ADVENTURE SCIENTISTS

EXPLORE. COLLECT. PROTECT.

Tracking Eastern Hemlock
Field Protocols

Your step-by-step guide to completing an observation
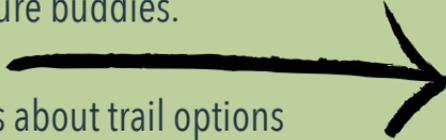
TO DO BEFORE HEADING OUT

1. Complete the training

Make sure to complete all of the online training modules before heading out on your trail(s).

2. Download TreeSnap on your smartphone and create your free account

Take time to load the app and familiarize yourself with the app. It will be important to already know how to input data before you head out to make observations.

3. Plan your adventure

- Gather a friend or group of adventure buddies.
- Use the map to view trail options.
  - You can zoom in to see details about trail options including difficulty level and where already documented Eastern hemlock exist.
  - Click on individual trails to view trail name, length, and whether observations for this project have already been completed.
- Choose your trail(s) and begin your adventure!

What you need:

1. Flexible Tape Measure with inches *
2. Smartphone with TreeSnap App loaded
3. Binoculars (optional)

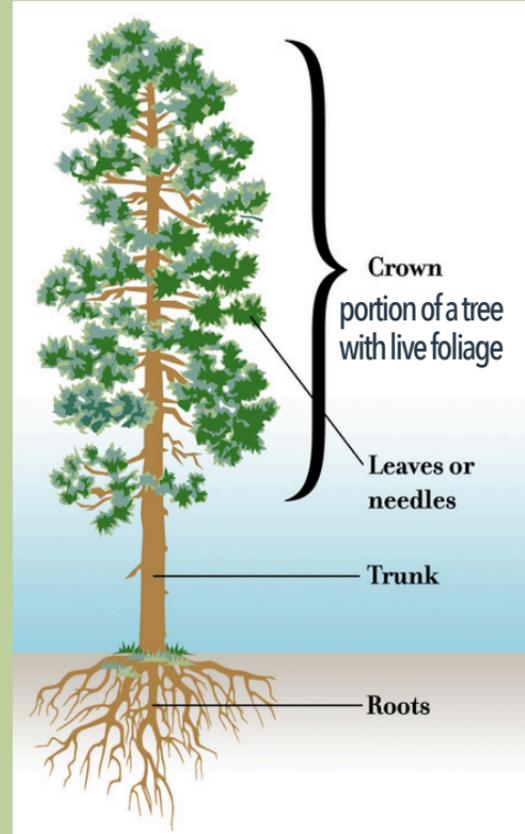*Adventure Scientists will provide this if you do not own one.

PRO TIP
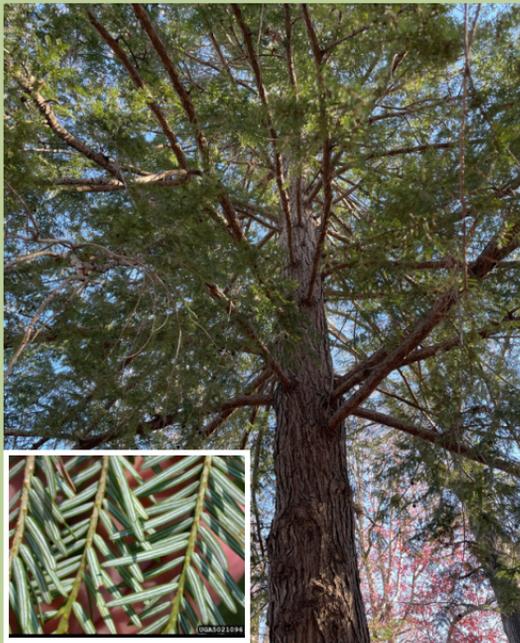Test out the TreeSnap application before heading out on your trail adventure.

Observation Basics

- Choose a designated trail within the specified national forest.
- Complete and record an observation <u>at least every 1/2 mile</u> on your trail.
  - Remember: if you see Eastern hemlocks between 1/2 mile markers, you <u>can</u> stop and make additional observations!
- Your first observation should be at the trailhead.
- Observing "no hemlocks" is valid data -- you will record this absence data in the application.

