pictures with a camera has over time helped me to look for beauty when I do not have the camera available. As a result, I find wonder and beauty more easily when I am simply observing in nature, increasing my appreciation of the surroundings. I don't have a camera with an enormous lens that can zoom in from great distances on small creatures. Those lenses are amazing, but also very expensive and hard to lug around. They produce spectacular photos in certain contexts (especially with timid creatures), but one can take brilliant pictures with any camera or phone, it is just that the range of sorts of photos shifts depending on the device.

For increasing my appreciation, I find that a single lens reflex camera (SLR) is more effective than a phone, even if they can take similar quality pictures. That's because I am looking directly through the lens and can play with the zoom to frame the image, even

if I do not have the mega, highest quality zoom provided by expensive lenses. I experiment with many frame possibilities before I take the picture. I am always asking, "What will look the best?" I am getting better at figuring it out with experience and reflections on what I capture. As a result, my photos are improving. Phones typically have much more limited zoom capabilities and one has to move forward or backward to zoom in or out. I find this more awkward, but it works for many people. Whatever the device, I tend to think of a camera as a means of appreciating nature rather than simply documenting and sharing nature. I do a lot of looking, and shifting things with the lens, before I push the button. Try it.

**Alan Warner greatly enjoys taking photos in his many excursions in natural areas, though he is very much a novice in the art form. He is also Editor of *Beyond the Tides*.**



Wonder of Colours, Wolfville. PHOTO: MANAMI KAKIHARA.

# Hints for Taking Pictures in Nature— Composing Your Photograph

Simple considerations can improve the photos you take in nature.

BY GARRY CONWAY

Here are a few simple tips for taking photos in nature, or anywhere for that matter. They can be useful in helping you take pictures and in appreciating and sharing natural settings.

- First, it is important to consider the placement of your subject in the frame of your camera. Think of your viewfinder or screen as a plane with a foreground, middle ground, and background. This can give your photo a sense of depth. Then consider the space both vertically and horizontally. Mentally, divide your screen into thirds, both horizontally and vertically (your camera might have a graphic overlay that can do this). Consider what your subject is and where it is in the picture frame. Here are some considerations when composing the photo:

- Having an object in the foreground can act as an interesting framing device for your subject, which might be in the middle plane. The background can give context for the subject or provide contrast to your subject. Combined with the foreground, it can give a stronger sense of depth to your photograph. For example, in the photograph above, I used the tree branches in the foreground to frame the photo. The canoe is the main subject in the middle ground followed by the sky and its reflection in the lake, and then the treed horizon acted as the background. It's good practice to look around inside the viewfinder or screen and think about how the subject is placed in relationship to the overall image, as well as checking the background to see how it supports the subject. Also look for distractions that might be illuminated. It may only take a slight change in camera position to achieve better results.



A canoe at Goldsmith Lake in Annapolis Co. N.S. PHOTO: GARRY CONWAY.

- Where you position your subject on the screen can make a huge difference to the final photograph. Dividing the screen or viewfinder into thirds can help with this. In most cases it helps to place the subject outside the centre third, either vertically and or horizontally.
- Think about the final photograph and how the viewer may see it. Think about them walking right into your picture, and how you compose it will determine where they go while they're inside it. Does the composition invite them in? Would the viewer take a look around, engage with your subject, wonder what's in front or behind? Would they want to see more, or even learn more, or does it direct them out of the photograph instead of holding their interest?
- Let's say you're photographing an animal walking toward something. If the animal is walking from one side of your photo to the other, place your camera so it looks like the animal is in the left or right third of the image with space open for them to travel toward their destination, this gives the viewer space to enter the photo with the animal, have a look around and see where it might be going before the viewer leaves the photo. If the animal looks like it is walking out of the photo, so will the viewer, and you're likely to lose their interest very quickly.

• If you're photographing birds, animals or plants, and you want the subject to take up most of the frame, then it may be “part” of the animal that is the subject to highlight. For the bald eagle at right, I was able to get close to the eagle and focus on its eye and head. The eagle is positioned so there is more open space in front of its beak and less behind its tail, so the viewer will be drawn toward the birds’ head and eyes, and hopefully linger there. If the spacing were reversed, less open space in front, the eagle would have appeared to be leaving the photographic plane, suggesting the person viewing do the same.



An eagle I photographed while canoeing up the LaHave River, Lunenburg Co. N.S.

These are simple tools for working toward a better photographic composition, but keep in mind these are photographic aids sometimes referred to as “rules”, but occasionally the best composition for a particular image defies the rules. What is important is that they give you a way of thinking about where things are placed in the picture plane. When getting ready to take a photo, look around and see how all these elements will affect the overall image.



A showy lady's slipper in Hants County. N.S. The subjects (the flower and plant) are just off centre to the left, using the rule of thirds. This leaves a little more space open on the right side of the frame for the person viewing to enter into the image. PHOTO: GARRY CONWAY

Sometimes you just need to move your camera up or down, or left or right, to get a better photographic composition.

One time I was on a vacation trip in the Arctic and marveled at how such small arctic plants could survive in the cold on an expansive gravel beach. I took many closeup shots of these plants, making sure the shot was in focus while using my tripod to keep the camera still. After I returned home and reviewed the photos, I realized that while the closeups of the plants were interesting, they could have revealed more. If I had moved the camera back a little and changed the angle slightly, I could have shown more of the landscape around the plants, and this would have told a much more interesting and inviting story about the harsh conditions they were growing in and how sparsely distributed they were. I did take many additional landscape photos of the area, which helped show the context the plants were living in, so all was not lost. There is so much to learn through experience.

**Garry is a graduate of the Nova Scotia College of Art and Design and a Certified Naturalist of the University of Toronto. He has worked as a professional and exhibiting photographer focusing on nature with a special interest in forests and the unique character of trees.**

# Biocontrol and the Future of Hemlock Forests

Nova Scotia needs a landscape-level solution to restoring the ecological balance that once protected hemlocks.

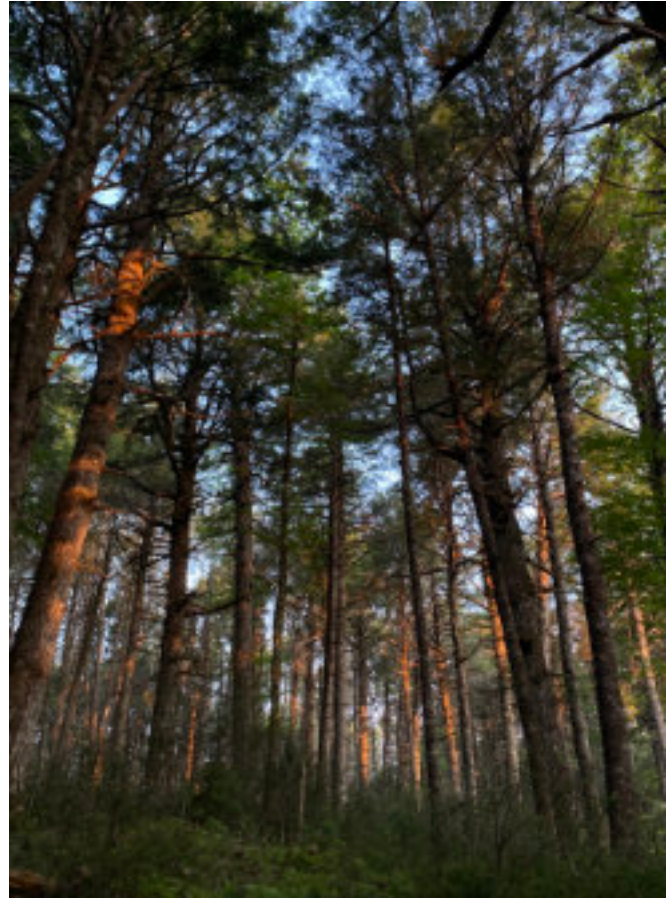
BY N. KIRK HILLIER

Eastern hemlock stands have long shaped the ecological character of Nova Scotia's forests. Their dense, cooling canopies regulate stream temperatures, anchor soils along steep slopes, and provide year-round habitat for birds, amphibians, insects, and mammals. Some trees tower above us after centuries of growth, forming living green vaults across woodland landscapes. These old-growth structures, once common, now survive only in pockets—and face an existential threat.

