

MAINE BIG NIGHT  
2021 REPORT

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# MAINE BIG NIGHT 2021 REPORT

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**MESSAGE FROM**  
**THE PROJECT CREATOR**

•  
*Greg LeClair*

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Boy, I'm waiting for the year when I can't gloat about how amazing this year's cohort of volunteers was! Once again, we broke records in participation—both in the number of people certified and the number of sites surveyed. This year's data was immensely helpful in getting our first scientific publication out (more on that later), and the enthusiasm among volunteers this year was unmatched. My inbox was full from February to May, at times averaging 80 emails a day! To have such enthusiasm for what started as an idea I had when I was only seven or eight years old is truly inspiring, and I cannot wait for 2022—the fifth year of our project!

This report is packed with stats of the season's work and even has a few special highlights. Thank you to everyone who volunteered this year and I can't wait to see you again in the spring. Maybe this time, I'll actually get out to some busier spots to meet you all in person?! Who knows!

I'll see you all again in the spring!

Regards,

Greg



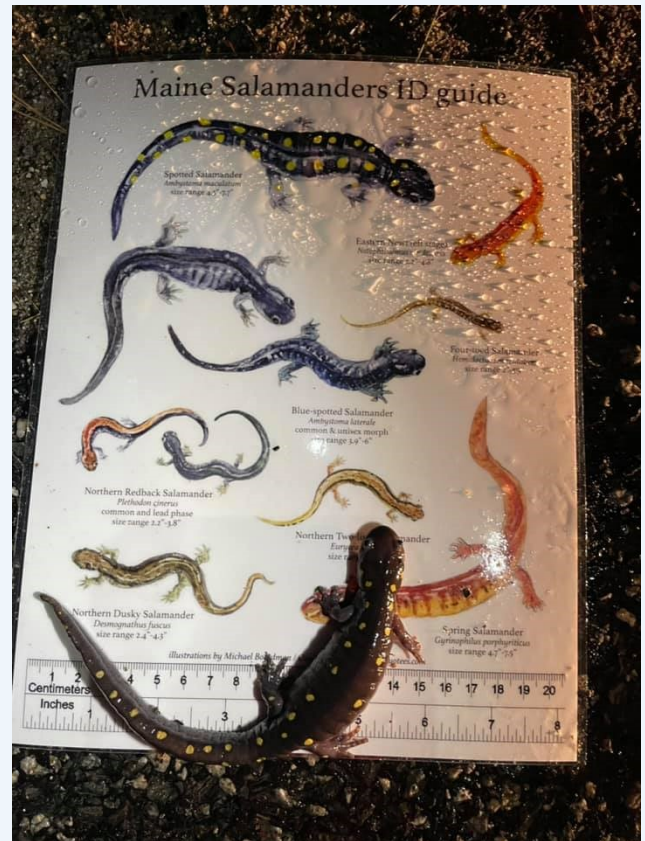
# MAINE BIG NIGHT NEWS

## MBN Receives First Funding

Maine Big Night grows every year, but this year growth was perhaps exponentially driven by the generous funding received from the Gordon and Betty Moore Foundation. The funds were used to address two major questions: how do we increase the impact of our project, and how do we make this project more accessible to everybody? Ultimately, these two goals go hand-in-hand; more people means more impact, and more impact means more people! The funds helped create participation kits—boxes of ID cards, headlamps, clipboards, and high-visibility vests— and distribute them to locations throughout the state for participants to check out for free. We also created a stipend and hired a GIS intern to help sort data and begin the process of making maps that will eventually be valuable for amphibian conservation planning. Finally, the funds covered our publication fee for our first published scientific article.

## New Identification Cards

This year, we partnered with Michael Boardman of Coyote Graphics to create life-sized renditions on an identification card of Maine's amphibians (minus the rarely encountered Mink Frog; there simply isn't enough room on a standard page!). These cards have been immensely popular, and you can buy them to have on hand for your next big night adventure at [www.coyotees.com](http://www.coyotees.com).



Top: A Spotted Salamander compares itself to Michael Boardman's artwork by Michael Boardman. Bottom: A Gray Tree Frog by Timothy LaFleur.



