

# SALAMANDER CROSSING BRIGADE



photo © Tyler Hogan

## VOLUNTEER HANDBOOK

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**HARRIS CENTER**  
FOR CONSERVATION EDUCATION

**a community science program of the Harris Center for Conservation Education**

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## Questions?

[harriscenter.org](http://harriscenter.org) or  
[thelen@harriscenter.org](mailto:thelen@harriscenter.org)

This handbook has been adapted from materials created by the Bonnyvale Environmental Education Center in Brattleboro, Vermont.



spotted salamander photo © Tyler Hogan

# Why Do We Shepherd Salamanders?

Every spring, spotted salamanders, wood frogs, spring peepers, and other amphibians migrate to breeding wetlands their species have inhabited for thousands of years. Superimposed upon this ancient world, however, is a new world of houses, businesses, and, perhaps most importantly, roads. In places where amphibians must cross roads, many are killed by passing cars. Studies have shown that this road mortality can have a significant impact on amphibian populations, and that efforts to protect migrating amphibians can reverse the negative trend.

The Harris Center for Conservation Education has been coordinating community science efforts to document and reduce amphibian road mortality in the Monadnock Region since 2006. We've now trained more than 1,800 volunteers, who have collectively moved more than 70,000 individual amphibians to safety at dozens of crossing sites throughout southwest New Hampshire.

In 2009, the City of Keene bought land that was previously slated for development to protect the migratory amphibian corridor at our popular



Jefferson salamander photo © Sigrid Scholz

North Lincoln Street crossing site. Even better: in 2018, Keene began working with the Harris Center to close that stretch of road to vehicles on amphibian migration nights! As our efforts grow, the data we collect could be used for land conservation or road projects that protect amphibians in other places too.

**You can help by volunteering with the Salamander Crossing Brigades!**

## What is “Big Night”?

From the thawed earth, rain draws them forth. Under spring's inexorable pull, they clamber through stone walls, crawl over logs, and hop across fallen leaves. Spotted salamanders, wood frogs, and other amphibians are moving toward their breeding habitat — shallow depressions in the forest floor that fill with snowmelt and spring rain, often drying completely by summer's end. On the first warm, rainy nights of spring, thousands of amphibians will travel to these vernal pools and other wetlands to breed. This migration is known as “Big Night.”

Some years, Big Night is easy to predict: thawed ground, warm temperatures (above 40° F), and heavy evening rain will prompt amphibians to move *en masse*. Other years, the migration is trickier to foretell. Often, temperature fluctuations and varying snowpack depth mean that Big Night occurs at different times in different parts of the region. Some years, Big Night is actually several Medium-Sized Nights, which can take place anytime from mid-March to early May in our neck of the woods.

# What Do the Salamander Crossing Brigades Do?

**Crossing Brigade volunteers** count migrating amphibians and help them safely across the road at sites throughout the Monadnock Region. Volunteers also help to discover new amphibian road crossings.

Attend a volunteer training or watch our online training videos to sign up for the Salamander Brigades, and we'll email you when conditions are right for Big Night. Updates will also be posted via a five-day "salamander forecast" on the Harris Center website ([harriscenter.org](http://harriscenter.org)) and on our community science Facebook page (@AVEO.citizenscience).

For more information, be sure to read **What to Expect on Big Night** on page 3.



photo © Abigail Touchet

## What Are My Responsibilities as a Crossing Brigade Volunteer?

1. **Watch the weather**, check your email and the online salamander forecast, and be ready to head out when the time is right!
2. **Learn to identify** the common amphibian species of southwest New Hampshire.
3. **Be safe and prepared** for walking along the road on dark, rainy nights.
4. **Keep count** of the amphibians you cross, by species, on Big Nights. At the end of the evening, give your counts to a Site Coordinator (if there is one) or submit them online at [harriscenter.org](http://harriscenter.org).
5. **Use care** when handling amphibians.

