Adirondack Forest Pest Hunters Beech Leaf Disease (BLD) Survey Protocol

Beech leaf disease (BLD) *kills both native and ornamental beech tree species, which is cause for concern since beech trees are prevalent in Adirondack forests. BLD was first identified in Ohio in 2012, and much about it, including the full cause of it and how it spreads, is still unknown. It is most likely associated with a nematode,* Litylenchus crenatae mccannii. ***Surveying for BLD is vital for helping scientists better understand this disease. Thank you for helping us find BLD and protect Adirondack forests, watersheds, and habitats.***

Table of Contents

SURVEY MATERIALS 1

PART 1: SET UP iMAPINVASIVES MOBILE APP 2

PART 2: SELECT SURVEY SITES 2

PART 3: BLD SURVEYS 4

PART 4a: CREATE IMAP ACCOUNT 5

PART 4b: ENTER FIELD DATA INTO IMAP 6

PART 5: RECORD YOUR SURVEY WORK 8

PART 6: IDENTIFICATION TIPS 9

PART 7: ADIRONDACK HIKING: 10

APPENDIX A: LOOK-ALIKES AND OTHER BEECH PHENOMENA 11

SURVEY MATERIALS

- Sturdy shoes or boots, and appropriate outdoor clothing for the expected weather conditions
  Please clean your boots with a boot brush and disinfect with Lysol or similar disinfectant between survey sites to avoid the inadvertent spread of the nematode
- GPS enabled smartphone or tablet for entering findings into iMapInvasives *(see Part 1 and Part 4 below to learn how to download iMapInvasives to your mobile device)*
- Trail map and compass (see Step 8 of Part 2 to find out where to locate local maps and guides)
- Headlamp or flashlight
- Beech and BLD ID sheet (Part 5 of this protocol)
- A printed copy of this protocol guide, if needed
- Pack with water, snacks, and safety gear 😊

PART 1: SET UP iMAPINVASIVES MOBILE APP

(This step requires use of a computer – laptop or desktop – as well as a smart phone or a tablet.)

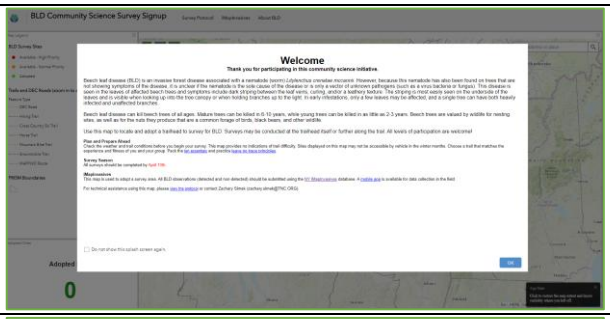
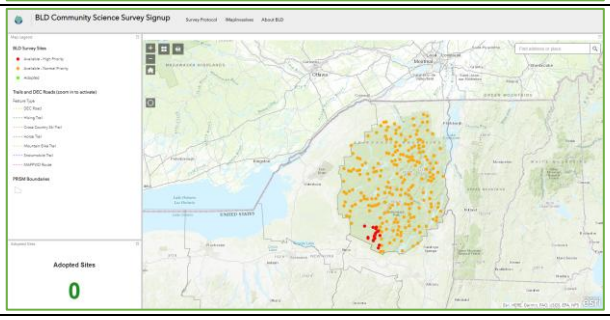
Step by step instructions on how to create an iMap account, download the app to your mobile device, and get started entering citizen science data are found in Part 4 of this BLD protocol.

