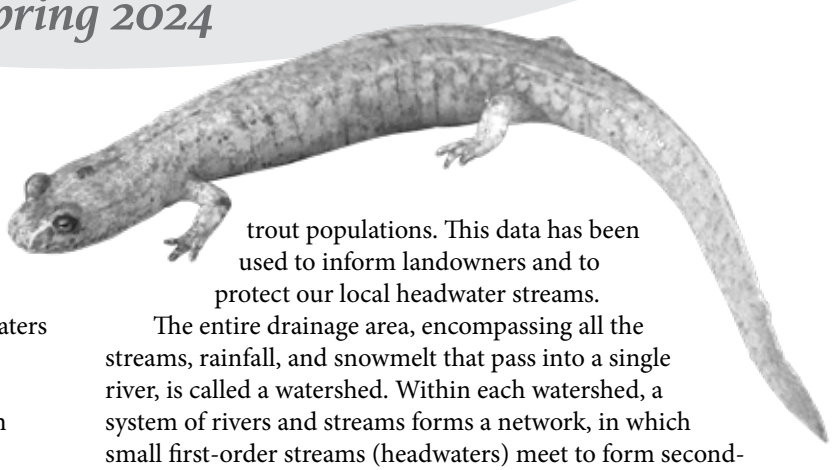
The Newsletter of the Francestown Land Trust, Inc.

Spring 2024

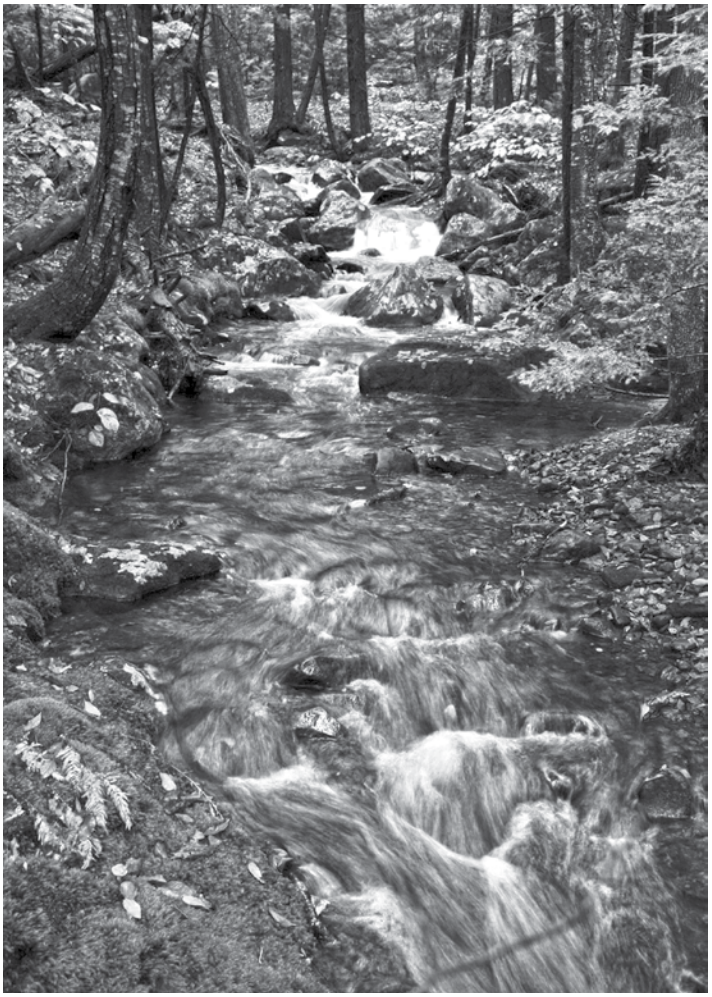
Headwater Streams:
Vital sources of clean water



Written by Barry Wicklow

FOR NEARLY 15 YEARS, I have been exploring the headwaters of the Piscataquog River.

