SALAMANDER CROSSING BRIGADE

photo: Laura Heady

VOLUNTEER HANDBOOK

AVEO
Ashuelot Valley
Environmental Observatory

HARRIS CENTER
FOR CONSERVATION EDUCATION

a citizen science program of the Harris Center for Conservation Education

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Contents

Questions?
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This program and handbook have been adapted from materials created by the **Bonnyvale Environmental Education Center** in Brattleboro, Vermont.

spotted salamander photo: North Branch Nature Center

Why Do We Shepherd Salamanders?

Every spring, spotted salamanders, wood frogs, and other amphibians migrate to breeding pools their species have used for hundreds, perhaps thousands, of years. Superimposed upon this ancient world, however, is a new world of houses, shopping centers, and, perhaps most importantly, roads. In areas where amphibians must cross busy 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.

AVEO — the citizen science arm of the Harris Center for Conservation Education — has been training volunteers to help move migrating amphibians across roads in the Monadnock Region of southwestern New Hampshire since 2006. In that time, nearly 1,000 volunteers have helped more than 35,000 amphibians to safety at dozens of road crossings.

In 2009, the City of Keene bought land that was previously slated for development to protect the migratory amphibian corridor at our popular North Lincoln Street crossing site. Even better: in 2018, Keene will be closing this site to vehicle traffic on Big 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.

Jefferson salamander photo: Sigrid Scholz

You can help by becoming a Salamander Crossing Brigade volunteer!

What is "Big Night"?

From the recently thawed earth, rain draws them forth. Under the inexorable pull of the pools, they creep through stone walls, lurch over ledges, and clamber up wooded banks. Salamanders and frogs are moving towards their breeding habitat, usually a vernal pool — a depression in the forest floor that temporarily fills with spring rain and snowmelt. On the first rainy, warm nights of spring, thousands of amphibians will travel to these small pools 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 spotted salamanders and wood frogs to move en masse. Other years, the migration is trickier to foretell. Sometimes temperature fluctuations and varying snowpack depth mean that Big Night occurs at different times in different parts of the region. Many years, Big Night is actually several Medium-Sized Nights, which can take place anytime from mid-March to late April 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 to sign up for the Salamander Brigades, and we'll email you when conditions are right for Big Night. Updates will also be posted on the AVEO website (aveo.org) and Facebook page, and you can always call (603) 358-2065 for the latest salamander forecast!

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

photo: BEEC

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 hit the road when the time is right!
2. **Learn to identify** 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 email them to Brett Amy Thelen at thelen@harriscenter.org.
5. **Use care** when handling amphibians.

What to Bring on Big Night(s)

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(s)

Getting Started

Salamanders and frogs typically begin moving at nightfall. Ideally, you should 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. 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 counted 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 email it, as soon as you get home, to thelen@harriscenter.org.

wood frog photos: Dave Huth

Handling Amphibians

Remember, amphibians are small and sensitive. 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 hold amphibians by their legs or pick up salamanders by their tails.

If your site is hopping with activity, we suggest using buckets to move several animals at once. If you do use a bucket, make sure it's free of soap, detergent, and chemical residues. If possible, rinse the bucket in rainwater before using it to transport amphibians. When releasing amphibians, make sure you place them well off the road, so they are not accidentally crushed underfoot.

Salamanders are sensitive to chemicals and readily absorb toxins through their skin. Please make sure your hands are free of insect repellent, lotion, soap, perfume, and hand sanitizer before handling 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 unknown, they should be reported as 'unknown frogs' or 'unknown salamanders'.) After you've identified and counted the dead, use a spatula, scoop, or (not for the faint of heart!) your hands to remove them from the road.

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 Coordinators, when you're ready to leave. You are, of course, welcome to stay as long as you wish to help move amphibians across the road. Remember to check out with a Site Coordinator before leaving, to watch carefully for critters on your drive home, and to email your counts to thelen@harriscenter.org **as soon as you get home**.

Staying SAFE on Big Night(s)

Your personal safety is of the utmost importance. It will be dark, wet, and foggy on Big Night, and driving visibility will be dramatically reduced. Although pedestrians do have legal right of way in most instances, **you are responsible for your own safety**.

Wear a reflective vest.

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 enough batteries to keep it bright. Dim lights can vastly reduce both your ability to see amphibians and drivers' ability to see *you*. 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 critters 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 that there will come a time when you see a salamander in the headlights of an oncoming car, and feel tempted to dart into the road for a quick amphibian 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 a car is coming, step aside.

*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**.*

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 your 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, street lights, slower-moving traffic). On Big Night, make sure everyone in your group is wearing a reflective vest. And maintain a 1:1 adult: child ratio *at all times,* with the primary responsibility of each adult being the safety of the child in their care.

photo: Tim Garceau

Tips for Big Night(s)

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 aveo.org for the latest salamander forecast, and make sure we have your contact information so we can email you when the Big Night(s) are upon us.