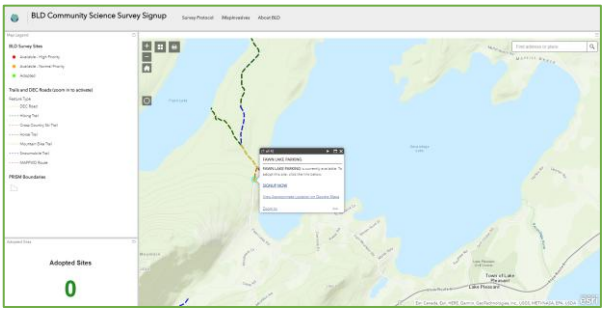
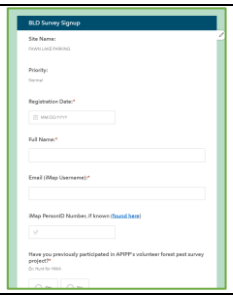
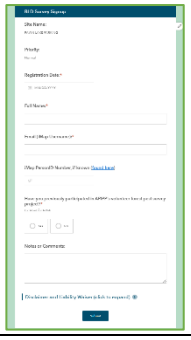
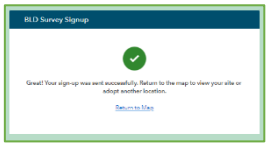
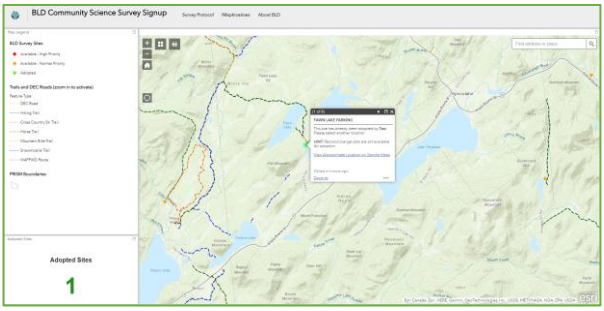
1. When creating your account online, set your **"JURISDICTION"** to **"NEW YORK"**
2. Please do **NOT** select an **"ORGANIZATION"**
3. Under **"PROJECT,"** select **"APIPP VOLUNTEER FOREST PEST MONITORING (Project ID Number: 1108)"**

PART 2: SELECT SURVEY SITES

OPTION A: Adopt a Trail on Public Lands.

(This step requires use of a computer – laptop, desktop, or tablet)

1. Go to: www.Bit.ly/BLD-survey to adopt an Adirondack trail needing to be surveyed for BLD (If you know your iMap user ID, have the number handy to enter into the form. It is an optional question.)	www.Bit.ly/BLD-survey
2. You'll be greeted by the **welcome screen** displaying information about BLD and links to this protocol. **After reading, leave the welcome screen by clicking "OK" in the bottom right of the window.**	
3. Visit the map and zoom into where priority trails are available for **adoption**. **Orange and red** dots are available to adopt with red dots having a higher priority; **green dots** represent locations that have been claimed by other community scientists.	

4. Explore the map to find a trail of interest to you. **Zoom in** until it is easy to click on an individual orange or red dot, symbolizing available trailheads ready to be scouted. **Click** on the orange dot or red to open an **Info Box** displaying the **trailhead's name,** link to **Google driving directions,** and a **SIGN UP NOW link.**	
5. Click on the SIGN UP NOW link to be brought to the "BLD Survey Sign-Up" page.	
6. Once you've filled in today's **date,** your **name,** and **email,** move your mouse over the small **arrow** to the right to **expand the Disclaimer and Liability Waiver.** Read and **click** the **"acknowledgement"** button**.** Click **Submit!**	 
7. After seeing the **successful sign-up** window appear**, click** on the link to **return to map.** This will help you see that your selected trailhead color changed from **Orange or Red to Green.** Hover your mouse over the, now **Green**, trailhead symbol to re-open the info box**.** Click on **"View Site on Google Maps" to find driving directions to the trail head parking area.**	
8. For additional trail details (hiking route, conditions, trail length, or points of interest) use your preferred local hiking guide, trail map, or website such as [www.AllTrails.com.](http://www.AllTrails.com)	**You're ready to go!**

OPTION B: Survey on your own private property (or private land you have permission to access)!