Beginning in 2010, my research students and I began a long-term study of 12 tributaries of the Piscataquog River in Francestown. We used data loggers to record hourly air and water temperatures, we measured water quality, identified stream insects, and determined the genetic structure of resident brook trout populations. This data has been used to inform landowners and to protect our local headwater streams.



FROMT TOP: The spring salamander, *Gyrinophilus porphyriticus* | Headwater streams supply cold clean water to larger streams and rivers, photos by Barry J. Wicklow

The entire drainage area, encompassing all the streams, rainfall, and snowmelt that pass into a single river, is called a watershed. Within each watershed, a system of rivers and streams forms a network, in which small first-order streams (headwaters) meet to form second-order streams that converge to form third-order streams, and so on. The Piscataquog River, as it nears its confluence with the Merrimack River, is a fourth-order stream.

While headwater streams are the smallest in this hierarchical stream network, they comprise a whopping 70% of the drainage area—and nearly 80% of stream length in watersheds. They are the capillaries of the watershed's circulatory system and critical to the health of the entire stream network.

These streams provide cold high-quality water to the river system; they regulate the downstream flow of nutrients, the transport of sediment, and distribution of organic matter. They also hold back flood waters, remove pollutants, provide fish and wildlife habitat, and serve as ground water facilitators, acting both as gathering sites for ground water recharge and as the suppliers of ground water, surface runoff, and snowmelt downstream. They are the stream network's strongest defense against climate change.

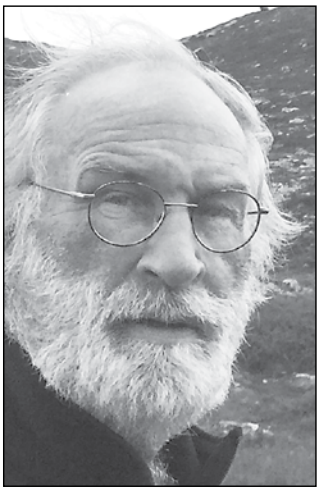
> ***"Life in us is like the water in a river."*** —Henry David Thoreau

For example, headwater streams provide cold water refugia for downstream species during warm periods and provide spawning habitat for species, such as the Eastern brook trout and the ground water and shade of trees along the banks of headwaters keep waters cool. Dusky salamanders, two-lined salamanders, and spring salamanders are found in headwater streams. Birds, such as the winter wren and Louisiana waterthrush, nest along the stream banks. Mink, otters, and bats use headwater streams as travel corridors. The streams also harbor a unique and diverse aquatic insect community.

I discovered this community early in life. One of my favorite places to sit as a boy was a fallen tree trunk that arched over a small headwater brook. From my perch, I could look through the

Headwater Streams *Continued on page 4*

A Letter from the Chair



Spring 2024

Dear Friends and Neighbors,

Apparently, Spring is the new Winter, who knew? After a rather warm and open winter, we endured two late-season snow storms, which complicated determining when ski season ends and fishing (or gardening?) season begins. While April snows are not unusual, they seem like a cruel joke at a time when we're ready to move on.

As I write this, we are in the midst of International Dark Sky Week, which culminates, fittingly, with the total solar eclipse on April 8th. By the time you read this, the Francestown Land Trust will have celebrated with a NH Audubon program on Nocturnal Wonders, which looks at some of the animals most affected by our increasingly illuminated world.

In a warming climate (Did you notice that in 2023 the USDA shifted about half of the country to the next warmer half-zone?), protecting headwater streams becomes even more important for species that rely on cold-water ecosystems. In this issue, long-time board member, aquatic biologist and valued grant writer, Dr. Barry Wicklow, describes the benefits of our local headwaters. Almost every piece of land that the FLT protects contains at least one of these, mostly unnamed, streams in either the South or Middle Branch drainage areas of the Piscataquog River. And we are currently working to conserve more key pieces in the watershed.