The hemlock woolly adelgid (HWA), a tiny sap-feeding insect native to parts of Asia and western North America, has recently spread rapidly through southwestern Nova Scotia. Once established on a tree,



Hemlock Woolly Adelgid (HWA) has a devastating impact on hemlock forests, turning them into “grey ghosts”. This photo is from the Appalachian Mountains of North Carolina where HWA has been rampant for many years. PHOTO: STEVE NORMAN, U.S. FOREST SERVICE.



The majesty of hemlock forests.

HWA feeds at the base of hemlock needles, weakening the tree's ability to photosynthesize, store nutrients, and withstand climatic stress. Infestations progress silently at first, but within a few years can transform once-vibrant stands into thinning, pale “ghost forests”. Without intervention, mortality rates can approach 90% in heavily infested regions.

Communities, land managers, and governments across the province have begun protecting selected trees with chemical treatments. While these insecticides can preserve individual or high-value stands, especially in parks or cultural landscapes, they must be reapplied every five to seven years and cannot feasibly be deployed across entire watersheds. Moreover, many stewards prefer options that reduce chemical reliance in the long term. As HWA continues its northward expansion, Nova Scotia needs a landscape-level solution—one that restores the ecological balance that once protected hemlocks in their native range.

## A New Tool for a Long-Term Problem

Biological control—using specialized predators to suppress HWA populations—has emerged as the most promising long-term strategy. For more than twenty years, scientists in the United States have tested and released predators from the adelgid’s native range. The results have been encouraging; although not a quick fix, these natural enemies can reduce HWA densities to levels where trees can recover and new seedlings can establish.

Acadia University is now at the forefront of bringing this approach to Atlantic Canada. A new biocontrol research and rearing facility, developed in partnership with the Canadian Forest Service and provincial collaborators, is nearing full operation on the Acadia campus. This state-of-the-art unit will house controlled-environment chambers, a quarantine-level research facility, and specialized equipment for rearing natural enemies of HWA. It represents the first such facility in Atlantic Canada dedicated to deploying biocontrol agents for forest conservation.

The facility’s purpose is twofold: to establish predators for release, and to generate the scientific knowledge necessary to ensure that every release is ecologically safe, environmentally sound, and biologically effective. Researchers and graduate students will study host specificity, predator life cycles, seasonal timing, winter survival, genetic diversity, and potential dispersal patterns of the predators. These insights will help shape where and how releases occur across the province.



HWA white and woolly egg sacs on hemlock stems.



Inside the Facility—Boxes inside the environmentally controlled space are rearing predatory *Laricobius* beetles.

## The Predators: Beetles and Silver Flies

*Laricobius nigrinus*: This is among the most valuable predators now being used, a small dark beetle native to the Pacific Northwest. Adults feed on HWA during late autumn and winter, precisely when adelgid populations are growing most rapidly. Their larvae consume adelgid eggs inside the woolly ovisacs, offering targeted pressure on the pest.

Acadia researchers, partnering with the Canadian Forest Service in Fredericton, New Brunswick, and colleagues in British Columbia, have now completed several successful collections of these beetles from coastal sites in British Columbia where they occur naturally. In the past three years, more than 21,000 beetles have been collected for release in Nova Scotia. Follow-up monitoring has confirmed good survivorship and establishment.

*Silver Flies*: Complementing the beetles are the *Leucotaraxis* silver flies—two species of shimmering predatory flies whose larvae feed on both generations of HWA. Because HWA produces two reproductive cycles each year, effective control requires predators that are active across both seasons. Silver flies fill this gap.

This spring Acadia and the Canadian Forest Service will begin scouting and collecting founder populations from British Columbia to initiate experimental rearing under controlled conditions. Once the new biocontrol facility is fully operational, we anticipate these flies will be produced in the tens of thousands, enabling targeted releases across multiple forest types.



The tiny but tenacious *Laricobius nigrinus* beetle feeds on HWA during the winter months. Adults and larvae work together to reduce adelgid densities.

## Why Biocontrol Matters for Nova Scotia

Hemlock forests in the province cover more than 216,000 hectares, much of it on private lands. They form cool riparian corridors, stabilize slopes, regulate nutrient cycling, and support diverse communities of organisms—from salamanders to lichens, fungus gnats to warblers. Their decline would ripple through forest ecosystems for decades.

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The two predators work in complementary roles as winter-active beetles and spring-active flies. Multispecies biocontrol is important to prevent HWA populations from rapidly rebounding.

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Biocontrol offers a sustainable, cost-effective path forward. Once released and established, predators disperse naturally, follow HWA populations through changing landscapes, and persist through winter and summer without constant human input. Unlike chemical treatments, which require repeated applications, biological control agents can become self-sustaining components of the forest community.

This approach will not eliminate HWA entirely, nor should it. The goal is to return the adelgid to the low, cyclical densities that exist in its native range, where predators keep populations in check and allow hemlock forests to thrive. Introducing predators from outside a region is not a decision taken lightly, as an introduction of exotic species can sometimes have unintended ecological consequences. For this reason,

extensive research and long-term testing are essential to ensure that any predator released is highly specific to the target pest and unlikely to disrupt native species or food webs. In the case of hemlock woolly adelgid, the predators currently being used have been studied for decades and shown to feed almost exclusively on adelgids. Importantly, these species originate from the West Coast of North America, where hemlock woolly adelgid are also present in a closely-related ecological system. Ongoing research, quarantine rearing, and post-release monitoring remain central to this work, helping ensure that biological control is applied cautiously, transparently, and with ecological safety as the highest priority.

## Research, Partnerships, and Community Involvement

Acadia's biocontrol program is embedded within a broad network of scientific and community partners. Graduate students are examining predator genetics, hybridization risks, climate tolerance, and forest arthropod diversity. Others are developing environmental DNA (eDNA) tools to track predator establishment. Field technicians and collaborators help scout release sites, monitor canopy decline, and collect environmental data. This initiative is supported by



Kirk Hillier and students examining a branch sample for HWA predators.

partnerships with Nova Scotia Department of Natural Resources (NS-DNR), Nova Scotia Environment and Climate Change NS-ECC), Natural Resources Canada – Canadian Forest Service, Parks Canada, and Environmental and Climate Change Canada. Consultation with Indigenous communities has also been paramount in the development of HWA management planning, including biocontrol options. Funds to support research and development of the biocontrol facility and associated risk assessments have been generously provided by NS-DNR, NS-ECC, the Nature Smart Climate Change Fund, the Sustainable Climate Change Communities Fund, Research Nova Scotia Forestry Missions Fund, and Natural Sciences and Engineering Council.

Since the majority of hemlock stands in Nova Scotia occur on private land, community awareness and involvement will remain central to the success of biological control. As releases expand, citizen scientists may play a role in monitoring predators through visual surveys, sampling fallen branches, or collecting environmental data in priority areas.