## What to Bring on Big Night

**Reflective vest**  
**Raingear**  
**Bright flashlight**  
Warm layers  
Extra batteries  
Camera or phone  
Drinking water  
Clipboard or notebook  
Data forms  
Pencil

**Optional**  
Headlamp  
Clean bucket  
Spatula (for dead amphibians)  
Snacks

# What to Expect on Big Night

## Getting Started

Salamanders and frogs typically begin moving at nightfall. Ideally, you should plan to be at your site from shortly after sunset until car or amphibian traffic slows, usually before midnight. When you arrive, check in with a Site Coordinator (if there is one) and take a few moments to familiarize yourself with the site. When you're ready, walk carefully along the road, scanning the pavement with a bright flashlight for amphibians. Train your eyes to look for shiny "objects" or sudden movement.

## I Found One!

When you spot an amphibian, record it on your data sheet, pick it up with a firm but gentle grip, and move it across the road in the direction it was traveling. Make sure you release it well off the road, so it's not accidentally crushed underfoot. Some amphibians will be impossible to catch as they move briskly along; when this happens, simply watch to make sure they make it across the road and include them in your count. Dead amphibians should be counted separately and removed from the road so they are not tallied more than once. If you're unsure about species identification, ask a Site Coordinator for help or take a photo to send to us. When you leave for the night, be sure to report your final tally to a Site Coordinator or to submit it, as soon as you get home, via the online form at [harriscenter.org](http://harriscenter.org).

## Handling Amphibians

Remember, amphibians are small and sensitive. Wear nitrile gloves or wet your hands with rainwater before handling them, and maintain a gentle, yet firm hold around the center of their bodies at all times. Do not carry them by their legs or tails. In addition, amphibians readily absorb toxins through their skin, so it's important to ensure your hands are free of lotion, bug spray, perfume, and other chemicals before you touch them. **Do not use hand sanitizer on Big Nights.**

## Bucket Brigades

If your site is hopping with activity, you may wish to use a bucket to move several animals at once. If you do, make sure it's free of soap, detergent, and other chemical residues. If possible, rinse it with rainwater before using it to transport amphibians.

## Encountering Casualties

Some critters are bound to be killed by passing vehicles. If you're comfortable with examining these casualties, carefully inspect them to identify their species. (If you don't know the species, they should be recorded as simply 'unknown.') After you've identified and counted the dead, use a spatula or (not for the faint of heart!) your hands to remove them from the road.

There may also be times when you encounter injured animals. Amphibians are resilient and can recover from minor injuries, so if the wound is to the leg or tail, move the animal off the road and include it in your "live" count. Injuries to the head or core body are likely fatal; those animals should be counted among the dead.



wood frog photos © Dave Huth

## The End of the Night

Toward the end of the evening, vehicle traffic will taper off. Official data collection will cease when the Site Coordinator calls it a night or, for sites without Site Coordinators, whenever you're ready to leave. You are of course welcome to stay as long as you like to help move amphibians across the road!

Remember to note your end time on your data form, check out with a Site Coordinator before leaving, watch carefully for critters on your drive home, and submit your counts and photos — as soon as you get home — via the online forms at [harriscenter.org](http://harriscenter.org).

# Staying Safe on Big Night

**You are responsible for your own safety.** On Big Nights, it will be dark, wet, and foggy, driving visibility will be dramatically reduced, and drivers may not expect to see people in the road. Here's how to keep yourself safe.

## Wear a reflective vest.

Wear a reflective vest. Wear a reflective vest.

**Wear a reflective vest.** (This one is really important.)

## Shine a light.

Don't wait for the rain! Make sure you have a big light for Big Night, and fresh batteries to keep it bright. Dim lights can vastly reduce both your ability to see critters and drivers' ability to see *you*. Cell phone flashlights are *not* sufficient. Headlamps are handy for keeping notes on how many salamanders you've crossed — and for making yourself extra visible to passing cars — but flashlights are key when it comes to looking for amphibians on the road. Many Crossing Brigade volunteers opt to use both.