### **MBN Publishes First Scientific Article**

Remember how in 2020 there were a lot less dead amphibians on the road than usual? This finding, discovered thanks to data from MBN volunteer scientists throughout the state, was powerful enough to receive publication in the scientific journal *Conservation Science and Practice*, a new, applied journal from the same group that runs the large and popular *Conservation Biology* journal. The article, written and analyzed by Greg LeClair, Matthew Chatfield, Jeff Parmelee, Cheryl Frederick, and Zach Wood, found that mortality rates were reduced by half in 2020, and that this was entirely due to a reduction in frog mortality—salamanders sadly did not see the same benefit. Additionally, they found that as temperature and rain increased, so did frog mortality, but again salamander mortality remained steady. The article will be published in print in the coming weeks or months.

### **MBN Scientists Help Notice Newly Discovered Disease**

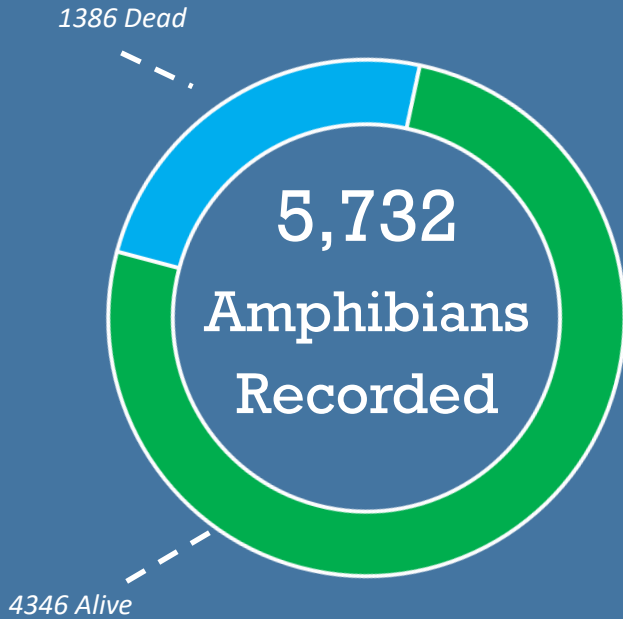
Amphibians face lots of pressure from disease—from ranavirus to chytrid fungus, there's a lot to look out for! A newly published paper in the journal *bioRxiv* found that Wood Frogs are being engorged with water due to the high amount of salt in pools near roads. These frogs look ballooned, and as it turns out we had been seeing them since 2020 but had assumed them to be heavily gravid females. This year, handfuls of Wood Frogs and even Spring Peepers were discovered with the condition, a form of edema. Notable concentrations of these diseased animals showed up in Camden, Gray, and other southern Maine areas. MBN will continue monitoring for diseased animals and has provided this data to state authorities. *Continued on page 13.*



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# RESULTS

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OVERALL MORTALITY RATE:

# 31.89%

▲11.9% from 2020 (19.93%)