## Looking Ahead

Nova Scotia stands at a pivotal moment in the future of its hemlock forests and losses already visible on the landscape are sobering. As a keystone species in the Acadian forest, eastern hemlocks shape unique forest ecosystems, and provide irreplaceable habitat valued by both wildlife and people. Nova Scotia faces the prospect of losing up to 90% of these trees, including

## How You Can Help

Report HWA infestations you find on iNaturalist or to [hwa@nshemlock.ca](mailto:hwa@nshemlock.ca). The Nova Scotia Hemlock Initiative website provides great access to resources and upcoming workshops on HWA.

iconic stands in places such as Kejimikujik, the Kentville Ravine, and the Millennium Trail. While there is deep concern and short-term chemical treatments are being applied in a limited number of high-value sites, these approaches are costly and come with significant ecological and logistical challenges. As a result, many hemlocks across the province will inevitably be lost. However, all is not lost—the emergence of a coordinated biocontrol strategy offers genuine reason for optimism. As Acadia University’s new facility comes online and predator releases continue, the province will move from emergency response to long-term ecological restoration.

The work ahead is significant, but hope lies in action. With science, community effort, and time, we may again see young hemlocks rising beneath their elders, streams kept cool under deep green canopies, and forests recovering the resilience they once held.

**Dr. N. Kirk Hillier is an entomologist specializing in how insects use chemical signals to interact with their environment. He directs Acadia University’s new HWA Biocontrol Facility. He contributed the photos.**



Acadia student researchers check blue vane traps to monitor predator numbers in the hemlock forest.

# Brown Trout in Nova Scotia: Nova Scotia's Most Beloved Aquatic Invasive Species

The distribution of brown trout is a cautionary tale of the delicate balance of natural ecosystems and the long-term consequences of attempts to alter them.

BY SAM ANDREWS

Far less attention is given to the creatures that live in the water than on land. They are hard to spot, their movements go unnoticed, and even in urban areas they can remain a mystery. One fish species renowned for its elusive qualities with an interesting story worth telling is the brown trout (*Salmo trutta*). It is a cautionary tale in which humans play a major role.

Compared to brown trout, few species of fish are as ubiquitous, adaptable, and well travelled. While it is generally considered a shy species native to European lakes and streams, it earned a reputation among European anglers as a prized game fish due to its caution and cunning. Wherever Europeans went during their period of colonization, their favoured brown trout soon followed, landing it in such far-flung destinations as New Zealand, Japan, Africa, Australia, the sub-Antarctic, South America, and North America, where they continue to thrive today.

Brown trout eventually arrived in Nova Scotia, originating from two distinct European sources. The first of these fish, known as the “German Browns” or *Salmo*

*fario*, arrived as eggs in 1925 from the German Fishing Club in Berlin. The second were the “Loch Leven Browns” (*Salmo levensis*) which were sourced in Loch Leven, Scotland, and first stocked in the province in 1929. In earlier times and sometimes still in Europe, the Latin term “fario” was used to describe a stream-dwelling brown trout and “levensis” suggested a lake-dwelling fish. Despite these perceived qualities, brown trout are represented by a single species, and when given the opportunity they will occupy both rivers and lakes and readily migrate to the sea.

Nova Scotia spared no expense in establishing this European species, and over the last century the province has raised and released more than 24.5 million brown trout. When stocking began, the species was deemed better suited to warmer waters, higher turbidity, and greater levels of pollution than the native brook trout (*Salvelinus fontinalis*). Furthermore, the wariness of the brown trout towards lures was noted to have made the species resistant to overfishing. Coupled with a lifespan extending to about 13 years and the ability to reach a large maximum size, brown trout were thought to provide a



A brown trout captured in Sharps Brook, Jijuktu'kwejk (Cornwallis) River, Kings County, Nova Scotia. PHOTO: LIZ BATEMAN.

more stable, exciting, and resilient fish population to the angling public.

In the early years of introduction, biologists in Nova Scotia and New Brunswick wrote of the potential for brown trout to outcompete native trout and salmon. Thus, early on it became a policy to focus brown trout stocking in areas where salmon and brook trout numbers were low, or where the species were absent due to dams and overfishing. It was not long before excitement over this new angling opportunity spurred broader introductions. This included areas with robust populations of native species, locations with higher angling pressure, and coastal estuaries.

Like many globe-trotting tourists, the brown trout is also known for exploring on its own accord, and the waters of Nova Scotia were more than suitable to support their lifestyle and travels. Brown trout can live in salt water and thrive in river estuaries, and Nova Scotia has no shortage of small rivers connected by the sea. Through this coastal corridor, brown trout were quick to expand their habitat from where they were introduced. They can now be found in most rivers of the Southern Gulf of St. Lawrence, Cape Breton Island, and Guysborough County. Furthermore, brown trout have even begun to show up in southeastern Prince Edward Island, where the species was never introduced.

As brown trout established themselves and spread, they gradually carved out a niche of their own by



A tiger trout (hybrid between a brook trout and a brown trout) captured in Elderkin Brook, Jijuktu'kwejk (Cornwallis) River, Kings County, Nova Scotia. PHOTO: LIZ BATEMAN.

taking over estuaries and warmer river reaches. As a result, the smaller brook trout have become rarer and mostly restricted to colder pools and headwater tributaries where narrow thermal niches afford them a slight competitive edge. Even the Atlantic salmon (*Salmo salar*), Nova Scotia's silver king, is impacted when brown trout invade. In Nova Scotia, brown trout compete with salmon for food and habitat, and readily prey on young salmon parr and eggs.

Brown trout have clearly made themselves right at home in Nova Scotia and have had evident effects on aquatic ecosystems. Still, some of their impacts are a bit more cleverly disguised. Geographically speaking, brown trout from the European continent and brook trout native to eastern North America would have had no natural opportunity to meet. Once they did, it was quickly realized that the two species could interbreed. The offspring of a male brook trout and a female brown trout is known as a "tiger trout". Finding one in the wild is extremely rare, but this stunning and sterile fish is visual evidence of the ongoing battle for territory and the waste of reproductive potential of a native trout species under threat. In some systems, brown trout have become so common that native trout can scarcely avoid spawning near or with this species. This limits the ability of brook trout to produce offspring with members of its own species and maintain robust local populations.



Fly fishing has been popular in Nova Scotia for a long time. This picture was taken in the early 1900s. SOURCE: NOVA SCOTIA ARCHIVES VIA WIKIMEDIA COMMONS.

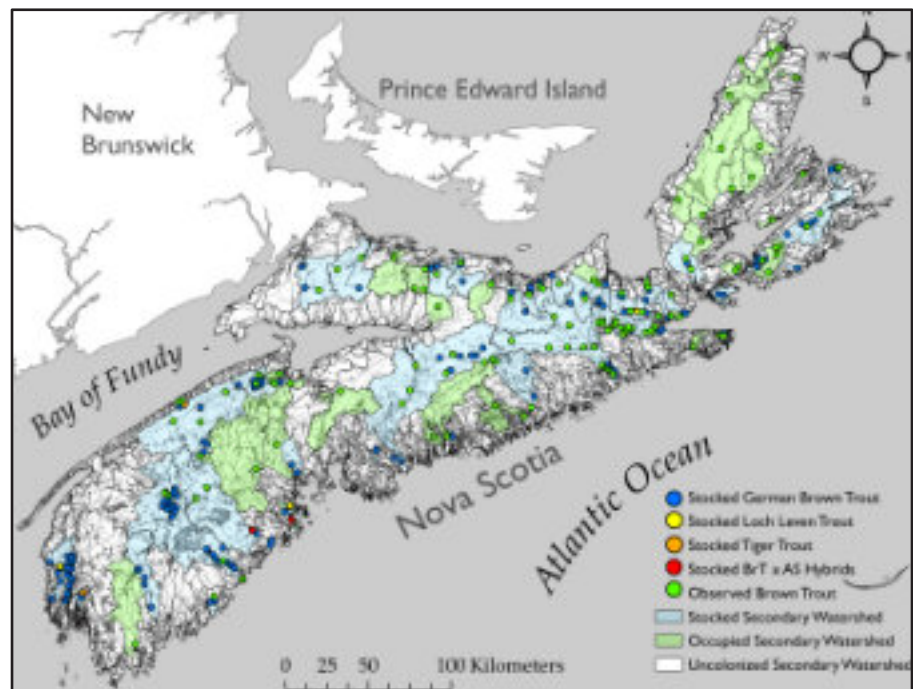
Inter-species hybridization does not stop with brook trout. Of greater concern may be the ability of brown trout to reproduce with Atlantic salmon. Salmon of the northwest Atlantic did not co-evolve with brown trout and are not adapted to life alongside them. Hybrid crosses between the two species have been found in Nova Scotian rivers, but their frequency has not yet been assessed. As Atlantic salmon populations dwindle, brown trout spread, and spawning habits degrade, inter-breeding between these species may become more common. Where studies have been conducted, such as the rivers of Newfoundland's Avalon Peninsula, on average 5% and up to 19% of young Atlantic salmon in some systems were discovered to not be salmon at all. Unlike the tiger trout, crosses between the brown trout and the Atlantic salmon are extremely difficult to identify. Biologists scarcely know what impacts these hybrids might have on the ecosystems they inhabit, but they waste salmon reproductive potential and add another layer of complexity to Atlantic salmon recovery.