General Tree Terminology

Crown
portion of a tree with live foliage

Leaves or needles

Trunk

Roots

3

Identifying Eastern Hemlocks

Green cones: young, ripening, seeds in

Hemlock cones

Photo credit: Chris Evans, University of Illinois, Bugwood.org

Brown cones: Old, mature, seeds out

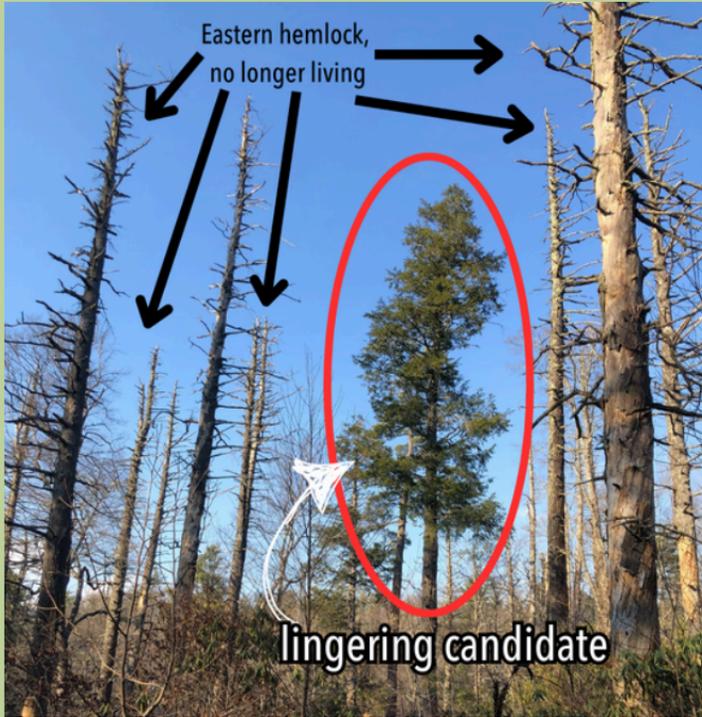Photo credit: Bill Cook, Michigan State University, Bugwood.org

Needles are flattened, 1.5-2 cm long, dark green on top and lighter on the underside with two white lines.

Bark can be cinnamon brown to gray in color

What is a lingering candidate?

Eastern hemlock, no longer living

lingering candidate

A lingering candidate is a living Eastern hemlock among no longer living Eastern hemlocks.

These can be found independently or in small groups.

The photo shows one lingering candidate.

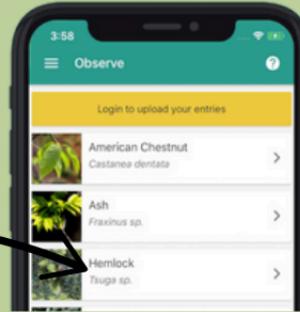# Identifying Infestation by hemlock woolly adelgid

not infested

infested

# Completing Observations and Recording Data

## TreeSnap Application

Step 1: Open the TreeSnap application.

Step 2: Click on Hemlock.

Step 3: Stand next to or "hug" a hemlock (or whatever tree is present if no hemlocks are visible) and Click on "tap to collect GPS of tree."

*NOTES:
- This might take a few moments to determine location accuracy.
- Generally you want an accuracy reading of 10 meters or less.
- If the reading is above 10 meters, press "more options" to recalculate or use a different method to determine GPS coordinates and enter manually
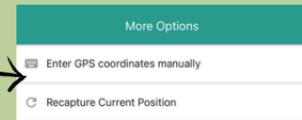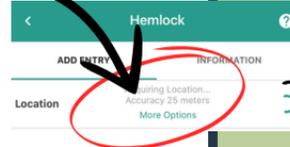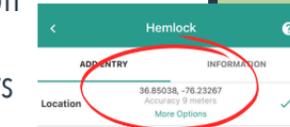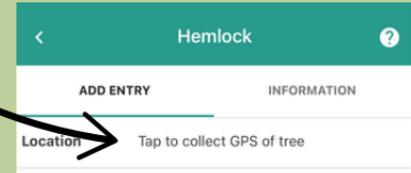
Images
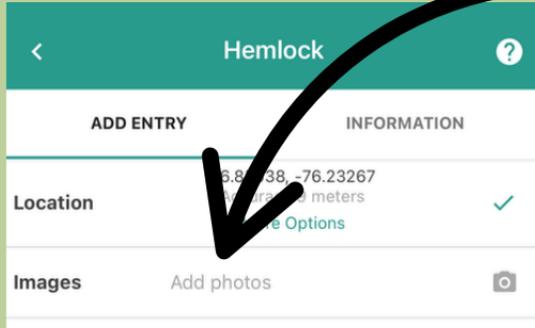
Step 1: Click "add photos"

Step 2:Take photos of what you see in your current location.