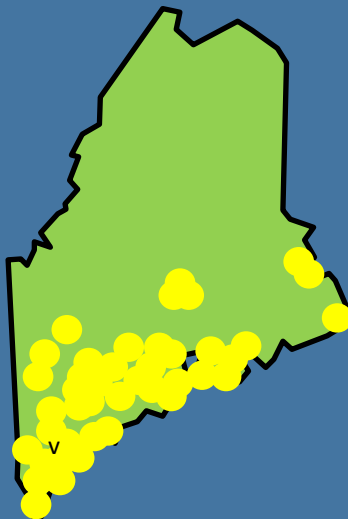
# 737.1

Hours  
Surveyed



# 185

Sites  
Surveyed



# 316

Volunteers  
Certified

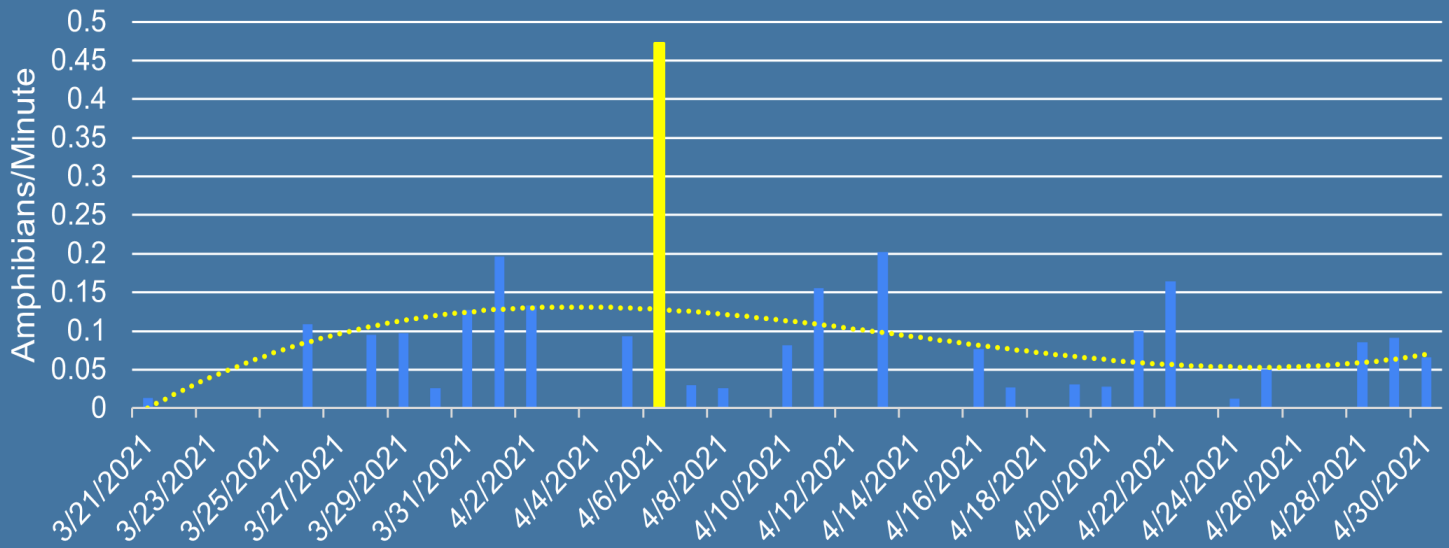




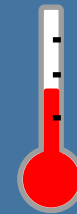
Species	Alive	Dead	Total	Mortality Rate
American Bullfrog	83	5	88	6.02%
American Toad	80	26	106	32.50%
Blue-spotted Salamander	125	9	134	7.20%
Eastern Newt	38	16	54	42.11%
Eastern Red-backed Salamander	286	11	297	3.85%
Four-toed Salamander	49	1	50	2.04%
Gray Treefrog	42	9	51	21.43%
Green Frog	116	29	145	25.00%
Mink Frog	2	0	2	0.00%
Northern Dusky Salamander	5	0	5	0.00%
Northern Leopard Frog	5	1	6	20.00%
Northern Two-lined Salamander	5	0	5	0.00%
Pickerel Frog	67	30	97	44.78%
Spotted Salamander	880	132	1012	15%
Spring Peeper	1664	745	2409	44.77%
Wood Frog	899	372	1271	41.38%

# When was the big night?

## Amphibian Encounters Standardized by Survey Time



## April 6 Conditions According to Volunteer Data:



47°F

## RESULTS

During the 2021 season, volunteers collected data between March 21 and April 30 on 5,732 amphibians. It appears that our migratory period is continuing to begin earlier than historical movements, starting mid- to late-March and continuing throughout April. For comparison, 2020's first movement was recorded on March 20th, only a day earlier than this year. All except one of Maine's native species were recorded (Spring Salamander, *Gyrinophilus porphyriticus*), marking a first for some species, such as the Mink Frog (*Lithobates septentrionalis*), Northern Dusky Salamander (*Desmognathus fuscus*), and Northern Two-lined Salamander (*Eurycea bislineata*).

After a year of reduced mortality from the pandemic, the mortality rates have returned to typical levels as seen in previous years. In fact, 2021's mortality rate is almost identical to 2019's rate of 32.71%. That means throughout the 2021 season, one third of every crossing amphibian was sadly found dead.