## Stay alert.

Driving visibility is dramatically reduced on rainy, foggy nights, and drivers may not expect to see pedestrians in the roadway. Keep your eyes and ears peeled for vehicles, and step off the road as soon as they come into view. In addition, it's quite likely there will come a time when you see an amphibian in the headlights of an oncoming car, and feel tempted to dart into the road for a quick rescue. *Don't do it!* It's easy to slip while running on wet roads or for salamanders to squirm out of your hands when you're in a rush, putting you in danger. **If you see a car coming, step aside.**

## Take care.

Stay home if you're sick, and **do not use hand sanitizer on Big Nights**, as it can be toxic to amphibians. Instead, wash your hands with soap and water before you head out and as soon as you get home after a night on the road.

## Bringing kids?

Big Night can be a transformative experience for kids, but you'll need to take some extra precautions to keep young Crossing Brigadiers safe and sound. Wait until children are elementary school-aged — and know how to be safe around traffic — before taking them to amphibian road crossings. Scope out your crossing site ahead of time to make sure it's family-friendly (wide shoulders, good visibility, streetlights, slower-moving traffic). On Big Nights, make sure everyone in your group is wearing a reflective vest and carrying a light. Finally, maintain a 1:1 adult-to-child ratio *at all times*, with the primary responsibility of each adult being the safety of the child in their care.



*This Crossing Brigadier is dressed for success: he's wearing a **reflective vest** and carrying two sources of **bright light** (a headlamp and a flashlight). He's also wearing a brimmed hat to keep the rain off his eyeglasses, so he can see well enough to remain **alert to traffic**.*

# Tips for Big Night

## Think ahead.

Visit your site in the daylight to make sure you know how to get there and where to park. Get your field gear ready, and keep your eye on the weather. Stay informed by checking [harriscenter.org](http://harriscenter.org) for the latest salamander forecast, and make sure we have your contact information so we can email you when Big Nights are upon us.

## When will Big Night be here?

Predicting Big Nights can be tricky. We now (think we) know that the migration will happen after the ground has thawed and temperatures have been in the 40s and 50s for at least a day or two. Early in the season, Big Nights typically occur when temperatures stay above 40°F into the early evening, and soaking rain has continued through the day and into the night. If the right conditions don't occur until late in the season, amphibians might move after a light rain or in heavy fog, when the ground is simply damp. Wood frogs require less moisture and tolerate colder temperatures than spotted salamanders, so if we have a particularly dry spring, they may move to their breeding pools as soon as the pools thaw, before any drenching rain.

## Carry a bright light.

Don't wait for the rain! Make sure everyone in your group has a big light for Big Night, and fresh batteries to keep it bright. Dim lights can vastly reduce your ability to see amphibians, and drivers' ability to see *you*. Some volunteers have learned the hard way that small flashlights, especially with waning batteries, might not reveal peepers until they're right underfoot. On the other hand, a large, bright light can illuminate amphibians across a wide swath of pavement. *Cell phone flashlights are not sufficient for Big Nights.*

## Walk carefully.

Walk carefully, facing traffic — so you're sure to see any oncoming cars — and sweep your flashlight side to side to scan for amphibians. When changing direction or resuming activity after standing still, be sure to check the area around your feet for new arrivals.

## Keep your feet on the street.

Amphibians are very difficult to see once they're off the road, so stay on the pavement unless you're forced to step off the road for safety.

## Make sure your hands are clean.

Salamanders and frogs are sensitive to chemicals and readily absorb toxins through their skin, so use nitrile gloves or make sure your hands are free of insect repellent, lotion, perfume, and other chemicals — **including hand sanitizer** — before handling amphibians. If you're using a bucket, rinse it thoroughly to eliminate any residue from soap, detergent, or other cleansers.



spring peeper photos © Dave Huth

# Special Project: Spotting Spot Patterns

## ***The spots on adult spotted salamanders are like fingerprints on humans:***

each salamander has its own unique constellation of markings, which can be used to tell that individual apart from all others. The Harris Center has undertaken a special project to create a photo database of individual spotted salamanders at some of our well-established road crossing sites. Over time, these spot pattern records could provide meaningful information on year-to-year survival in spotted salamander populations that must cross roads to reach their breeding pools. Read on for tips on how to take photos for inclusion in this database.