*Note: you must take these within the app, right now!

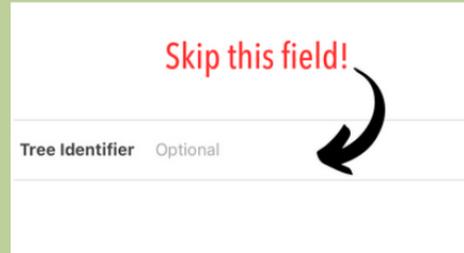Consider taking at least 4, with you facing different directions.

Ideally, this will provide a panoramic view of your observation location for scientists to "see" what you see!

Tree Identifier

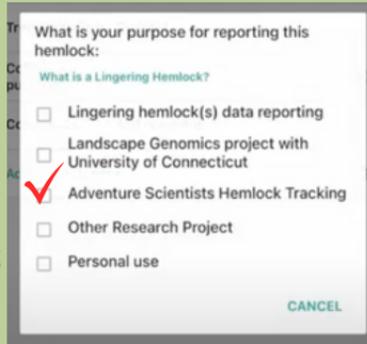This is an optional field that we will not be using for this study.

Please skip the section labeled Tree Identifier.

Skip this field!

Tree Identifier   Optional

8

Collection Purpose

In the collection purpose section, click on the downward facing arrow on the right hand side.

Select "Adventure Scientists Hemlock Tracking."

Volunteer ID

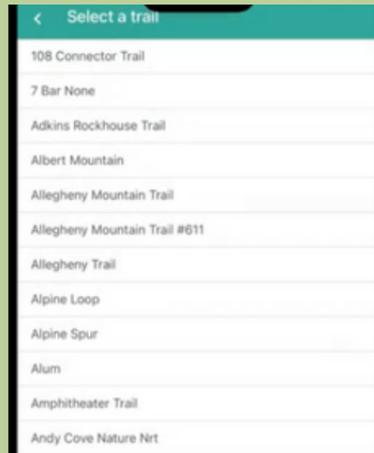In the volunteer ID section, type the volunteer ID # you were assigned for this project.
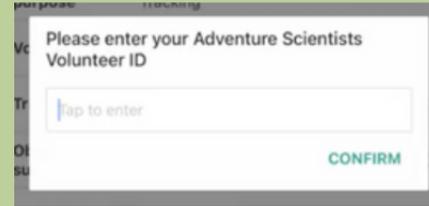
If you do not know or remember your ID #, it can be found in your volunteer sign up email!

Trail Selection

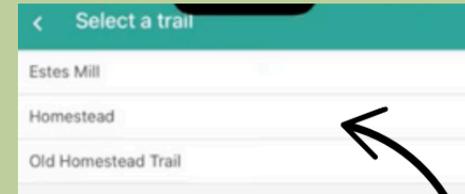In the trail selection section, click on the downward facing arrow on the right hand side.
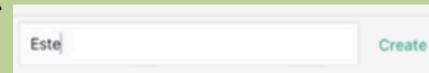
Select the name of the trail you are on.

You can also begin typing the name of the trail at the bottom of the screen and matching options will appear at the top for you to select. **9**

Observation Subject

Step One: In the observation subject section, click the downward facing arrow on the right hand side.

Step Two: The options will appear along with example photos and a definition of lingering hemlock at the top.

To view the definition or photos, click on the green text WHAT IS A LINGERING HEMLOCK? or SHOW EXAMPLES.

Step Three: Based on what you see in this observation space, select one of the options.