As expected, the most commonly encountered amphibian was the Spring Peeper (*Pseudacris crucifer*); over 2,400 were recorded. They continue to boast one of the highest mortality rates as well at 44% (nearly half of all peepers being found dead!). Why do we find so many dead peepers? A few theories exist, but one is that since they are so small

and well camouflaged that they are only easily found when they are dead, with white bellies and other less-conspicuous features exposed. Therefore, it is possible that many more peepers are sneaking by successfully, we just may not be noticing them!

Blue-spotted Salamanders (*Ambystoma laterale*), a species of concern in the state and a vernal pool breeder, continues to be relatively uncommon in our detections. Two other species that are not vernal pool breeders, the Green Frog (*L. clamitans*) and Eastern Red-backed Salamander (*Plethodon cinereus*), were both found more frequently than the blue-spot. The other vernal pool breeders, Spotted Salamander (*A. maculatum*) and Wood Frog (*L. sylvaticus*), were both the third and second most frequently detected animals respectively, with concerning high mortality rates for both species. Previous research has indicated that mortality rates above approximately 10% could cause localized extirpations in Spotted Salamanders; this year, Spotted Salamander mortality rates were 15%. Wood Frog mortality rates were also very concerning as 41% of all Wood Frogs were found deceased. While these frogs are colored similarly to spring peepers, their size should make them easier to notice; it feels unlikely that we would be missing

many living individuals, though it is certainly still a possibility that this is a biased result.

Two other species featured very high mortality rates; the Eastern Newt (*Notophthalmus viridescens*) (42%) and Pickerel Frog (*L. palustris*) (45%). Newts, while brightly colored in their eft stage, are very small and slow moving, and thus are not easily avoided by cars. Pickerel Frogs are uncommon far from the water's edge, so to not only encounter over 90 of them but have almost half be dead on a road is striking. Pickerel Frogs can have small migrations to and from their winter hide-out spots to where they spend the rest of the year, so it seems likely that roads have similarly interrupted this species' migrations similar to vernal pool breeders, even when those migrations usually follow closely to water.

The detection of Mink Frogs was an exciting one. This species was deemed the least likely to be encountered of any Maine amphibian since they are perhaps the most aquatic frog of any of our species and migrations are unlikely. Alas, a few were reported and confirmed with photo ID. Not only were they confirmed, but they represented new town records in Maine, meaning that they were found in areas previously unknown to scientists!



Wood Frogs photo by Elaine Fuller-Despres.



Interestingly, our “big night” appears to have come very early this year, landing on April 6th. However, this data is from only a handful of reports in a geographically small area and thus bias is likely; as indicated by the conditions on page 6, rain was not even falling and roads were dry! This may point to April 13th as the next possible big night, but again, the same issue—a handful of reports from a very small area and dry conditions. Next up would be April 1st, which seems like it would be the most likely culprit. Conditions were more conducive to migrations with steady rain and temps between 37°F and 55°F. If April 1st were our true big night of 2021, that would be remarkably early, but conditions certainly seemed prime! We usually expect big night around April 20th, but 2020 was also early as it occurred on April 13th. Sounds like we may need to start adjusting our calendars with climate change!

Per usual, I like to break down sites by their mortality rates to indicate where the most help may be needed. As mentioned earlier, areas with 10% or higher mortality could reduce long-term presence of salamanders, so this tends to be the threshold I use to indicate whether a site may be facing significant mortality. Of the 185 sites surveyed, 62 reported no amphibians and 147 were surveyed for at least an hour. Of the sites surveyed for at least an hour, 55% had mortality greater than 10%. The deadliest sites were Bennoch Rd in Orono, Royalsborough Rd in Durham, and Thorndike Rd in Unity. Two sites, one in York and one in Wiscasset, both had 100% mortality but only one and two individuals were recorded in total respectively; without more data, we cannot say for certain where these two sites land.

### Data Note

Data used to compile results represent all data that met data quality standards. Data that were incorrectly collected or reported were not included here.