## **Stick With Spotties**

Although we love to see and share photos of all kinds of amphibians, only spotted salamanders have one-of-a-kind markings, so only spotted salamander photos can be included in our database.

## **Time After Time**

Spotted salamanders are creatures of habit, returning to the same breeding sites year after year. The value of the spot pattern database lies in comparing pictures from one year to the next, and seeing which individual salamanders re-appear. Although we've accepted photos from many sites in the past, we are now concentrating our efforts on five long-established sites that have a consistent salamander and volunteer presence year after year. Please only submit spot pattern photos from the following sites:

- **Keene:** North Lincoln Street & Jordan Road
- **Swanzey:** Matthews Road & Swanzey Lake Road
- **Nelson:** Nelson Road

## **Head Shots**

The best way to identify a spot pattern is by looking at the salamander's upper body, so take your picture from above, and make sure the head, back, and both sides of the salamander are visible and in focus. Use a clipboard or data form as a backdrop to prevent glare from wet roads.



*This spotted salamander was photographed during its migration to its breeding wetland on 4/11/14 (left) and its migration away from its breeding wetland 4/27/14 (right). Note the distinctive spot pattern, which is unique to this individual salamander.*

## **One and Done**

To minimize confusion, send just *one* photo per salamander.

## **Don't Forget the Data!**

These photos are only as useful as the information that comes with them. When you submit your photos via [harriscenter.org](http://harriscenter.org), be sure to include:

(1) the date the photo was taken, including the year; (2) the name of

the crossing site; and (3) a unique number for each individual salamander, to distinguish it from the other photos taken on the same night at the same crossing. Without this information, your photo is just a photo. *With* this information, your photo is data! Ideally, you'll re-name the photo file to include all three pieces of information. For example: JordanRd\_041522-1.jpg; JordanRd\_041522-2.jpg, etc.

## **File Size Specs**

If possible, please re-size your photos so they're bigger than a thumbnail, smaller than a poster. On a smartphone, this will be either the "large" or "original" size. ("Small" or "medium" files, especially when taken under low-light conditions, may not reveal enough detail for spot pattern analysis.)

# What Do Site Coordinators Do?

**Site Coordinators** are responsible for setting up signs and cones at designated locations on migration nights, recording data and making sure it gets submitted, and assisting other Crossing Brigade volunteers. We provide Site Coordinators with field equipment and support, and remain in close communication with them throughout salamander season.

We are always looking for new Site Coordinators! If you're interested in volunteering as a Site Coordinator, please email Brett Amy Thelen at [thelen@harriscenter.org](mailto:thelen@harriscenter.org).



spring peeper photo © Dave Huth

## What to Bring on Big Night

In addition to the equipment listed on page 2, please bring:

**Data sheets\***  
**“Salamander Crossing” signs\***  
**Traffic cones\***  
**“Harris Center” Reflective vest\***  
Laminated ID sheets\*  
Cell phone

**Optional**  
Digital camera  
Lightbox\*  
Extra pencils  
Extra flashlights  
Extra reflective vests\*

*\*provided by the Harris Center*

## What Are My Responsibilities as a Site Coordinator?

1. **Be available** to help out most nights from mid-March through early May. Big Nights can't be scheduled in advance, so we ask Site Coordinators to be on call for the duration of the season.
2. **Learn to identify** all of New Hampshire's spring-migrating amphibian species.
3. **Maintain field equipment** (signs, traffic cones, reflective vests, field ID sheets, lightboxes) and return it at the end of the season.
4. **Coordinate volunteer activity** on Big Night(s): greet volunteers and passersby, answer questions, collect data forms.
5. **Record amphibian data and report it** via the online form at [harriscenter.org](http://harriscenter.org).
6. **Photograph** any rare, uncommon, or unknown species, and email the photos to [thelen@harriscenter.org](mailto:thelen@harriscenter.org).
7. **Pat yourself on the back** for making a difference in the lives of amphibians!