This year, our Annual Meeting will be held in person on June 13th at the Old Meeting House of Francestown. In addition to a short business meeting, we will welcome Rick Van de Poll, PhD., who will present a program on the effects of climate change on wildlife.

Tucked inside this newsletter, you will also find an FLT membership drive envelope. Your annual membership fee of $25 confers voting rights for two adults per household. It also gets you a special mention on our donors' list. Membership fees cover most of our annual operating costs (e.g., printing newsletters, hosting events, and active stewardship of our holdings), which we work hard to keep at a minimum. As an all-volunteer organization dedicated to protecting agricultural, recreational, and conservation land in Francestown and surrounding areas, we thank you sincerely for your support and donations of all kinds.

The seasons seem to speed by more quickly with each passing year. May you find ways to get out into nature, slow down, and enjoy what each season holds for us to experience.

Larry Ames, Chair
Francestown Land Trust

The Francestown Land Trust is pleased to support Francestown's George Holmes Bixby Memorial Library through offering two new magazine subscriptions

The New Hampshire Wildlife Journal is published by NH Fish and Game and is dedicated to Wildlife and Outdoor Recreation. It is a terrific source for fishing, hunting, wildlife, and conservation information in the state. It is published six times per year and the first issue will be on its way soon.

Northern Woodlands is published by the Center for Northern Woodlands Education, an educational nonprofit located in Lyme, NH. It celebrates northeastern forests and the people who care for them and is a fun read with a serious purpose. It is published four times a year (quarterly by season) and the first issue is already here!

FRANCESTOWN LAND TRUST
Founded in 1986

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Join our email list to learn about our upcoming events. Contact us at **info@francestownlandtrust.org** to be added to this list.

FLT protects 1,200 acres surrounding South Branch headwaters

THE *HEADWATERS*-*South Branch Conservation Initiative* is a strategic, long-term land conservation project focused on protecting the South Branch of the Piscataquog River, its headwaters, and uplands.

The original goal of the initiative was to protect 1,000 acres of critical open space surrounding the headwaters of the South Branch watershed.

Working with many partners, including the Francestown Conservation Commission, the Francestown Land Trust has been able to protect more than 1,200 acres surrounding the mostly unnamed, first-order streams in this catchment area of Francestown!

Headwater streams in the northeastern portion of Francestown drain into the Middle Branch of the Piscataquog River and, although not technically part of this project, are just as worthy of protection. Currently, the FLT protects 64 acres of land that includes 400 feet of frontage along both sides of Whiting Brook. These acres are part of an interconnected block of 346 acres of protected land.

The focus of the South Branch Initiative in Francestown has been on the headwaters that feed into the second-order Rand Brook and Brennan Brook streams, which, in turn, feed into the southern branch of the Piscataquog.

A timeline of strategic headwaters protection

Here's a timeline of the FLT's achievements in acquiring fee-owned property and easements to protect South Branch headwater streams and their catchment areas over the years.

Phase 1. The *Headwaters Project*. During a multi-year effort beginning in 2004, 600+ acres of upland and approximately 10,000 feet of shoreline were conserved along Rand Brook and the South Branch of the Piscataquog River.

Phase 2: The *Rand Brook-South Branch Confluence Project 2010*. This effort conserved an additional 53 acres, including 5,000+ feet of shoreline along Rand Brook and the South Branch of the Piscataquog River.

Phase 3: The *Avery Brook Watershed Project 2012*. This project protected 250+ forested acres and nearly the entire Avery Brook catchment, including the entire length of Avery Brook West (4,500+ feet), nearly all of Avery Brook East (2,800+), and 1,700 feet along the South Branch of the Piscataquog River. Match conservation easement properties protected an additional 3,100 feet along Rand Brook and 2,450 feet along the South Branch.

Phase 4: *The Brennan Brook Headwaters Project 2012*. This project protected about 150 acres, including approximately 2,250 feet of frontage along Brennan Brook, a first-order cool water stream known to support eastern brook trout and spring salamanders, and approximately 4.8 acres of "palustrine wetlands," as identified by the National Wetlands Inventory.