For the last century, brown trout have played a complex and evolving ecological role in the rivers, lakes, and coasts of Nova Scotia. As a fish in the salmon family (salmonids), they are beloved by anglers while also avoiding the scrutiny typically applied to non-salmonid invasive species such as smallmouth bass (*Micropterus dolomieu*) and chain pickerel (*Esox niger*) that so often dominate the news. Even after a century, brown trout are still not legally recognized as invasive in Nova Scotia. Despite this lack of designation, brown trout have broadly and silently altered Nova Scotian waters, but their resilience has also allowed them to adapt in the face of rapidly changing ecosystems. As climates warm, rivers become urbanized, and streams grow increasingly fragmented, the brown trout may soon become not only an instigator, but also a beneficiary of the changing environment.

On the global stage, brown trout remain a top-tier gamefish receiving continued support from stocking programs, while also being broadly recognized as one of the world's most successful aquatic invaders, however, there is little public will and no practical methods to remove them. Brown trout are now so well ingrained in global rivers that any attempted eradication could not be made without threatening native salmonids, and brown trout would be quick to re-colonize from the coast.

The distribution of brown trout is a cautionary reminder of the delicate balance of natural ecosystems and the long-term consequences of attempts to alter them. Nova Scotia's freshwater ecosystems support a limited number of native fishes, but this only makes them more important to conserve in the face of the spread of exotic species.

**Sam Andrews is the Atlantic fish habitat biologist for Ducks Unlimited Canada and has studied fisheries biology in the Maritime Provinces for 18 years. He has a keen interest in under-studied fish species and local ecological history, which he uses to inform ongoing fish habitat restoration and research projects.**



Stocking history and modern distribution of brown trout in N.S. Map reproduced with the authors' permission from: Andrews, S.N., Colton, K.J., Bateman, E.M.T., *et al.*

# Little River Falls—A Not-So-Little Waterfall

A short, enjoyable walk in winter or spring with a big reward at the end.

BY PETER WALLACE

West of Sunken Lake is an abandoned county road, also known as the Nictaux Road, which leads to a small, but spectacular waterfall. The Nictaux Road was likely a trail originally used by Mi'kmaq for innumerable generations dating back long before colonization. Settlers started road construction on the trail in the late 18th century to enable a shorter route between Annapolis Royal and Halifax relative to the “highway” through the centre of the Annapolis Valley. Unfortunately, it was never finished and some of the abandoned sections have been lost in the last 225 years. From the road, a small forest trail departs on the right and heads to the falls. This small trail parallels the Little River, which drains Little River Lake and Trout River Pond. The river was dammed as part of the Gaspereau Lake–Lumsden Pond hydro system in the mid-20th century. This dam means that there is less water in the falls in dry summers, so the best time to view the falls is in late winter or early spring. The small forest trail is on private land, so respect the owner by packing out all your waste and keep all dogs under control.

## Directions

This is an in-out route that starts at the junction of the Sunken Lake Road with the Nictaux Road (see map). The road is not drivable so park on the Sunken Lake Road, taking care not to block other vehicles; there are nearby logging operations, and many trucks/ATVs use this to access the area for recreation and logging activities. There is no street sign so do not confuse this with the nearby Little River Lake Road, which has cottages—there are no cottages on the Nictaux Road.

Start walking down the Nictaux Road, which forks 100 m from the start. Stay straight (right) at this fork. After another 1.1 km, the road gently curves to the left. The forest trail starts 60 m past the curve on the right side. It is usually flagged and the opening of the trail into the conifer trees is quite obvious. The trail weaves and winds through the woods for over 300 m to a rocky promontory overlooking the falls. This first view is from a cliff edge partially obscured by trees; be careful. For the adventuresome, the trail continues and winds its way down a very steep slope to the river for a better view of the falls and gully. Other users have put a rope down the steep section to assist the descent and ascent; use it at your own risk. The trail ends here though the Gaspereau River is only 200 m to the north, but it is very rough going to get to it.

## Description

The land on the right of the straight section of the Nictaux Road was clear cut over 15 years ago and is now composed of shrubs and small trees such as red maple, ash, alder, etc. After the curve, there is an



Little River Falls



The Nictaux Road near the curve where it is a bit muddy.

abrupt change in the forest to larger trees, a mix of softwood and hardwood, as there has been no recent forestry activity there. On the left, just after you pass the initial fork, is second-growth forest of intermediate-aged trees, which is currently being selectively logged. Sections of the road near the curve are quite wet at times but are safely passed by walking the road edges.

The small trail through the forest curves around large trees and over boulders and hummocks. Some of these features are very picturesque in any season. Listen to the stream water to the west that gets louder as you approach the falls. It makes getting to the falls very climactic. The treeless (rocky) promontory overlooking the falls is quite large and flat with a very sharp and dangerous edge. According to local lore this waterfall is the centre of the world. A signpost in the clearing gives distances to other notable places far

away, one being to the bottom of the falls in case you wonder how far you will fall if you go over the cliff! (82 m by GPS, but the sign says 200 m just to impress the kids).

Climbing down on the trail to the bottom of the falls is worth it for the view. The water comes out of a notch falling into a pool at the bottom. The pool is formed from rocks and debris that hold the water back, but is also helped by tree trunks that have washed down the stream and over the falls. This debris in the water course and the thick vegetation along the riverbanks make it difficult to continue down to the Gaspereau River.



Signpost to other important places in the world.

It is a short hike but makes for a relatively easy and nice afternoon trek for everyone, including children and dogs.



Map of the road and trail to Little River Falls. SOURCE: GOOGLE MAPS.

**Peter Wallace is a retired geologist and leads a weekly hiking group in the region. Peter contributed the map and photos.**

# Learning Takes Root: Highbury Students Contribute to Ecological Restoration

Students understand that restoration is not an abstract concept but a physical practice, carried out one root system and one sapling at a time.

BY BROOKE BOUTILIER

The Friends of the Wolfville Trails Committee has completed a highly productive second year of restoration work at Wolfville Reservoir Park. A lot was accomplished, and a key element was the contribution of a group of students from Highbury Education Centre. This is a story of how a community restoration project paired with junior high school experiential learning results in positive benefits for everyone.

For the 2025 field season, this Blomidon Naturalists Society volunteer committee, under David Steele's leadership, focused on reversing invasive species dominance and re-establishing native forest composition along the trails in the park. Approximately 1,500 m<sup>2</sup> were cleared of invasive woody plants, including glossy leaf buckthorn (*Frangula alnus*), multiflora rose (*Rosa multiflora*), Norway maple (*Acer platanoides*), and English oak (*Quercus robur*). These areas were subsequently replanted with more than one hundred native trees and shrubs selected to reflect the native forest biome of the Wabanaki-Acadian Forest, including several species of maple, red oak, river and paper birch, serviceberry, black willow, mountain ash, white pine, red-osier dogwood, witherod, and Labrador tea, among others.