Jefferson (l) and spotted (r) salamander photos © Dave Huth

# How to Find New Amphibian Crossings

**What if there aren't any crossings near me?** We know of at least eleven major amphibian crossing sites in the Monadnock Region, but there are bound to be more, and we need your help to find them! When it comes to designation as an official crossing site for our Salamander Crossing Brigade project, traffic volume matters as much as amphibian movement—we're looking for places where volunteer efforts to cross and count amphibians will make a difference (rarely-traveled dirt roads need not apply), but where traffic isn't so fast or frequent as to endanger our volunteers (no four-lane highways). The information you collect will help us decide where to concentrate new volunteer efforts, and may ultimately inform wildlife-friendly transportation and conservation planning in our neck of the woods.

## Watch the weather.

If you've signed up for our email list, you'll be notified when conditions seem right for a migration. Bottom line: if the snow pack has melted, nighttime temperatures are above 40° F, and it's one of the first rainy nights of spring, amphibians are likely to be on the move.

## Watch the clock.

Go out after sundown, once the frogs and salamanders have had a chance to get going. As long as it's warm and raining steadily, the amphibians will keep moving well into the night, so you can decide for yourself when it's quitting time.

## Where to go?

View the map of amphibian crossings at [harriscenter.org](http://harriscenter.org) to find potential crossing locations in New Hampshire. If you're further afield, check [inaturalist.org](http://inaturalist.org) for roadside spotted salamander or wood frog observations. We also encourage you to look for entirely new sites in your town, and to share them with us for inclusion on our map. Roads near wetlands are a good place to start.

## Bring a friend.

You'll need at least two people to scout safely— one to drive and the other to scan the road for amphibians. Once at a crossing, it's also helpful to divvy up data recording and amphibian shuttling tasks.

## Drive slowly.

When you get to a potential crossing site, reduce your speed to 15 mph, slower if amphibians are present. Do not attempt surveys on busy roads with fast-moving traffic. It's too dangerous!

## Take a breath of fresh air.

Keep your windows open as you drive. The "quack" of wood frogs might be the first sign that you're nearing a vernal pool.

## Scan the whole road.

Scan both sides of the road for frogs and salamanders, both live and dead. You'll see frogs and toads leaping or sitting still, impersonating tiny, tipped-up pyramids. Salamanders will look like sticks with one upturned end. They are often stunned by headlights, and may not move until you come to them.



wood frog photo © Dave Huth





## Mole Salamanders

The mole salamanders, from the genus *Ambystoma*, spend their lives as moles do — in dark, underground tunnels. They only venture aboveground on warm, rainy spring nights, congregating in vernal pools for just a brief breeding period before returning to their fossorial lives. Big Night(s) are your best chance for spotting them! They are fairly hefty salamanders with moist, smooth skin and costal grooves pleating their sides.

### Spotted Salamander

*Ambystoma maculatum*

Adults range from 6 - 8" long, and are gray to black in color.

#### Look for these identifying characteristics:

- two irregular rows of yellow spots — very distinctive!



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© davehuth.com

### Jefferson Salamander

*Ambystoma jeffersonianum*

Jefferson salamanders have pale blue flecks on brown to gray skin. Adults measure up to 7" long.

#### Look for these identifying characteristics:

- tiny pale blue flecks, mostly on sides and belly
- long toes
- head widest behind the eyes

### Blue-Spotted Salamander

*Ambystoma laterale*

Adults range from 4 - 6" long, and sometimes have a brown tinge to their skin. Immature Blue-spotted sometimes migrate with adults. Much less common than spotted or Jefferson salamanders in southwest New Hampshire.