Phase 5: *The Brennan Brook-South Branch Confluence Project 2017*. This 7.6-acre Brooks property protects 1,100+ feet of undisturbed riparian habitat. In addition to its ecological, natural habitat, wildlife, wetland, water supply, scientific, educational, and recreational value, it connects other already protected lands.

Phase 6: *Piscataquog South Branch Connectivity Project 2018*. The Connard/Murphy project permanently protects 24 acres, including a buffer of riparian and upland forests along approximately 3,480 feet of the Piscataquog South Branch, as well as seepage, basin, and drainage swamp, an intermittent stream, and 12 vernal pools.

Phase 7: *Piscataquog South Branch: Connecting Conserved Lands 2019*. This 10.2 acre, now-protected riparian property was slated for development when the FLT was able to acquire this irreplaceable connector in our initiative to connect riparian lands along the South Branch. It protects 1,200 feet of forested riparian habitat.

Phase 8: *Arnold/Wicklow Project 2020*. Approximately 20+ acres, slated for development, was purchased by Arnold and Wicklow in 2012 as an emergency measure to conserve the land. The property abuts already protected land and includes 1,080 feet of frontage along the South Branch of the Piscataquog River and approximately seven acres of floodplain forest. The entire property is classified as the highest ranked category habitat in the state.

Phase 9: *Gilman Rand Brook Connectivity Project 2021*. The 37-acre former Gilman property contains 700 feet of Rand Brook. Twenty-five percent of the property (also slated for development) is classified as the highest ranked habitat in the state. In addition, the project includes 23.6-acres adjacent to the Gilman property, owned by Hardwick/Tarr, which is in the process of being donated as a conservation easement. The Hardwick/Tarr property will also protect 1,000+ feet of School House Brook, a tributary of Rand Brook, and connects two large blocks of protected land totaling 1,100+ acres.

Cold headwaters and wild native trout

Temperature is a primary variable in stream ecosystems. According to Allan and Castillo, 2007, temperature influences the distribution, metabolic rates, physiology, life cycle, fecundity, and growth of stream species, as well as stream processes, such as biological production, leaf breakdown, and nutrient uptake. Self-sustaining populations of brook trout, for example, require water temperatures at or below 64 ºF (17.8 ºC).

Fortunately, while air temperatures fluctuate widely, headwater streams keep water cold and stable. For example, during our multi-year study period, School House Brook maintained summer water temperatures averaging between 61.5 ºF (16.4 ºC) and 64.2 ºF (17.9 ºC).

Genetically distinct wild brook trout populations

Over two field seasons, we collected nearly 300 samples of fin tissue from brook trout in 12 headwater streams for DNA analysis. Our findings show that populations in our headwater streams are not only wild, but *native* brook trout (without hatchery influence). Moreover, each headwater stream population is *genetically distinct!* It is likely that these discrete populations, over many generations, have adapted to local environmental conditions.

Protecting headwater streams

Sadly, self-sustaining populations of brook trout have declined sharply in the eastern United States, primarily due to habitat degradation from abusive land use.

In the absence of protective regulations, The Francestown Land Trust, Francestown Conservation Commission, and the Piscataquog Land Conservancy have stepped in to protect both headwater streams and their surrounding uplands.

Currently, 3,500 stream feet of School House Brook, along with 100 acres of surrounding land are now protected—with protection of another 1,000 stream feet in process. Additionally, 9,000 stream feet of Avery Brook and 250 acres of surrounding land is protected. In both cases, property owners can continue to work their lands, while maintaining protective buffers around streams.