- **Follow all the steps in Parts 1-4, excluding use of the trail adoption map (Part 2-Option A).** Scouting for BLD (presence or absence) on private properties you have permission to access is just as important as looking for it on public lands. Please enter your survey results into iMapInvasives – see step 4 below.

PART 3: BLD SURVEYS

1.	**Before you hike - see hiking tips below in Part 6 from the Adirondack Mountain Club.** Make sure your clothing is seasonally appropriate, and check local weather and road conditions for safety before heading out. Don't forget to charge your mobile device, download iMapInvasives, and pack plenty of water and snacks. If appropriate, sign into the trail register before setting off.
2.	As you hike, be on the lookout for American beech trees along both sides of the trail. **(See Part 5 for Beech ID Guide).** Typically found in groups (or stands), American beech **are often a dominant canopy tree in eastern deciduous forests and they thrive in moist, well-drained soil.**
3.	**When you encounter a group of beech, visually examine the trees for signs or symptoms of BLD including:** **- Darkened stripes between the leaf veins. These stripes are most visible on the underside of leaves and can be seen by looking up into the canopy or by holding branches up to the light** **- Curled leaves with a leathery texture. (Note: beech leaf rolling aphid will also** cause leaf curling.)
4.	**Check multiple branches on different sides of the tree. Look at a few more trees in the stand using this same method. Stop scouting after ten minutes or when all beech along that area of the trail have been examined** and move onto the next step.
5.	After searching for BLD in the stand**, enter your findings into iMapInvasives** (see Part 4). **Enter findings into the App EVEN if you did NOT find any BLD!** Knowing where BLD has not yet invaded is very important information. **If you suspect you have found BLD, take a photo.** Record a detailed description of the tree location in the comments section of the iMapInvasives app. If you have flagging with you, you can also put it around the tree and note the color of flagging in your iMapInvasives report. Suspected sightings can also be reported to the New York State Department of Environmental Conservation by emailing a photo and location to foresthealth@dec.ny.gov or by calling 1-866-640-0652.
6.	After entering records into iMap, keep hiking! When you come along the next group of beech, stop and repeat steps 3-6. If the trail you're hiking is too densely populated with beech to find separate "stands," keep hiking and stop to repeat BLD surveys every ten to fifteen minutes as you go.
7.	**Sanitize your boots after each survey trip!** Since little is known about how BLD spreads, it is a smart precaution to clean and sanitize your boots between survey trips to avoid inadvertent spread of the nematode. NYSDEC recommends cleaning your boots with a boot brush and disinfecting with Lysol or a similar disinfectant between survey sites.