#### Look for these identifying characteristics:

- pale blue spots and flecks on entire body, including legs and head



© Todd Pierson



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### Jefferson/Blue-Spotted Complex

Jefferson and blue-spotted salamanders frequently hybridize. If you see a blue-flecked salamander, it is likely a hybrid. Unless it is clearly one or the other, record it as a Jefferson/blue-spotted complex. Take photos of all Jefferson and blue-spotted salamanders, if possible.



## Other Salamanders



### Eastern or Red-Spotted Newt

*Notophthalmus viridescens*

The newt has two distinct life stages: the juvenile eft and the adult. As efts, they are bright orange to yellow-green with dry, granular skin, and they are terrestrial. Adult newts are olive-green, smooth-skinned, and aquatic. 1½ - 4" long. You're more likely to see efts than adult newts on Big Night(s).

#### Look for these identifying characteristics:

- row of red spots down each side of back
- black line around each spot
- gold-colored eyes

### Red-Backed Salamander

*Plethodon cinereus*

Quite small (2 - 3½" long) and slender, these salamanders can be difficult to see and even more difficult to catch.

#### Look for these identifying characteristics:

- small legs
- wide red, yellow, or gray stripe down flattened back
- darker stripes at edge of back



### Four-Toed Salamander

*Hemidactylium scutatum*

These reddish-brown salamanders are also quite small (2 - 3½" long).

#### Look for these identifying characteristics:

- four toes on each foot, including rear feet
- constriction at the base of the tail
- white belly with black speckles

### Northern Two-Lined Salamander

*Eurycea bislineata*

These small (2½ - 4" long), yellowish-brown salamanders are not common at road crossings, but are sometimes found on roads near wooded floodplains or fast-running brooks.

#### Look for these identifying characteristics:

- dark brown lines running from the back of each eye to the tail
- lighter, yellowish stripe along the length of the back, sometimes containing small dark spots
- bright yellow belly and underside of tail



# Frogs Commonly Seen on Big Night(s)

Although wood frogs and spring peepers are our earliest migrants, many other frog species take to the roads on warm, rainy nights. The species here are listed in approximate order of appearance, from early spring through late summer.

## Wood Frog

*Lithobates sylvaticus*

Wood frogs are seen in abundance in early spring. They range from 1½ - 3" long, and are brown to reddish-brown in color.

### Look for these identifying characteristics:

- dark "bandit mask" around eyes
- prominent dorsolateral ridges running length of back



© davehuth.com



© Patrick Coin

## Spring Peeper

*Pseudacris crucifer*

These tree frogs are commonly found at road crossings in March and early April. They are tiny and tan-colored, so look carefully for them.

### Look for these identifying characteristics:

- X-shaped marking on back
- adhesive discs on toes
- small size (¾ - 1¼" long)
- no dorsolateral ridges or "bandit masks"

## American Toad

*Anaxyrus americanus*

These short-legged, slow-moving hoppers are stout and warty. They tend to be active late in the season, after temperatures have warmed. 2 - 3½" long.

### Look for these identifying characteristics:

- pairs of dark spots on head and back
- 1 - 2 warts within each dark spot
- large, kidney-shaped parotid gland behind each eye



© davehuth.com



## Frogs Sometimes Seen on Big Night(s)



### Gray Tree Frog

*Hyla versicolor*

These small (1 - 2" long) frogs might be seen on warmer nights, late in the season. Their markings can change in response to light, temperature, and humidity; they are most often light gray, but they can also be green or brown.

#### Look for these identifying characteristics:

- adhesive discs on toes
- warty texture

### Pickerel Frog

*Lithobates palustris*

Pickerel frogs range from 2 - 3" long, and are far more common than leopard frogs — with which they are commonly confused — in New Hampshire.

#### Look for these identifying characteristics:

- dark rectangular spots on a tan back
- orange or yellow inside the hind legs and groin



### Green Frog

*Lithobates clamitans*

Green frogs range from 2¼ - 3½" in length, and are brown to green in color. Like toads and bullfrogs, they are more likely to be found during late-season migrations or on rainy summer nights.