Protecting these vital streams requires funding from numerous foundations as well as many individual donations. The inclusion of scientific data strengthens our applications for competitive funding.

cool clear water to see small critters scurry over the sand and over and under rocks. These were cold-adapted aquatic insects that thrive in headwater streams. For instance, many species of stoneflies require cold, clean, highly oxygenated water to survive; a single headwater stream may harbor several stonefly species. (In addition to being an integral part of the food chain, the presence of stoneflies, mayflies, and caddisflies serve as important bioindicators of water quality. Stoneflies are now considered one the world's most endangered faunas.)

"If rivers come out of their icy prison thus bright and immortal, shall not I too resume my spring life with joy and hope?" —Henry David Thoreau

Because headwater streams are small and have low water volumes, they are extremely sensitive to disturbance. And there are no regulations that protect these vital streams. Development, impervious surfaces, runoff, pollution, loss of the tree buffer along the stream, and loss of connectivity endanger our headwater streams and as a result, jeopardize larger streams and rivers. Harm to headwater streams echoes throughout the entire stream network.

These days, in my visits to the headwaters of the Piscataquog River, the sound of the flowing waters, the scent of ferns and moss, and the rich life in and around these headwaters give me a sense of well-being. Thoreau mused that streams are more liberating than other waterbodies. The more I study these streams, the more I understand the importance of these clean cold waters.

When you think about the source of clean water for people and wildlife now and for future generations, remember the natural benefits of our headwater streams.

Barry Wicklow

FROM TOP: The stonefly *Acroneuria sp.* (tolerance to pollution value = 0) | The Eastern brook trout, *Salvelinus fontinalis*, photos by Barry J. Wicklow

Hiking under the Snow Moon

THE FRANCESTOWN Conservation Commission and the Francestown Land Trust joined forces to host a community night hike under the bright light of the February Snow Moon. Rendezvousing at the end of Farrington Road, a bundled-up group of fifty hearty hikers set out across the snow-covered fields of West End Farm, which backs up to the Town's extensive trail system through the Crotched Mountain Forest. Although there were a few headlamps used to keep the front of the line in touch with the back of the line, they were hardly necessary as the clear winter night allowed the moonlight to shimmer brilliantly off the snow cover.

No doubt any native wildlife bolted for higher ground as the large group meandered through the woods, chatting and laughing along the way. Winding through the woods and connecting with the Joslin Loop Trail right below the intersection of Scot's trail, the long train paraded clockwise along Joslin to Bullard Hill Road, down to its intersection on Farrington Road, and back up to the original rendezvous point. All in all, the hike was a great success, with the full Snow Moon lighting the path through the silhouette of tree tops and all hikers accounted for.

Even so, the night was only half over. Like any good Francestown community event, the opportunity to catch up with friends and meet new neighbors drew the hikers indoors to a crackling fire and refreshments. Everyone chipped in, with trays of baked goods, cheese & crackers, and other snacks, with pitchers of cider and hot chocolate. Familiar faces and new faces all had a great time.

Whether you are new to Francestown, or your family has been here for generations, our community's access to open space, outdoor recreation, and diverse habitat is a benefit we all enjoy, thanks to our all-volunteer Conservation and FLT organizations. Fifty people showing up for a night hike on a bitter cold night in February is a testament to that appreciation!

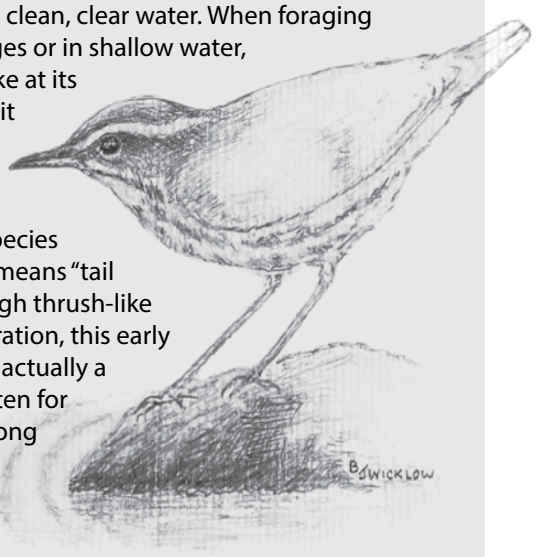
To learn more about upcoming events, including guest speakers and more community hikes, visit francestownlandtrust.org/news-and-events

February Snow Moon Hike, photo by Hannah Proctor

Did You Know?