PART 4a: CREATE IMAP ACCOUNT

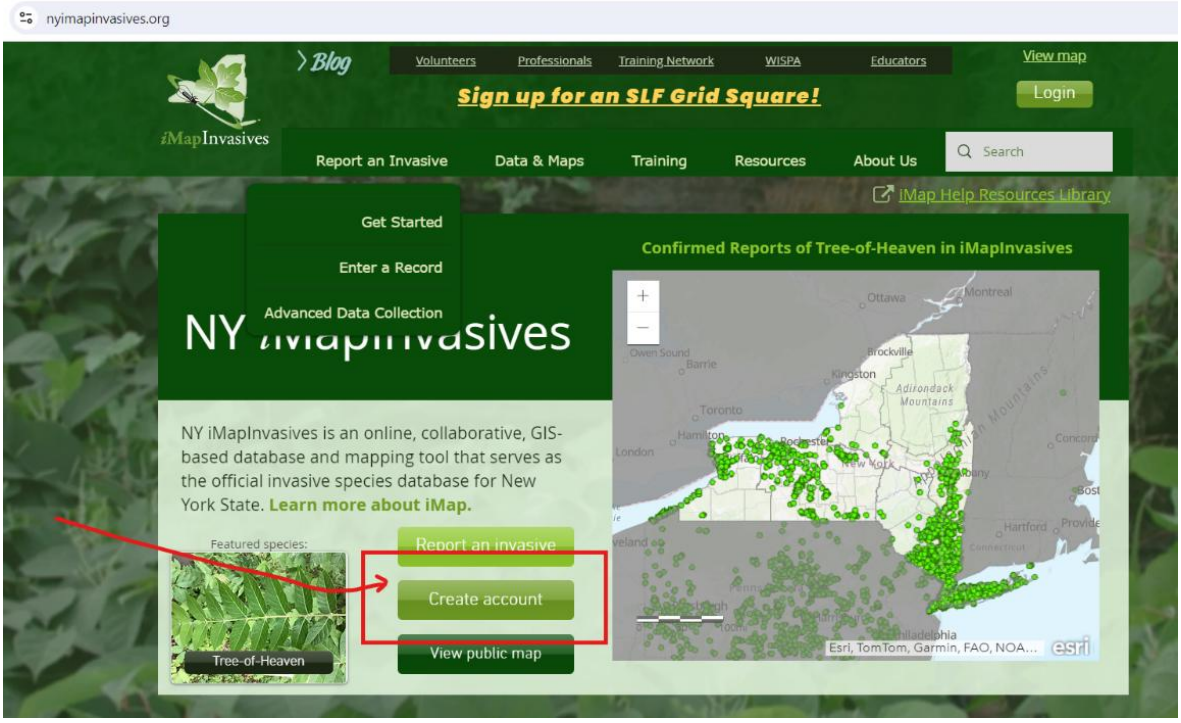
Create and iMap account if you have not done so already.

To create an account, log on to www.NYimapinvasives.org on your desktop or laptop computer.

Select "Create account."

Enter your contact information and set a password.

When asked for "Jurisdiction" enter "New York" from the dropdown menu.



PART 4b: ENTER FIELD DATA INTO IMAP

Step by step instructions on how to enter your survey into iMapInvasives Mobile App below.

REMEMBER – ENTER FINDINGS INTO IMAP EVEN WHEN YOU DO NOT FIND ANY INVASIVE SPECIES!

iMapinvasives Mobile App for Android or Apple

Report invasive species locations using your tablet or smartphone

- First you will need to create a free iMapInvasives account online at: www.NYiMapinvasives.org
- Download app from Google Play or iOS App Store (search for "imapinvasives")

Preferences

"Preferences" are your customized user settings. You will need to fill in your iMapInvasives account information to upload reports to the database.

1. Select State
2. User ID (email) and Password (must match online account!)
3. Select species name and create a custom list (optional).
4. Save your picture to your devices photo library (optional)
5. Select map preference and zoom
6. Select project (optional)

Project = APIPP Volunteer Forest Pest Monitoring

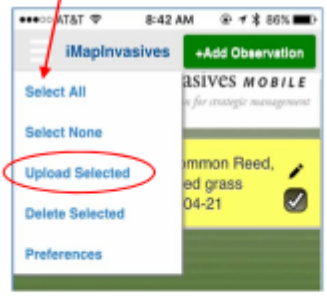
ID#1108

Save changes!

Home Page

From the home page users can add a new observation record, view records already collected and access all other functionality via the Menu.

Manually select **box** or choose **Select All** from the menu



Questions? Contact:
imapinvasives@nynhp.org

www.NYimapinvasives.org

Observation Record

Make new reports of invasive species and edit existing records here!

Take Photo

Select Species

Select Detected or Not Detected

Uncheck to manually enter location

Zoom In or Out

Select your project

If you don't see it listed contact your administrator.

Save new observation or updates

Enable your custom species list

Select Date

To manually edit location, uncheck the GPS box, touch and hold the map push pin. Drag it to the location of the invasive.

If 0,0 is displaying in the Location box, please make sure your GPS is enabled on your device.

www.imapinvasives.org

New York Natural Heritage Program

NatureServe

Supported by the New York State Environmental Protection Fund through a contract with NYS Department of Environmental Conservation

PART 5: RECORD YOUR SURVEY WORK

After you are done in the field recording your observations you will need to complete a report summarizing what you did. This helps us keep track of when, where, how long and what you saw while monitoring.