This work was made possible through the efforts of volunteers, including the students from Highbury Education Centre. Highbury, an experiential school in New Minas within the Annapolis Valley Regional Centre for Education, emphasizes hands-on, community-based learning. While students follow the same curriculum as other secondary school programs, much of their learning takes place in the community and through service projects. Accompanied by their teachers, the students joined in this past fall for four afternoons of invasive removal and native planting.

The students' work began with learning how to interpret the site ecologically. They were introduced to glossy leaf buckthorn, the most problematic invasive in the park's understory. They learned to recognize its smooth, glossy leaves, greyish bark marked with pale lenticels, and its tendency to form dense, near-monocultural thickets. Once these features became familiar, students began to recognize the species throughout the site. "I enjoyed pulling out the invasive species and now I identify them everywhere!" one student said afterwards. Students' perspectives shifted from seeing an undifferentiated "woodlot" to recognizing composition and ecological patterns.



Highbury students at work. PHOTO: BROOKE BOUTILIER.

Armed with loppers and mat-tocks, the students began the slow process of mechanical removal. Particularly with glossy leaf buckthorn, the physicality of the work quickly reveals the scale of the task. The plant invests heavily in below ground biomass, and when it finally comes free, it brings with it a dense, fibrous root mass. “It’s satisfying to pull the whole tree out and see the extensive roots”, a student remarked. While a single, tree-sized buckthorn can take up to thirty minutes to remove, the plant tends to establish in dense thickets, and in areas where it is young and shallow-rooted, one can remove hundreds of seedlings in an afternoon.

The students’ attitudes created a buoyant atmosphere. One student noted that “it was fun working together outside”. As the work proceeded, students began to understand the ecological rationale behind it. Although invasive species create dense vegetative cover, they contribute very little to local food webs. Native species support native herbivorous insects, particularly caterpillars, which are a critical energy source for young forest birds.

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Students leave tired, a little sore, and visibly proud of what they have accomplished together.

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Once areas were cleared, students worked in pairs to plant native trees and shrubs, hauling potted trees several hundred metres along the Millennium Trail to access the planting sites. They demonstrated care and precision, inspecting the nursery stock to ensure that each tree or shrub was the correct species and placed in accordance with the planting plan. Following the on-site demonstration, they prepared the trees and shrubs for planting, set them carefully into their holes, and backfilled each pit with a mix of native soil and compost, then mulched and watered each planting thoroughly to ensure they established success-



The reservoir team. PHOTO: BROOKE BOUTILIER.

fully. The surrounding forest may still bear the marks of invasion, but changes will be evident. The students helped catalyze a long-term ecological process.

Wolfville Reservoir Park is well-loved green space, visited daily by walkers, runners, and families. Most visitors will never know who planted which tree or removed which buckthorn thicket, but over time, they will experience the results: increased bird and pollinator activity, greater structural and seasonal diversity, and a forest that functions more fully as an ecosystem.

For the students from Highbury, the effects are more immediate. They leave tired, a little sore, and visibly proud of what they have accomplished together. More importantly, they leave with a new way of reading the landscape, and with the understanding that ecological restoration is not an abstract concept but a physical, deliberate practice, carried out one root system and one sapling at a time.

Friends of the Wolfville Trails would like to thank the students and teachers at Highbury Education Centre for their enthusiasm and dedication to restoring one of our native ecosystems!

**Brooke Boutilier is the junior high program teacher at Highbury Education Centre. She enjoys her job most when outside and students are making real world connections.**

# Fireworks and the Environment

Fireworks have negative effects on humans and creatures, but there are ways to reduce the impacts.

BY HOWARD WILLIAMS

Fireworks may be pretty and memorable, but their use comes with a number of negative environmental impacts that deserve attention and reflection: noise, flashing lights, contamination of air and water, and increased fire risk. There are also negative effects on mental health. The order of these negative effects does not necessarily indicate their seriousness.

## Noise and Light

Fireworks create sudden loud noises, with bright flashes of light. Both of these have adverse effects on breeding and migrating birds, as well as pets, livestock, and humans.

Data from wetland, open field, and forest habitats show that bird nesting peaks in mid-July and does not end until late August.<sup>1</sup> Birds Canada provides a handy tool to determine which birds nest locally and over what period.<sup>2</sup> Birds common in the Kings County area are listed by the end of their nesting seasons. Many bird species nest twice, if not three times, running late into the season. Late last August, I saw young downy woodpeckers being taught to feed by their parents, and young song sparrows running across the road in a way that no adult would consider proper behaviour.



A golden crowned kinglet in Kentville at Miner's Marsh—not far from the impacts of fireworks. SOURCE: SARAH FOOTE.

Some birds do not even start to nest until the end of May, like the white throated sparrow, alder flycatcher, and northern mockingbird; some even wait until July, like the American goldfinch.

The data indicate that our local birds are nesting during fireworks celebrating Canada Day on July 1st, and Mud Creek Days in Wolfville in August. As well, shorebirds start migrating south in mid-July.

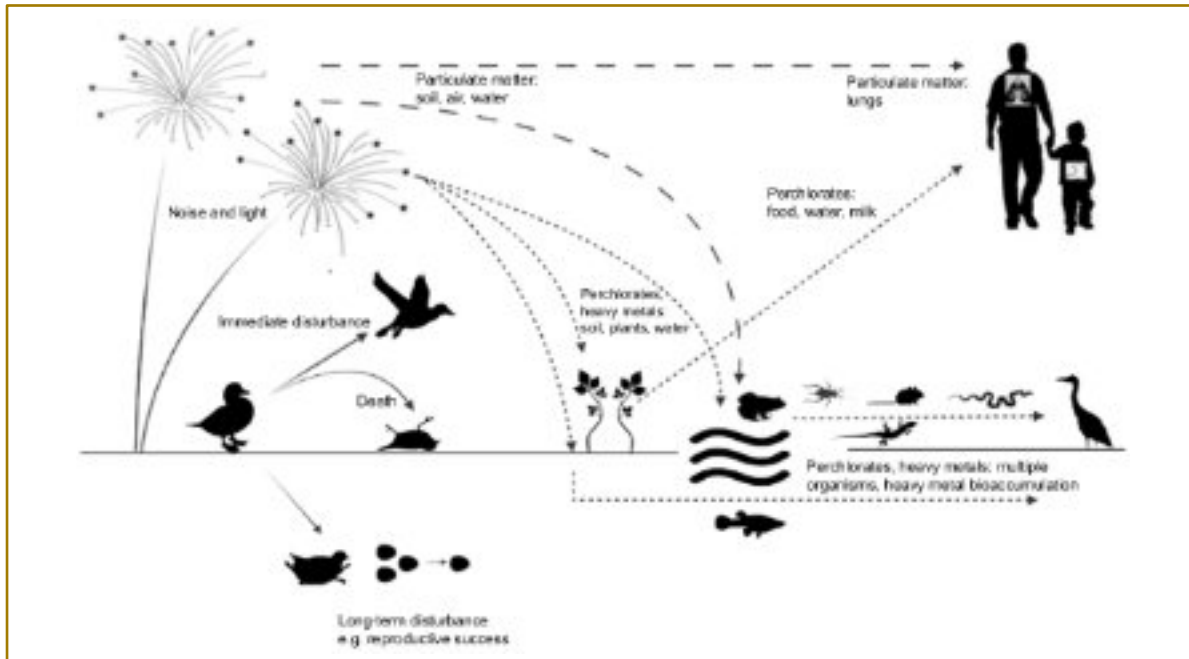
Many pet owners see that their dogs, cats, and other pets do not respond well to loud noises, and commonly need training to stay calm.<sup>3</sup> Some dogs may even try to escape from their houses or hide under furniture.<sup>4</sup> My dogs become very anxious and uncomfortable.