Top: Pickerel Frog by Lindsay Strout. Bottom: Spotted Salamander by Sharon Fogarty-Trafton



# The 10 DEADLIEST SITES of 2021

## 1. Bennoch Rd, Orono

*90% mortality, Leopard Frogs present*

## 2. Royalsborough Rd, Durham

*75% mortality*

## 3. Thorndike Rd, Unity\*

*72% mortality, Blue-spotted Salamanders present*

## 4. Forest Avenue, Orono\*

*Two segments at 71% and 68% mortality. Blue-spotted salamanders present.*

## 5. Durham Rd, Brunswick\*

*Two sites at 60% and 66% mortality.*

## 6. Shore Rd, Cape Elizabeth

*64% mortality.*

## 7. Hinckley Rd, Clinton

*63% mortality.*

## 8. Essex Rd, Orono

*63% mortality, Leopard Frogs present.*

## 9. Boyd's Corner Rd, South Berwick\*

*61% mortality, Blue-spotted Salamanders present.*

## 10. Center Rd, Gray\*

*Two sites at 59% and 67% mortality. Road salt pollution-affected individuals detected.*

*Sites with high mortality but less than 10 amphibians recorded are not included on this list. Roads marked with a \* are "repeat offenders" - they have been flagged as high mortality sites in previous years as well. Species of concern are listed as present if detected in 2021 data. Background photo by Elane Fuller-Despres.*

# BIG NIGHT STORIES FROM THE FIELD

*Want to have your own big night story featured next year? Email it to  
Greg LeClair (Gregory.leclair1@gmail.com) for consideration!*

## **Amphibians by Noah Seigh**

Amphibians are pretty amazing creatures. They are able to live on land and water. Their name comes from the Greek word 'Amphibios' which means 'both lives.' This spring we are learning a lot about amphibians because we signed up for Maine Big Night, which is a community science project. It involves monitoring their migration, collecting data, and protecting them as they cross roads. Amphibians migrate to vernal pools in Spring. Vernal pools are temporary bodies of water that provide a breeding habitat for many amphibians. They fill up with the spring rain and usually dry up in summer. In cold places some freeze over in winter. Salamanders and frogs come out of hibernation in late winter or early spring to lay their eggs in these vernal pools. The conditions have to be just right, over 40 degrees and raining and then it's perfect for them to migrate to the vernal pool. The female and male salamander do this dance which fertilizes their eggs. Then they head back to the forest. There are also no fish in a vernal pool, so all the frogs and salamanders that live there have a better chance of surviving.

When amphibians hatch out of their eggs, they have gills which means that they can breath underwater and don't have to come up for air, like fish. But then their gills change into lungs, which means that every once in a while they have to come up for air just like humans. Amphibians can also breath

through their skin as long as it stays moist.

Like reptiles, Amphibians are also cold blooded, which means they can't regulate their own body heat. So to get warm they would have to lie on something warm like a rock or, if you're lucky, your porch!

Have you ever noticed how you stand up straight and don't slither like a snake? That's because you have a backbone and so do amphibians! If you have a backbone you're a vertebrate and if you don't have a backbone you're an invertebrate. Frogs and salamanders are vertebrates so they don't all slither like snakes even though salamanders look like they are slithering.

There are many different kinds of amphibians and they vary by location. In Maine, the most common species that need access to the vernal pool are Wood frogs, Spotted and Blue Spotted salamanders, and Fairy shrimp. Like Sea Turtles, frogs and salamanders go back to the same vernal pool they were born in to lay their eggs. Fairy shrimp are very small creatures that live in vernal pools. The biggest one ever found was about 1 1/2 inches long. I didn't know that there was another kind of shrimp that lived in vernal pools and not the ocean. It's crazy to think that fairy shrimp eggs must dry out completely and freeze in order to hatch the following spring. According to "The Secret Pool,"





some fairy shrimp eggs can last 15 years before hatching!

To prepare for our first Big Night we picked up our safety gear from Sweet Tree Arts. Next we learned how to tell them apart and how they sound. We visited some vernal pools to look for eggs. Then we went to Hidden Valley Nature Center and some people showed us frog eggs, a baby snapping turtle, and some salamander eggs! I also found some tadpoles! I learned salamander eggs might look foggy and are often attached to a twig and frog eggs are transparent and don't have the extra jelly coating that salamanders do.