#### Look for these identifying characteristics:

- prominent dorsolateral ridges
- green upper lip



### Bullfrog

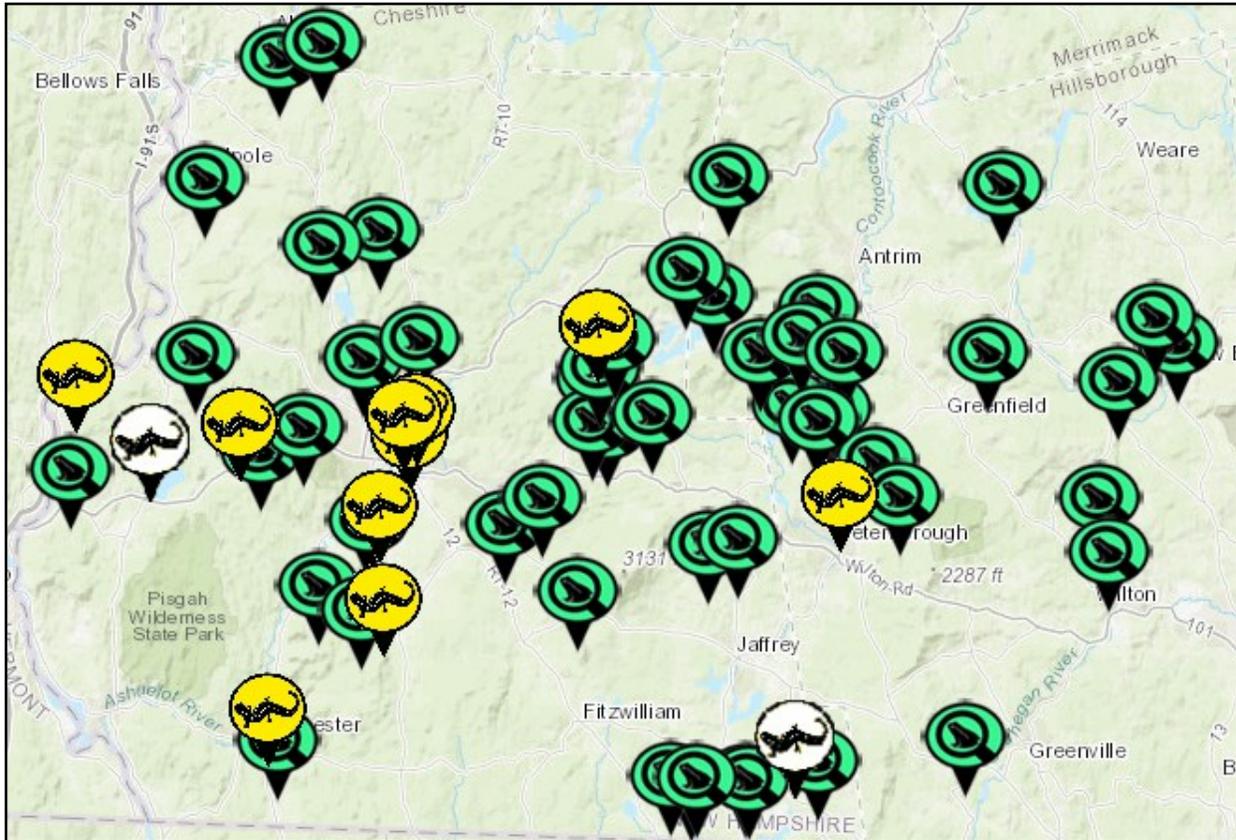
*Lithobates catesbeiana*

Compared to other frogs, bullfrogs are BIG. Some adults may weigh up to a pound. Adults range from 5 - 8" long, and vary in color from olive green to greenish-brown.

#### Look for these identifying characteristics:

- no dorsolateral ridges
- folds behind each eye curve over ear drum (like earpieces on glasses)
- green face

# Crossing Site Locations



For more detailed information on the locations of known and potential amphibian crossing sites in New Hampshire, visit [harriscenter.org](http://harriscenter.org).



wood frog photo © Brett Amy Thelen