TRAIL MAPS of the Rand Brook Forest, Schott Brennan Falls Reserve, Crotched Mountain and Miller/Dinsmore Brook Conservation Area, as well as the Francestown Wildlife Action Plan map can be downloaded from **francestownlandtrust.org**

The Louisiana waterthrush, *Parkesia mottacilla*, is a good bioindicator for healthy stream habitats. It nests along forested headwater streams where it feeds primarily on aquatic insects in clean, clear water. When foraging along stream edges or in shallow water, it strikes heron-like at its prey. As it walks, it constantly bobs the rear end of its body up and down (the species name *mottacilla* means "tail wagger"). Although thrush-like with cryptic coloration, this early spring migrant is actually a large warbler. Listen for its loud ringing song along streams beginning in mid-April.



Joan Hanchett Nature Series

Sponsored by the Francestown Land Trust, the George Holmes Bixby Memorial Library, *The Francestown News*, and the Francestown Conservation Commission.

Landscape Impacts in New Hampshire: From the Glaciation to the Present

LAST FALL, on November 12th, an audience of forty-nine were treated to terrific presentation by Mike Gagnon, Extension Forester and Field Specialist in Natural Resources for the University of New Hampshire Cooperative Extension in Hillsborough County. Mike spoke in detail about the many factors that have influenced the landscape and ecology of New Hampshire over the past 10,000 years.

The information-packed lecture was accompanied by a superb slide show. We learned that geology and glaciation determined the mix of forest types from the coastline to the mountains of New Hampshire and that the glacial retreat spurred a series of successional changes in species composition over time.

During the primary succession period, natural disturbance, climate, physiography, seed source, time, land use history, and competition and growth strategies influenced the formulation and mix of forest communities. During the secondary succession period, fire, wind, insect, disease outbreaks, and clear cutting all played a part in the establishment of plant communities, after the earlier community had been disturbed.

Bringing us to the present, Mike said that today's forests are considered middle-aged, or about 75 to 120 years old. He went on to point out that they have "grown out of the shrubby stage, which many species require, maturing into a forest landscape that becomes increasingly more natural in appearance and character where more shade-tolerant, long-lived species are on the increase."

Mike noted that the key issues facing New Hampshire forests and wildlife today are the "loss of forest land and habitat due to conversion, fragmentation of habitat blocks, lack of young forest habitats, shrublands, and grasslands to support a suite of species that rely on them, and threats to forest health and productivity, including insects, diseases, invasive plants and animals, climate impacts, and weather events."

Learning about Nocturnal Wonders during International Dark Sky Week

FOLLOWING a power-challenged, two-day winter storm in Francestown, close to 40 attendees made their way through the snow to the "Spring" Joan Hanchett Nature Series on April 5th.

Willa Coroka, Project Implementation Specialist at NH Audubon, gave an animated and very informative lecture on *Nocturnal Wonders*, those species that navigate at night… in the dark.

The evening program opened with a nod to celebrating *International Dark Sky Week*, which is held each year in April, during the week of the New Moon, when night skies are darkest. This year, it culminated with the spectacular total eclipse.

The goal of the week is to raise awareness of the importance of reducing outside artificial light for the benefit of our night sky. We are encouraged to turn off or tone-down outside lights during the overnight and to choose responsible outside lighting to ensure that light is projected down-ward and not up into the sky. Darkness is beneficial to both humans and wildlife. For people, a host of health issues are linked to excessive exposure to artificial light at night, especially blue light. For the nocturnal birds and animals that depend on navigating at night, dark skies are critical.