When will Big Night be here?

Predicting Big Night(s) 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 (°F) for at least a day or two. Early in the season, a Big Night will likely occur when temperatures stay above 40°F into the early evening, and soaking rain has continued through the day and into night. If the right conditions don't occur until late in the season, amphibians might move after a light rain, when the ground is simply damp. Wood frogs seem to 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 you have a big light for Big Night, and enough batteries to keep it bright. Dim lights can vastly reduce your ability to locate amphibians. Some volunteers have learned the hard way that an ordinary flashlight, especially one with waning batteries, might not reveal salamanders until they are underfoot. On the other hand, a large, bright light can illuminate amphibians across a wide swath of pavement.

Walk efficiently.

With a bright flashlight, stride briskly along your stretch of road, sweeping the light from side to side. Always check the area by your feet when changing direction or resuming activity after standing still.

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 make sure your hands are free of insect repellent, lotion, soap, perfume, and hand sanitizer before picking them up. 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. We're embarking on a special project to create a photographic database of individual spotted salamanders at our well-established road crossings. 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 the 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 will be included in this 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. Therefore, we strongly encourage you to send pictures from our long-established crossing sites, or from sites that you re-visit year after year.

Head Shots

The best way to identify a spot pattern is by looking at the salamander's head and upper back, so take your picture from above, and make sure the head and back are clearly visible and in focus. You'll get a better shot if you have a friend shine a light on the salamander while you take the picture, though you may need to experiment with the angle of the light to minimize glare. If you're at an established crossing site, check with your Site Coordinator to see if they have a specialized "lightbox" for salamander photography.

*This **spotted salamander** was photographed on its inbound migration on 4/11/14 (left) and its outbound migration on 4/27/14 (right). Note the distinctive spot pattern on the head and upper back, which is unique to this individual.*

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 data that come with them. 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. Example: ElmSt_041515_1.jpg; ElmSt_041515_2.jpg; and so forth.

File Size Specs

If you're a tech-savvy person who knows about such things, please re-size your photos so they're approximately 600 x 900 pixels each: bigger than a thumbnail, smaller than a poster! If you don't know the first thing about re-sizing photos, just send them along as is, and we'll make them work.

What Do Site Coordinators Do?

Site Coordinators are responsible for recording data and making sure it gets submitted, managing field equipment, and assisting other Crossing Brigade volunteers at designated locations.

We provide Site Coordinators with field equipment and support, and remain in close communication with them throughout the salamander season.

spring peeper photo: Dave Huth

What to Bring on Big Night(s)

In addition to the equipment listed on page 2 for regular Crossing Brigade volunteers, please bring:

Data sheets*
Salamander Crossing* signs
Traffic cones*
Laminated ID sheets*
Blinking red light*
Lightbox*
Digital camera
Cell phone

Optional
Buckets
Extra pencils
Extra flashlight

**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 late April. 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, lightboxes, flashing lights, field ID sheets, traffic cones) 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** by email to thelen@harriscenter.org.
6. **Photograph** any rare, uncommon, or unknown species, and email the photos to 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 ten major amphibian crossings 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 Brigades, 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 in 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?

Visit the map of amphibian crossings at aveo.org to find potential crossing locations in the Monadnock Region. We also encourage you to look for entirely new sites in your town. 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, slow to 15 mph, slower if amphibians are present. Do not attempt surveys on extremely busy roads. (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

What to Do Once You've Found a New Crossing

Pull over.

Once you find a good crossing ("good" = multiple casualties and/or live amphibians), pull over. **Make sure your car is off the road and easily visible from behind**. If possible, don't park directly in front of a house. (This can make homeowners understandably uncomfortable.) **Don't get out of the car unless you are prepared for being on the road** (reflective vest, flashlight, and raingear) and be sure to check under your car for critters before you leave.

Keep count.

If you're prepared for being on the road, move live animals across the road in the direction they were headed and keep count, by species, on your data sheet. (See below for an example.) Fill out one data sheet for each site that you visit. Be sure to include start and end time, temperature, and weather notes, as well as detailed directions, so we can find your site again. Send data sheets and photos to thelen@harriscenter.org or Brett Amy Thelen at the Harris Center for Conservation Education, 83 King's Highway, Hancock, NH, 03449. **Email is strongly preferred**.

Sample Data Sheet for Scouting New Crossings

SPECIES		LIVE	DEAD	TOTAL
Salamanders	Spotted Salamander	18 live	10 dead	28
	Jefferson/ Blue-spotted Complex			
	Redback Salamander			
	Eastern Newt			
	Other Salamander *(please name)*			
Frogs	Wood Frog	64 live	25 dead	89
	Spring Peeper	27 live	11 dead	38
	Pickerel Frog			
	Other Frog *(please name)*			
Toads	American Toad	2		2
Other Species				

This data sheet was adapted by the Harris Center for Conservation Education (Hancock, NH) from one developed by the North Branch Nature Center (Montpelier, VT).