Many people, especially those with autism, post-traumatic stress disorder (PTSD), or mental health issues, do not respond well to loud noises.<sup>5</sup> For example, loud bangs and flashes may re-awaken memories of the original trigger and cause severe distress for those with PTSD.

## Contamination and Fireworks

The use of fireworks may contaminate air, soil and water. Fireworks can release gases such as carbon dioxide, sulphur dioxide and carbon monoxide, while smoke and dust particulates can accumulate on surfaces. The figure on the next page describes the various pathways of potential contamination.<sup>6</sup>

The large amount of smoke that fireworks emit contains metals used to colour the fireworks.<sup>7</sup> Smoke may also have plastic fragments, which with metals and oxides, can be deposited onto land and water. It also has human health effects, which many people experienced during the forest fires and air quality warnings this past summer. Smoke inhalation can lead to stress on the lungs, exacerbating asthma and



This is a conceptual diagram of the effects of fireworks on the environment, including the immediate disturbance of birds and other animals, the rapid pollution of air quality by particulate matter, and the deposition of perchlorates and heavy metals into soil and water where they can transfer to humans or bioaccumulate in food chains.<sup>6</sup>

circulatory issues such as COPD. Perchlorate, one of the oxidants used in propelling fireworks, can block the ability of the thyroid to use iodine.<sup>8</sup>

Numerous Valley towns and households rely on groundwater for their drinking water, which can become contaminated from the percolation of surface water into the ground. Metals, such as barium, strontium, lithium, cadmium, aluminium, and manganese, are released during a fireworks display. Non-metallic ions, such as nitrate, sulphate, perchlorate are also released.<sup>9</sup> Most of these are “conservative” materials, which means that they maintain their potency during their passage through the sub-soil into groundwater aquifers.

Fireworks, even those set off by governments, increase the risk of fire in dry periods.

## Potential Solutions

There are potential solutions to these issues. First, I believe there should be regulated seasonal use rather than an outright ban. Halifax staff have recommended that the City should continue making every effort to provide advance warning of public fireworks displays. Their report also recommended requiring all grant applications for fireworks displays to include proof

that the public were notified. In contrast, there is an outright ban on consumer fireworks in Vancouver but it has been hard to enforce. Hamilton has banned consumer fireworks excepting on Victoria Day and Canada Day, but again monitoring and enforcement of the restrictions has been difficult.<sup>10</sup> Also, restricting seasonal use of fireworks only addresses the bird conservation aspects, not the human, pet, and contamination issues.

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Is there a real need for traditional fireworks anyway? Traditions can change.

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A second option is that fireworks can be made much quieter without thunderclaps, so-called “noiseless fireworks”.<sup>11</sup> If there were less noise and fewer flashing lights, nesting birds would not be affected as much during their breeding seasons.

Third, spectacular drone or laser light shows are available, are much quieter, and do not necessarily produce flashes of light. These types of shows avoid all of the negative aspects of traditional fireworks.

Given the impacts that fireworks can have, is there a real need for traditional fireworks anyway? Traditions

can change: public executions are long gone, and smoking is now banned in public buildings. Surely we can acknowledge the harm of traditional fireworks and take action.

**Howard Williams lives by choice in Wolfville and has enjoyed careers in geology, hydrogeology and is currently involved in local government.**

<sup>1</sup> Bird Canada site accessed from: <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#toc1>

<sup>2</sup> <https://www.naturecounts.ca/apps/rnest/index.jsp?lang=EN>

<sup>3</sup> [https://www.vetmed.ucdavis.edu/sites/g/files/dgvnsk491/files/inline-files/Fear\\_of\\_Fireworks.pdf](https://www.vetmed.ucdavis.edu/sites/g/files/dgvnsk491/files/inline-files/Fear_of_Fireworks.pdf)

<sup>4</sup> <https://veterinarypartner.vin.com/default.aspx?pid=19239&id=4952947>

<sup>5</sup> <https://sbtreatment.com/blog/the-effects-of-fireworks-on-your-mental-health/>

<sup>6</sup> <https://www.publish.csiro.au/pc/pdf/PC22040>

<sup>7</sup> <https://watersheds.ca/fireworks-and-freshwater-ecosystem-health/>

<sup>8</sup> <https://www.lung.org/blog/fireworks-hidden-dangers>

<sup>9</sup> <https://www.psu.edu/news/research/story/researchers-investigate-effect-perchlorate-fireworks-drinking-water>

<sup>10</sup> <https://nationalfireworks.ca/wp-content/uploads/2023/10/CNFA-The-Banning-Of-Fireworks-Oct-2023.pdf>

<sup>11</sup> <https://rocketfireworks.ca/collections/quiet-fireworks>; Also see Fireworks FX, a local firm: <https://www.fireworksfx.com/our-staff/>,



Noiseless fireworks can address one problem with fireworks displays. Do we need the bangs? PHOTO: KAOZ69 VIA WIKIMEDIA COMMONS.

# What's Up in the Night Sky?

## Highlights for February 15 to May 15

BY PATRICK KELLY

*Feb. 17: New Moon*

*Feb. 18: Moon 1° from Mercury (6 PM)*

*Feb. 19: Mercury at greatest angle from Sun (evening)*

*Feb. 23: Moon next to Pleiades Cluster (11 PM)*

*Mar. 2-3: Full Moon\**

*Mar. 8: Daylight Savings Time Starts*

*Mar. 18: New Moon*

*Mar. 20: Equinox*

*Apr. 1: Full Moon*

*Apr. 3: Mercury at greatest angle from Sun (morning)*

*Apr. 25: Moon 0.1° from Regulus (10 PM)*

*May 1: Full Moon*

*May 3: Moon 1° from Antares. (midnight)*

*\* The Moon is actually full at 7:38 AM on Mar. 2 so it is seen as almost-full moon both nights*

There's lots to discover in the night sky in the next few months. The Moon passes a star cluster and two bright stars. There are two chances to see Mercury, once in the evening sky (February), and once in the morning sky (April), while Venus and Jupiter dominate the evening skies. Here are the details:

The *Moon* will pass very close to the Pleiades, a cluster of young stars in the constellation of Taurus, on the night of February 23. The view will be reasonably good as the Moon will be just past its first quarter phase, so it will not greatly outshine the star cluster. On the night of April 25, look for the Moon to pass very close to Regulus, the brightest star in Leo the Lion. At our latitude, Regulus is the 15th-brightest star in the night sky.

The Moon also has a close encounter low in the southern sky with Antares on the night of May 3. Antares is the brightest star in Scorpius the Scorpion. It appears reddish as it is a red giant star with a surface temperature much cooler than the Sun. It makes up for that by being 700 times larger than the Sun. All that extra surface area means that it emits about 75,000 times as much energy as the Sun! As Mars passes this star regularly and can be about the same brightness, the star was given the name Antares, meaning the "rival of Ares", Ares being the ancient Greek name for Mars, the Roman god of war.



Antares is a red giant star much cooler than the Sun, and much further away, but it emits 75,000 times as much energy due to its far greater size. PHOTO: ROBERTO MURA VIA WIKIMEDIA COMMONS.

*Mercury* can easily be seen for several days around February 19 because it is far enough from the Sun and high enough in the sky. On the 18th, the Moon comes very close to Mercury, making it even easier to find. Look due west around 6:00 PM. You will see brilliant Venus low in the sky. Look directly above it to see a very thin crescent Moon, and just above it, the bright star will be Mercury. As only 2% of the Moon is illuminated, you will likely see Mercury first! Mercury will then quickly move between Earth and the Sun, emerging in the morning sky in mid-March.