FROM TOP: Fall Joan Hanchett Nature Series | Spring Joan Hanchett Nature Series, photos by Hannah Proctor

During her program, Willa Coroka described the special features that nocturnal species use to maneuver in the dark. She highlighted owls with their binocular vision, facial discs, and soundless wing feathers… bats with their phenomenal sonar and maneuvering capabilities… mammals, such as foxes, raccoons, and coyotes with their special eye lenses, whiskers, and big noses… and frogs with their excellent vision and sensitivity to movement.

A super PowerPoint presentation with lots of photos made the trek home through more falling snow well worth it!

Thank you to all our previous year's donors!

The Francestown Land Trust is dependent upon, and deeply appreciative of, community support. Whether you are a Francestown resident, a neighbor in the region, or you just have a special place in your heart for our town and its wild places, we would like to express our gratitude to all who have supported us during this past year:

Beverly Abbott
Robert Abbott
Meredeth & Leonard Allen
Brewster & Elizabeth Ames
Larry Ames & Jay Hale
Pamela Avery
Judith Badot & Ron Cheney
Vicki Baggia
Ruth Behrsing & Peter Jones
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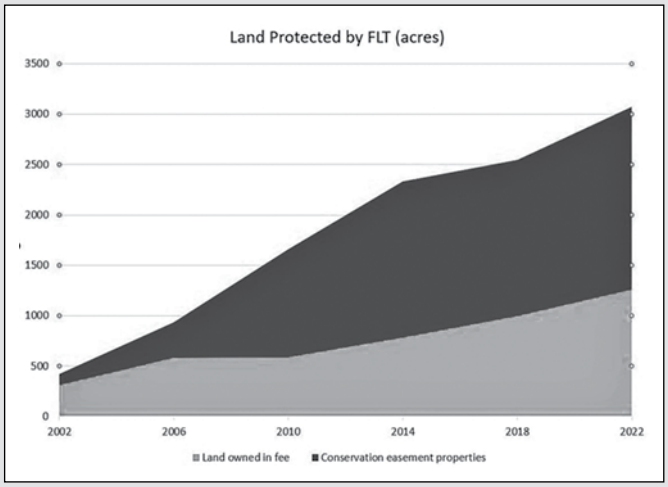
Francie VonMertens
Monica & Michael Lehner
Tom & Alice Welden
Barry & Lois Wicklow
Lisa Wilsher & Steve Chamberlin
Harry Woodbury
Robert & Patricia Zeamans

* In Honor of Bob & Linda Lindgren

FRANCESTOWN
LAND TRUST

CURRENTLY, the Francestown Land Trust owns 1,258 acres, including the Rand Brook Forest and Schott Brennan Falls Reserve. All land owned by the FLT is open for public use. In addition, the FLT holds 35 conservation easements helping to protect an additional 1,812 acres. With one Executory Interest, the FLT helps to protect a total area of 3,096 acres.



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FLT ANNUAL MEETING

The Effects of Climate Change on Local Wildlife

THURSDAY
JUNE 13
6:30 PM

THE FRANCESTOWN LAND TRUST will hold its Annual Meeting at 6:30 pm on Thursday, June 13th. After a brief business meeting, our featured speaker will be Dr. Rick Van de Poll, principal of Ecosystem Management Consultants (EMC) of Sandwich, New Hampshire. Since 1988, EMC has completed bio-inventories and land management plans for the public and private sector on over 350,000 acres of land. Rick has taught dozens of workshops and seminars on wildlife species in NH and has served with the NH Fish & Game Department and the Tin Mountain Conservation Center as their Research Director.

Rick's slide-illustrated talk will review the current trajectory of global warming, precipitation shifts, and biodiversity loss associated with climate change. With a focus on local wildlife species, he will cover a variety of impacts to birds, mammals, fish, reptiles, amphibians, and invertebrates as they deal with warmer, wetter winters, shifts in insect population abundance, seasonal droughts, and stronger wind events.

Old Meeting House of Francestown