Our first night out we met up with our old school teacher from Montessori, Jackie Grannis-Phoenix and stayed up until 10:00 at night to help the frogs and salamanders cross the road. It was so cool! We saw a lot of spring peepers, wood frogs, bullfrogs, green frogs, red-backed salamanders and spotted salamanders. Unfortunately, this one guy didn't have a leg, but we thought that he might still make it. Another spotted salamander was going across the road when a car ran him over. It was very sad but we think that if it was a girl that she might have been coming back from laying eggs because it was moving away from all the sound.

On our second night we went to a different location and we found a new species, the Eastern Newt/Red Eft. It was not even the size of my pinky finger! We also found a spotted salamander on the road that we live on. We got my dad to come out and look at it and then we saw another spotted salamander in the vernal pool on our driveway.

The next day we walked down our road to see if we could find anything. The reason we walked is because we wanted to avoid driving so we wouldn't run anything over. So we walked down that road and found 10 spotted salamanders! Then we asked the person in charge of the project, Greg LeClair, if we could make it a site and he said that he would

make it one! One of our last times we went out we found nothing else but 51 PEEPERS! One was injured and two were dead, but forty-eight were alive and healthy. Spring Peeper Peepers are easy to identify because they're the smallest of the frogs and most have an X marking on their back.

On Mothers Day we went to the Botanical Gardens and we found a vernal pool with some salamander eggs that I was able to touch! The jelly that protects the eggs felt slippery and slimy. We also spotted some frogs and I tried to catch a tadpole but they were too fast. In all I thought that this project was really fun and I'm hoping to do it again next year with some of my friends! I learned a lot over the season about vernal pools, how to identify amphibians, and how to handle them when I help them during their migration.



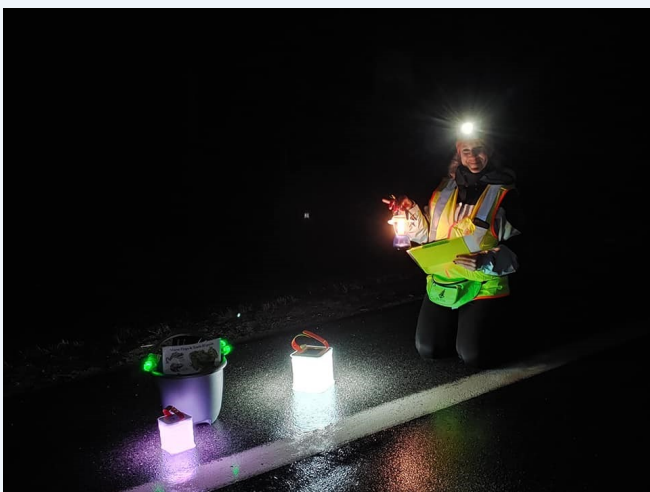
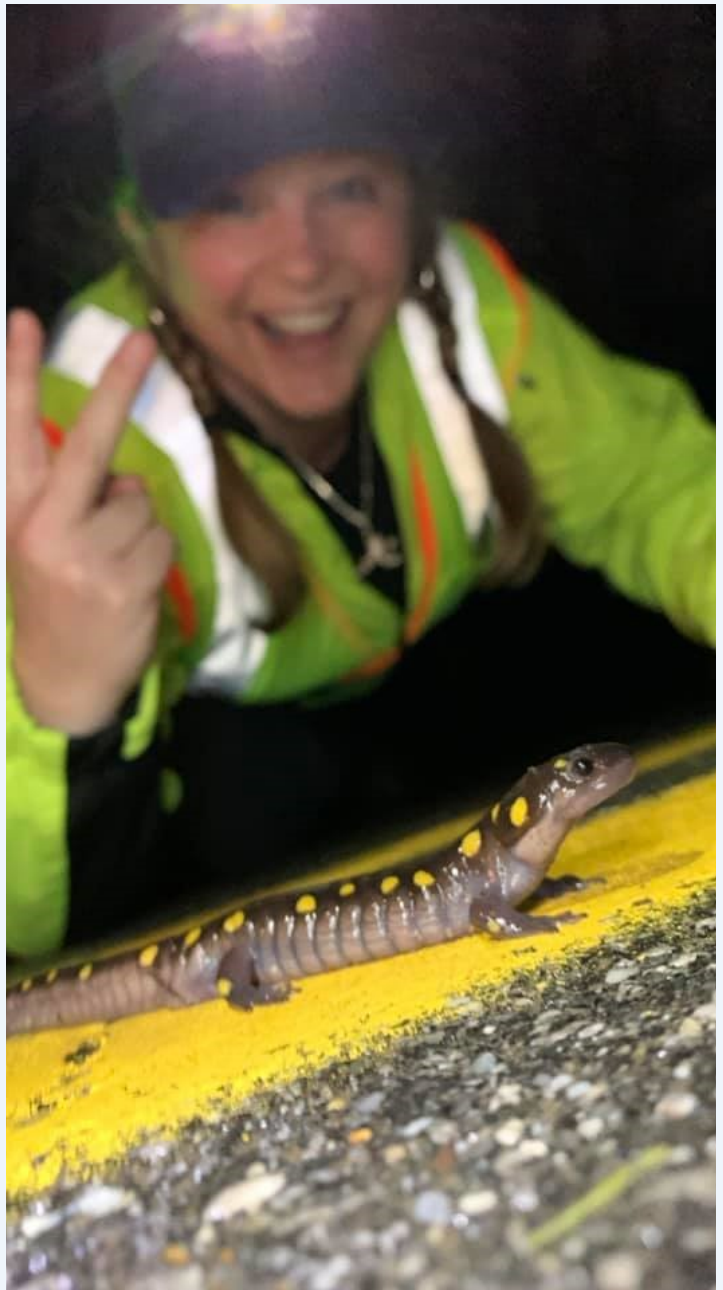
*Photos by Stephanie Seigh.*