By April 3, it will reach its greatest angle from the Sun. Look for Mercury at 6:30 AM. Find the bright spot that heralds where the Sun will rise. Look 30° to the right of that (the angle made by holding two fists side by side at arm's length). Binoculars will help. You will need a good eastern horizon as you are looking for a star about 5° above the horizon. If you find an even fainter "star" about two-thirds of the distance from the Sun to Mercury, you have now found Mars.

*Venus* is in the evening sky over these three months and slowly rises higher with each passing day. It is brilliant enough to be unmistakable in the evening sky.

*Mars* mimics Venus, except it slowly moves higher up each day in the morning sky. Mars is not very bright because it is on the far side of its orbit as seen from Earth.

*Jupiter* is not as bright as Venus in the evening sky, but while Venus sets in the evening, Jupiter dominates the sky for the entire night, setting well after midnight.

*Saturn* is behind the Sun and only reappears in the morning sky in early May.

**Patrick Kelly has had a life-long interest in astronomy. He has taught first-year astronomy and presented shows at the Halifax Planetarium for over 30 years.**

# What Happened to the Monarchs in 2025?

Monarchs struggled in the drought while new technology improved knowledge of the migration.

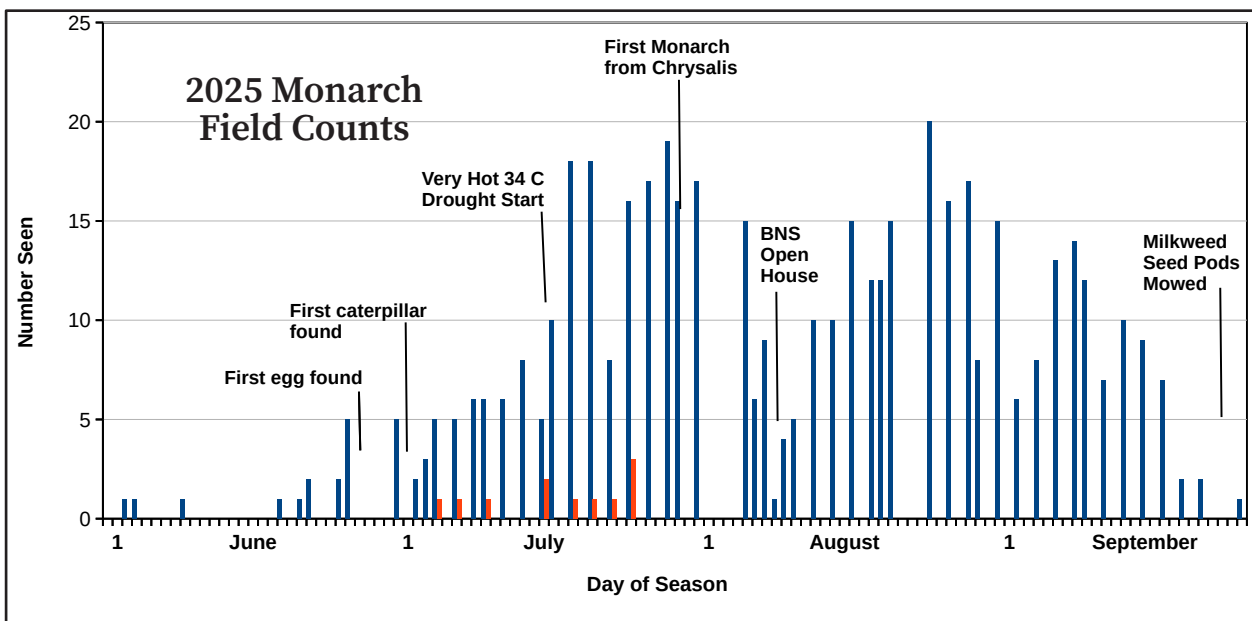
BY LARRY BOGAN

Ever since 2006, when my wife and I designated the 2-hectare field behind our house as wild, we have had monarch butterflies visit and breed on the common milkweed that grows there. We manage the field for monarchs and do all we can to help increase the population of this fascinating and beautiful butterfly. As part of that effort we have a butterfly garden and have registered the area as a monarch way station with Monarch Watch.<sup>1</sup> Each summer we record arrivals, breeding activity, and numbers of adults in the field. The information is reported to various citizen science repositories such as Journey North, Mission Monarch, e-Butterfly, as well as Monarch Watch. A fraction of the butterflies are reared inside and protected from predators. We locate chrysalises in the field and tag emerging monarchs along with some reared ones. In these ways we contribute to the international study and monitoring of the monarch.

## 2025 Monarch Observations

This past year the common milkweed growing in our field began sprouting in mid-May and was well up and starting to flower by the time we saw our first monarch in the field on the 2nd of June. A monarch was seen in Aylesford 3 days later, and a few others were observed elsewhere in the Maritimes around this time according to the Journey North tracking website. These early arrivals were outliers of the main migration, which occurred later in June.

I surveyed our field regularly to track the monarch populations and no new monarchs arrived until the last week of June. On the 26th of June we found the first eggs attached to a young milkweed plant and by the 30th we had caterpillars eating milkweed. More monarchs arrived in the field in early July and by mid-month there were eight in my count. We frequently saw the monarchs mating at this time.



6539 Brooklyn Street, Brooklyn Corner, Nova Scotia

The eggs laid in early July yielded a new generation of monarchs in early August. Typically, these new adults are sexually active and lead to more local egg laying and a second jump in the population in September. The first eclosure (a butterfly’s emergence from its chrysalis) was on 28th July, a month after the first egg was seen. This agrees with the expected one-month period for a monarch butterfly to develop from an egg. The dynamics in our field this year are portrayed across time in the chart at the bottom of the previous page.

Normally, the sexual activity in early July would lead to an abundance of egg laying followed by an abundance of caterpillars in the field during the month. This year that did not happen because just then the long, hot, dry spell began. During July, August, and September, Kentville rainfall was only 68 mm—the average in a normal year is 245 mm. Normally, the milkweed continues to send up more young plants, which we encourage with controlled mowing. It is on these small plants that the caterpillars eat and grow. This summer the milkweed stopped sprouting, and we experienced reduced caterpillar activity. The drought slowed the monarch development but did not stop it. The number flying in the field varied and reached a maximum of 19 on the 23rd of August, down from previous years. To give some perspective, here are the maximum daily counts in the field for 2025 compared to the six previous years.

**Monarch Numbers in the Field for 2019-2025**

Year	Peak No. of Monarchs	Date of Peak No.	First Arrival	No. of Captive Releases
2025	19	23 Aug.	2 June	91
2024	42	11 Aug.	31 May	147
2023	28	28 Aug.	14 June	71
2022	125	16 Aug.	21 May	190
2021	62	10 Sept.	6 June	214
2020	83	5 Sept.	16 June	197
2019	72	30 Aug.	1 July	300

The monarchs that emerge after mid-August are in the state of diapause, which means that they are not sexually active and ready to begin their migration south. After that date, the numbers in the field decrease as they leave the area. The last monarch was seen in the field on 28th September, which is a bit earlier than usual. In 2024, the last monarchs left on the 15th of October. Due to the drought, the red clover



Monarch on a thistle flower. PHOTO: MEAGAN DIMMEL.

and goldenrod flowers in our field dried out early and provided little nectar in late summer. Typically, the monarchs use this nectar “bulk up” on in preparation for their flight south. Also, the milkweed plants were dropping leaves, and some attached chrysalises were lost before the monarchs could emerge.