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!

© davehuth.com

© 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-spotteds 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

© davehuth.com

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

Marbled Salamander

Ambystoma opacum

Marbled salamanders have only been recorded in two towns in New Hampshire in the last twenty years, but they are occasionally found just south of us in Massachusetts. They lay their eggs in the fall, but might be out and about on any rainy night. Adults range from 3½ - 4¼" long.


© Brian Gatwicke

Look for these identifying characteristics:

- irregular silvery-blue stripes or bands on back
- stout body
- thick tail


© davehuth.com

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

Redback Salamander

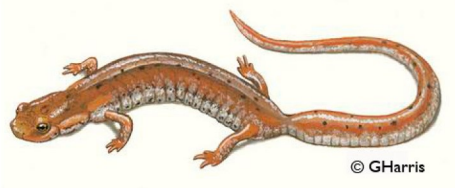
Plethodon cinereus

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


©Todd Pierson


© GHarris

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

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 early March and 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

Bufo 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 Treefrog

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" long, 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

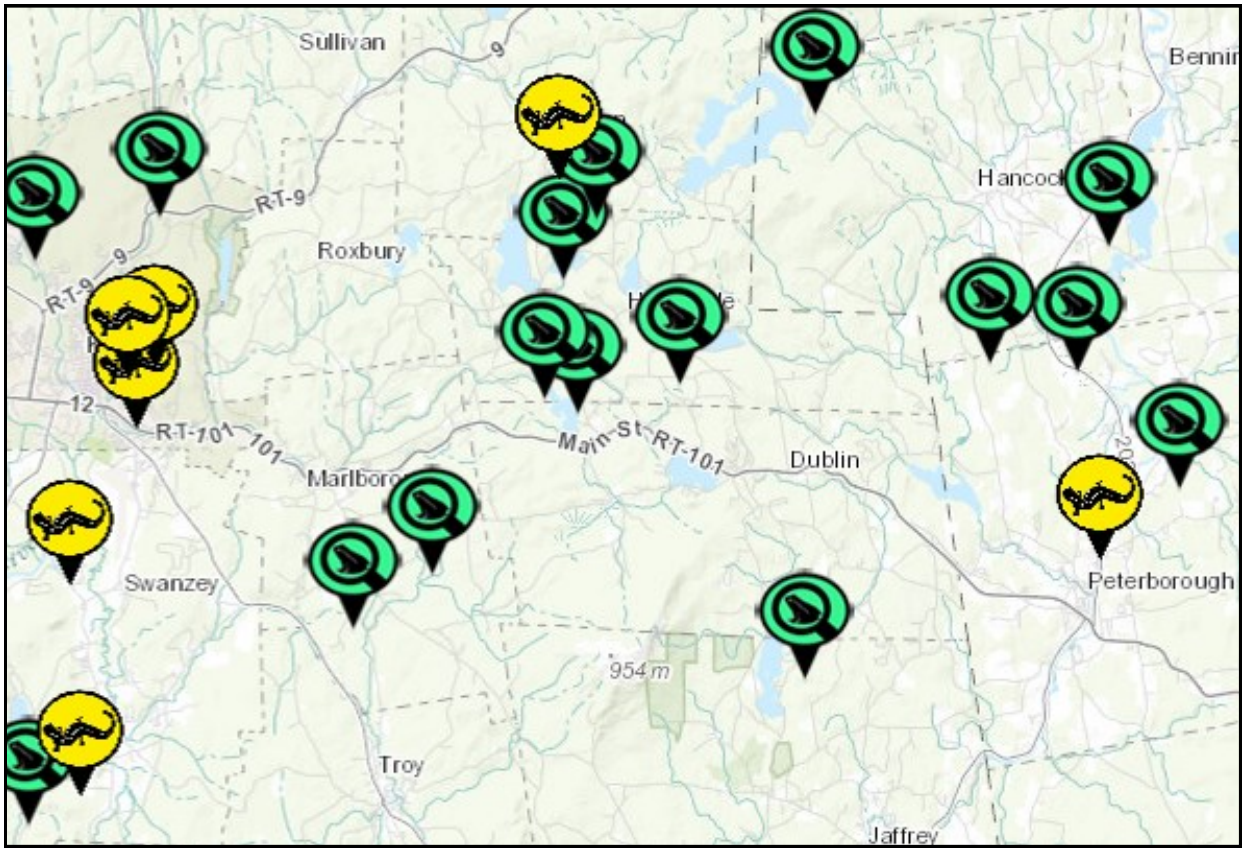
Lithobates catesbeiana

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 amphibian crossing sites in the Monadnock Region, visit **aveo.org**.

wood frog photo: Brett Amy Thelen