***What I love about Maine Big Night  
by Rebecca Blaesing***

The people. The supportive, collaborative spirit of this community of volunteers and the level of excitement for sharing experiences and learning together. Greg LeClair's tireless dedication to this project and his lifelong love for herps.

The creatures. The deafening song of countless peepers in the pitch darkness around a pond in New Gloucester. The first sighting of a hopping wood frog caught in the rain-soaked beam of a headlamp. The simultaneous gasp of absolute delight when my buddy Kristi and I encountered our very first spotted salamander trundling across Middle Road in Cumberland.



To be out in a dark, cold, wet night in April, witnessing this mass transit of amphibians who are responding to their genetic urge to get back to their vernal ponds of origin RIGHT NOW. To help some cross safely and then watch them continue on their determined way through the woods. To gently move the bodies of the unlucky ones off the road. To count and tally and feel a burst of joy with every sighting and identification. To feel like we were in a secret place that most people don't get to see.

*Photos by Kristi Sarchi*



# Tracking New Disease

Back in 2020, MBN volunteer Nell Rux shared photos of several Wood Frogs she found that were heavily bloated; what was normally a frog the size of a thumb was filling her palm. Many of us figured that these were females that, for whatever reason, were just extremely gravid, bloated with eggs that were yet to be laid.

However, early in 2021, a new paper titled “Salted roads lead to edema and reduced locomotor function in wood frogs” by Frymus et al. was published in the journal *bioRxiv*. MBN coordinator Greg LeClair happened to be following one of the authors on Twitter, who shared an image of a Wood Frog with the article that looked suspiciously similar to the ones discovered by Nell a year before.

As mentioned in the paper, road salt is a pollutant with a complicated history with amphibians. In some cases, higher salinity can help protect amphibians from certain diseases, but it is also frequently deadly, especially to younger individuals. The closer a pool is to a road, the more likely it is to have higher salinity levels, and the more problematic the salt becomes to amphibians. The authors found that frogs in these pools closer to roads were much more likely to

develop edema, where they became so bloated that movement became difficult. The bloating is attributed to kidney malfunction as a result of the high salinity, resulting in improper regulation of fluids within the frogs’ bodies.