**Nova Scotia Monarchs**

Despite the difficult weather conditions, we did have monarchs in the field for four months and were able to host the Blomidon Naturalists Society’s Monarch Open House on August 9th. We enjoyed the presence of the monarchs all summer. In contrast, I observed only a few outside of our field. To get an estimate of the wider population of monarchs, I accessed observations on iNaturalists (iNaturalist.org) and e-Butterfly (e-butterfly.org) for the local area and the province. These numbers are in the following table.

Location	iNaturalists Observations	e-Butterfly Observations
Annapolis County	18 (11 observers)	
Kings County	57 (21 observers)	50 (3 observers)
Hants County	8 (6 observers)	
Nova Scotia	370 (168 observers)	50 (3 observers)

**The Big Picture for Monarchs**

The population numbers of monarchs in North America is of concern and the species has been listed

as a species at risk in Nova Scotia, Canada, and internationally by the International Union for the Conservation of Nature. It is proposed for the list in the United States. Most of the population roosts in Mexico from November through March. The number that make it there depends on many factors including production at the breeding sites, milkweed abundance, nectar availability, and the weather. A successful migration is a critical part of that equation.

The tagging provides timing and locations of the butterflies' origins, and collection of tag information determines the end of the migration. Each year Monarch Watch sends out hundreds of thousands of tags and about one third are attached to the wings of monarchs at the beginning of the southern migration. The tag recovery rate in the roosting sites in Mexico is about one percent of those used. Since 1992, over 2 million butterflies have been tagged by volunteers across the continent and more than 20,000 tags recovered. From these tags it is known where roosting takes place, the length of the migration, and the migration survival rates. This year a more precise tagging system was tested that tracks the monarch migration from start to finish (see box below).

The important question is how did the monarch population fare this past year? The standard measure is the area in use by the monarchs for roosting in Mexico. It is yet to be measured, so it will not be known until spring. Let's hope that the area will be



The map shows the tracks that were determined by radio tags on the path of 500 monarchs throughout the migration this year. SOURCE: MONARCH JOINTVENTURE.ORG

larger this winter than in past years, even if monarchs struggled here this past summer.

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

<sup>1</sup> <https://www.monarchwatch.org/>

<sup>2</sup> <https://celltracktech.com/pages/project-monarch-press-release-november-17-2025>

<sup>3</sup> <https://www.birdscanada.org/tracking-monarch-butterflies-from-long-point>



## The BluMorpho Radio Tag

The BluMorpho Radio Tag is a new, small, radio transmitter (.06 gm) that has been designed by Cellular Tracking Technologies to track monarchs.<sup>2</sup> It is solar powered and uses cellular networks to report its location. In September 2025, thirty monarchs at Long Point, Ontario, were tagged with these small radios and released. This trial showed the viability of these tags for tracking the migration. Many other researchers joined the effort, and by October, 400 transmitters were deployed from Canada to Cuba. These transmitters emit a signal of 2.4 GHz once a second, which can be detected by several types of cellular radio networks along their paths. Their identification number, time, and location are automatically sent to the researchers via the internet. The map above shows the tracks that were determined by radio tags this year. These tags provide information which is extremely helpful in understanding monarch behaviour.

Birds Canada's Motus Wildlife Tracking System was a major part of this monarch radio tracking process. Check out this article<sup>3</sup> on the Birds Canada website for a description of its use, including a fascinating video of the migration tracks of five hundred monarchs this past Fall.

# The Backyard Bird Chronicles

A series of engaging journal entries and sketches from a passionate bird lover.

REVIEW BY JEFF NEWBERY

Perhaps it has something to do with age, but it often seems that an interest in birding is acquired in one's later years. Of course there are many passionate bird watchers of younger generations, but as one passes through the years and begins to slow down, time and reflection become more valuable, and little things become more significant. One such thing is finding great delight in the daily sightings, chirps, and peeps from the variety of little feathered visitors to backyard bird feeders.

Amy Tan discovered this and became passionate about the birds of her backyard, so much so that she wrote and illustrated a book of her observations, which was published in 2024. She uses the word "obsession" for her birding interest and assures the reader "it is not hyperbole". Her book, *The Backyard Bird Chronicles*, has been on the New York Times best seller list for months. Amy is likely better known as the bestselling author of such works of fiction as *The Joy Luck Club*, *The Kitchen God's Wife*, and *the Bonesetter's Daughter*.

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An easy, enjoyable read whether you are a novice birder or a seasoned veteran.

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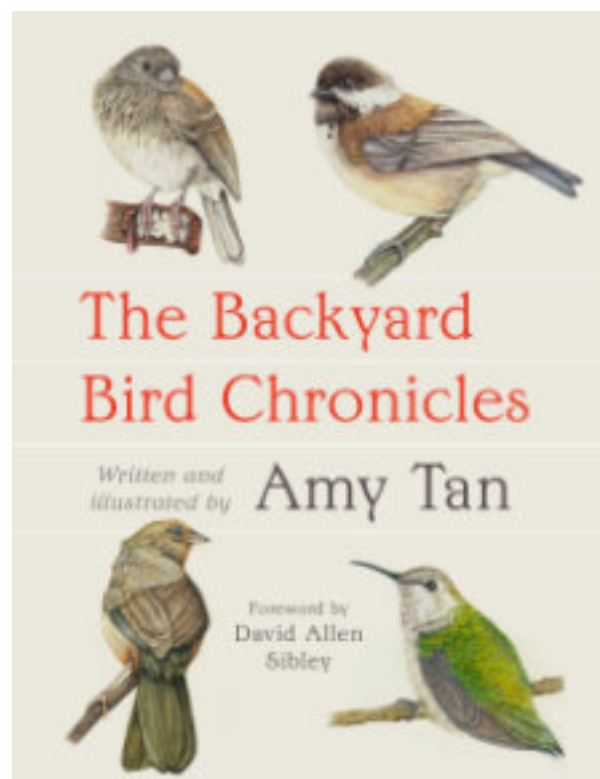
Amy learned her bird journaling and sketching from taking classes and going on field trips with John Muir Laws, a renowned naturalist, artist, and author. She began as a novice bird watcher, barely able to identify a few bird species in her backyard. Her drawing skills were extremely limited. Amy became deeply enamoured with her little patch of a backyard and the birds and other creatures it attracted. She spent hundreds and then thousands of dollars on diverse feeders to attract a great variety of species. *The Backyard Bird Chronicles* ends up being a series of her journal entries from 2017 through 2022, complete with associated sketches for each entry.

Amy's journal entries and sketches are at times quite humorous. For example, her November 9, 2019, entry

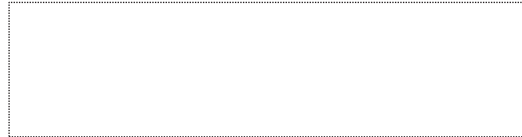
is about her offerings of various food types to attract a diversity of species. She titles this sketch "Dusk Specials". Here she lists menu items such as "Spicy Suet: Just like the stuff Mom used to throw up for you", and "Nuts & Chews & Bugs: Winner of the 2018 Scrub Jay Award for Best Loot". She provides great detail in her observations, asks excellent questions, and offers thoughtful reflections.

*The Backyard Bird Chronicles* is an easy, enjoyable read, one that you can casually pick up from time to time or read straight through from beginning to end, whether you are a novice birder such as myself, or a seasoned veteran. There is plenty to learn from observing your backyard birds!

**Jeff Newbery is a retired educator and among other things, spends his time volunteering, travelling, reading, and wandering the various nooks and crannies of "home".**



Blomidon Naturalists Society  
P.O. Box 2350  
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For more information and/or to become a member, visit: [blomidonnaturalists.ca](http://blomidonnaturalists.ca)  
or contact us at [coordinator@blomidonnaturalists.ca](mailto:coordinator@blomidonnaturalists.ca).