Visit this link or use the QR code below to access the form on your smartphone or computer when you are back at your car or at home and have a data connection.

Here is a general overview of the questions the form asks you:

- Lead Observer Name
- Organization
- Professional or volunteer
- Contact information - phone number or email in case we need to contact you
- Survey Date
- Other Observers – Record their names
- Total Crew Size – How many people where out looking for forest pests?
- Total Survey Time – How long did you spend looking for forest pests?
- Town or County – Record the general location to help in identification
- Land Use – select the ownership of the area you searched
- Location Name/Description – record a name or general description to help identify the area
- Survey Type
    - Trap Check – looking at or collecting from a trap in a set location like a trailhead, campground, or recreation destination
    - Hiking Trail – You walked along a trail and searched for forest pests
    - Bushwacking – You went on and off trail to cover an area looking for forest pests
- Forest Pest Searched For – select the species that you were looking for on the survey
- Forest Pests Detected – Yes or No
- Forest Pests Observed - If you did detect forest pests select what you observed
- Entered into iMapinvasives – Yes or No, did you enter presence and/or non-detections into iMapInvasives from this survey
- Photo – Share any photos of the area or people out surveying
- General Comments – Any information that is useful about the survey or area
- Geometry – this is the area that you covered when looking for the forest pests
    - Trap – a point location where the trap is
    - Trail – trace the general route of the trail that you walked along.
    - Bushwhacking – Trace an outline of the area (polygon) that you searched

PART 6: IDENTIFICATION TIPS

American Beech Tree Identification

Healthy Beech Bark Photo Credit: Joseph O'Brien, USDA Forest Service, Bugwood.org

Beech Bark Disease Bark Photo Credit: Joseph O'Brien, USDA Forest Service, Bugwood.org

Beech Leaves and Twigs

Silhouette: American beech grows with a rounded crown. Mature trees can reach up to 80 feet in height with trunks up to three feet in diameter. Root suckers are common, so thickets often surround older trees.

Leaves: American beech leaves are alternate, elliptical with pointed tips. Leaves have many straight, parallel veins and coarse teeth on their edges. Leaves are shiny green above, paler below, and have a papery texture. In fall, leaves turn yellow, then pale brown and remain on the tree well into winter.

Bark: American beech bark is pale grey in color, thin, and very smooth. Beech bark disease severely deforms the smooth bark and cankers are often present.

Branches: Branches tend to be slender and light brown in color. They are arranged alternately. Buds are long (3/4 inch) and cover with overlapping scales.

Seeds: Beech nuts are brown, ½ to 1 inch in diameter, and have a unique three-sided spiky structure.

Beech Leaf Disease Identification

Photos Courtesy of: New York State Department of Environmental Conservation

Striping On Underside of Leaf

Striping When Looking into Canopy

Curling and Leathery Texture

Symptoms of BLD are seen in the leaves and include dark striping between the leaf veins, curling, and/or a leathery texture. The striping is most easily seen on the underside of the leaves and is visible when looking up into the tree canopy or when holding branches up to the light. In early infestations, only a few leaves may be affected, and a single tree can have both heavily infected and unaffected branches. NOTE: there are many lookalikes that affect beech trees and that cause discoloration and curling of leaves. Appendix A contains a list of lookalikes from NYSDEC.

PART 7: ADIRONDACK HIKING:

CONSIDERATIONS FOR YOUR HIKE:
1. Check **weather** and **trail conditions** before your trip.
2. Check **sunrise** and **sunset** to be sure to be on the trail during daylight hours and absolutely **bring one or more headlamps**.
3. **Choose a trail** that matches your **experience** and **fitness** level and that of **your group**. It is best to start with a **familiar trail.** If you are hiking after snowfall, plan your hike to be **½ the distance** you would feel comfortable doing in the summer (and then work your way to longer distances or more difficult trails).
4. Check the **rules** and **regulations** for the land where you will be hiking (or ask for permission if it is private land). In some areas of the Adirondacks (such as the High Peaks Wilderness) NYSDEC requires snowshoes or skis when the off-trail snow depth is 8 inches or deeper.
5. Pack the 10 essentials: a. Navigation (map and compass) b. Sun protection (sunglasses and sunscreen) c. Insulation (extra clothing) d. Illumination (headlamp/flashlight) e. First-aid supplies f. Fire (waterproof matches/lighter/candle) g. Repair kit and tools (knife, cordage, duct tape, etc.) h. Nutrition (extra food) i. Hydration (extra water) j. Emergency shelter (tent/emergency blanket)
6. Follow **Leave No Trace** Principles: **i.** **https://www.adk.org/leave-no-trace** **ii.** **https://lnt.org/the-7-principles-of-leave-no-trace-winter-recreation/**
For more **information** or **questions** about how to prepare for outings please contact the ADK High Peaks Information Center 518-523-3441, ext. 121 or email at hpic@adk.org, and/or cathy@adk.org.

APPENDIX A: LOOK-ALIKES AND OTHER BEECH PHENOMENA

Review the table below reprinted from the NYSDEC website for other issues you may see on beech trees. It is possible for a beech tree to exhibit symptoms of both beech leaf disease and any of these other impacts simultaneously.

Name	Signs and Symptoms	About
Beech bark disease (BBD)	**Symptoms:** The symptoms of this disease are concentrated on the bark. A white, fuzzy coating on the tree's trunk and branches is a sign of the scale insect. Photo by Linda Haugen, USDA FS, Bugwood.org	Beech bark disease is the result of the combined effects of a non-native scale insect and a canker fungi. The insect pierces and sucks at the tree, allowing the fungus to enter and cause harm internally. This disease is common across New York State and is not managed by DEC. Most trees die within 10 years of infestation by the insect and fungi. Learn more (leaves DEC website).
Erineum patch	**Symptoms:** Yellowish patches appear on the upper side of the leaf. The patches are light green in spring, then fade to orange and eventually brown. Photo by Eric R. Day, Virginia Polytechnic and State University, Bugwood.org	Erineum patch is caused by eriophyid mites and is not typically viewed as a problem. The patches rarely cover enough of the leaf to affect the overall health of the tree. Learn more (leaves DEC website).

Name	Signs and Symptoms	About
Powdery mildew	**Symptoms:** Leaves and stems appear to be covered in a white, powdery substance that resembles powdered sugar. Photo by University of Georgia Plant Pathology, Bugwood.org	Powdery mildew is caused by native fungi and affects a variety of shrubs and trees. This is a cosmetic disease that does not kill the tree but could cause defoliation if not addressed. Learn more (leaves DEC website).
Anthracnose	**Symptoms:** Small brown or black spots on leaves that eventually cause dead areas. New leaves may curl. Photo by Nancy Gregory, University of Delaware, Bugwood.org	Anthracnose affects a variety of tree species and is caused by a group of fungi. In beech, the fungi infect the leaves and stems and can cause dieback or some defoliation. The disease thrives in years where there are cool, wet conditions during bud break. Learn more (leaves DEC website).

Name	Signs and Symptoms	About
Beech blight aphid	**Signs:** These native insects have a fluffy, white outer coating. Also known as "boogie woogie aphids", the insects will shake or "dance" when the branch is disturbed in order to ward off potential predators. Photo by Steven Katovich, Bugwood.org	This insect is native and feeds on beech without causing much harm. Learn more (leaves DEC website).
Beech leaf rolling aphid	**Signs:** Leaves may curl and appear yellow/faded between the veins. 	These injuries are caused by aphids feeding on the leaves. This insect is native and feeds on beech without causing much harm. Learn more (leaves DEC website).

Name	Signs and Symptoms	About
Marcescense	**Signs:** Beech retain their dead leaves through the winter. 	This is a totally normal, common, and harmless feature of beech. Learn more (leaves DEC website).