Sure enough, with more eyes on the road in 2021 than ever, we found more and more Wood Frogs with edema. Where one was found, it was not uncommon to find another, and soon it became apparent that there are pockets where the disease is more prevalent than the surrounding areas. Center Road in Gray and Molyneaux Rd in Camden became hotspots for producing these bloated frogs. The first recorded Spring Peeper with the condition was found in Camden.

Other areas with diseased frogs appeared as well. Sebago. Brunswick. Auburn. Cumberland. Orono. All areas with higher human activity. These are sites that we will continue to be vigilant of, and ask that anyone who encounters an amphibian with suspected edema submit a photo to Greg LeClair ([Gregory.leclair1@gmail.com](mailto:Gregory.leclair1@gmail.com)) for documentation.



Left to right: Wood Frog by Lindsay Se, Wood Frog by Kryss Williams Carriere, Wood Frog by Nell Rux, and Spring Peeper by Jackie Grannis-Phoenix. Note the variation of severity between the three Wood Frogs.



# PREPARING FOR 2022

The 2022 season will be the fifth year of the project—a fantastic milestone! Below, I have outlined expected changes and goals to the project going forward.

## Expected changes:

- To reward returning volunteers and incentivize returns, any volunteer who has submitted data in the previous year will be allowed to sign up for a site in advance of other volunteers, allowing them to claim sites that they know and enjoy.
- One of the greatest challenges of every year is managing emails, volunteer certifications, and other administrative tasks. I will be attempting to find someone to help handle the administrative load, hopefully in a paid position.
- Given that misidentifications seemed to increase a bit this year, the certification exam will emphasize identification more and passing grades may be more ridiculed.
- The idea of an app for data recording will continue to be pursued. A few options currently exist—test-drivers may be wanted!

## Goals

- Continue increasing access to the project, especially to urban and underserved communities.
- Increase participation in northern Maine.
- Increase participation in mountainous areas to determine what effect, if any, traffic has on Spring Salamanders. This may require specialized units that do vehicle-based surveys in high-likelihood areas.
- Reduce data collection errors—primarily in identification and time recordings.

I greatly look forward to what the 2022 season will bring—with so much going on in the project and beyond, it seems like every year brings new discoveries and new important conclusions. With five years under our belt, we will be becoming a true long-term monitoring project with a data set to be reckoned with. Don't forget to stay in touch on our Facebook page ([www.facebook.com/groups/bignightmaine](http://www.facebook.com/groups/bignightmaine)), on Twitter @mainebignight, and our website ([vernalpools.me/big-night/](http://vernalpools.me/big-night/)). As usual, updates will typically start coming through around January and February.

Here's to another year of community building, salamander saving, and data dissecting!

## A VERY SPECIAL

# THANK YOU

Maine Big Night would not be the success it is without the amazing work of so many people. This year, I want to give a special thanks to all of the volunteers who not only braved the rainy nights and roads, but introduced friends and family to the joy of big night, wildlife conservation, and community science. Important to these were my kit hosts, Blue Hill Heritage Trust, Greater Lovell Land Trust, UMaine Farmington via Leigh Ann Fish, the Saco River Wildlife Center, the Downeast Coastal Conservancy, the Patten Free Library, and Runamuk Acres Conservation Farm.

I would also like to thank Michael Boardman and Rebecca Blaesing for using their gifts of artistry to support this project, my scientific advisory committee Dr. Matthew Chatfield, Dr. Cheryl Frederick, Dr. Jeffrey Parmelee, and Dr. Marcia Moreno-Baez for their endless support and guidance. I would also like to especially thank Dr. Moreno-Baez and Zuzanna Duffy for their dedication and work in getting the project upgraded to professional standards with their GIS expertise. Finally, I would like to thank Aram Calhoun and her web engineer Shannon Homola for so generously hosting us on their website.

## **Stay Updated!**

Facebook: [facebook.com/groups/bignightmaine/](https://facebook.com/groups/bignightmaine/)

Twitter: [@mainebignight](https://twitter.com/mainebignight)

Website: [vernalpools.me/big-night/](https://vernalpools.me/big-night/)

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Report written and compiled by Gregory LeClair