The option you select will determine what further information you will need to enter in the application.
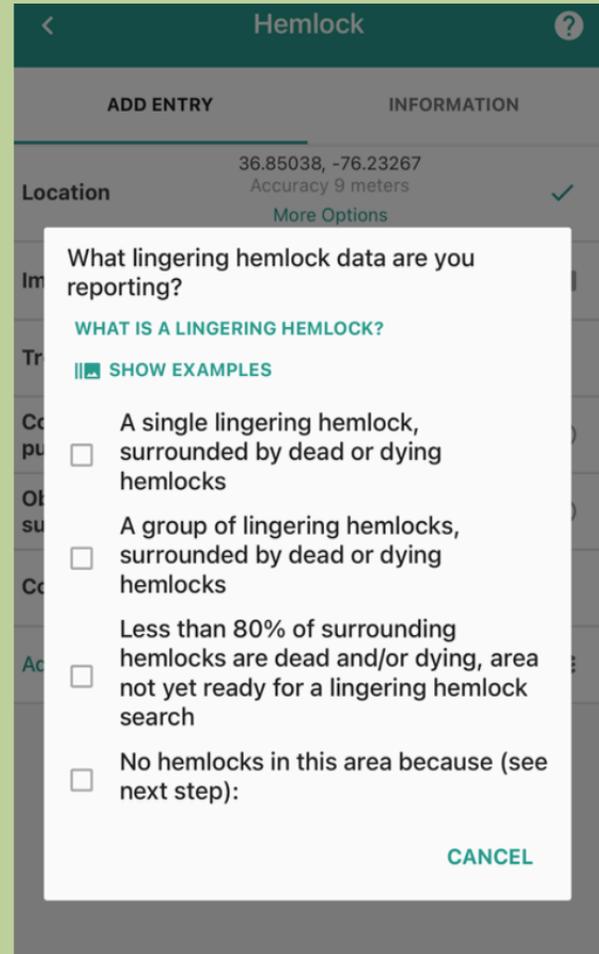
Next steps based on Observation Subject
If you chose:

Less than 80% of surrounding hemlocks are dead and/or dying, area not yet ready for a lingering hemlock search

go to page 12

No hemlocks in this area

go to page 13

A single lingering hemlock or a group of lingering hemlocks

go to page 14

If You Selected: Less than 80% of surrounding hemlocks are dead and/or dying, area not yet ready for a lingering hemlock search

12

The application will ask you:

1 Training:

Select "yes"

2 Comments (optional):

In the comments section, you can include any information you would like that you believe would be helpful for scientists to know about your observation. You can also leave this blank.

3 Advanced Options (leave blank):

Please do not select any of the options in this section. This will limit what data scientists can see.

4 Save your data.

At this point, you must SAVE your observation before proceeding to your next 1/2 mile mark.

If you selected: No hemlocks in this area, because...

The application will ask you:

1 No hemlocks because:
Area logged.
All hemlocks found were dead and/or dying.
No hemlock here, alive or dead.

2 Time Spent
Enter the amount of time you spent searching using numbers to represent minutes.

3 Describe Area
In this section, you will use words to describe the area of your observation.
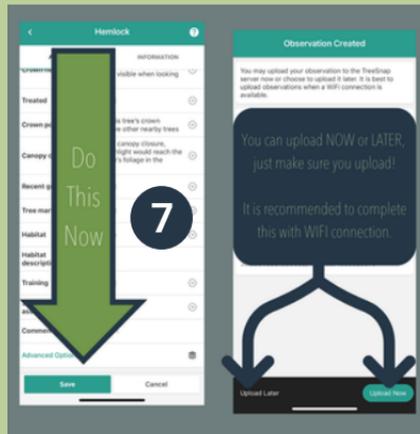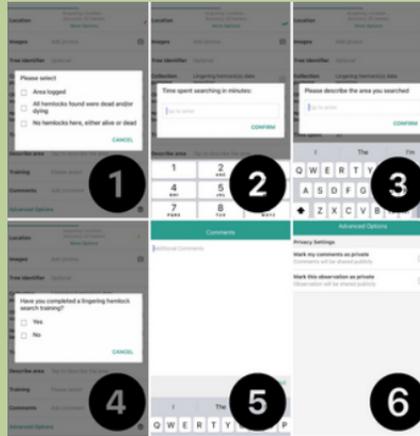
4 Training
You will be able to select "yes" or "no". You will select "yes".

5 Comments (optional)
In this section, you can add information you believe will be relevant for scientists. You can leave this section blank if you wish.

6 Advanced Options (leave blank)
Do not select any of these options. They will limit what data scientists will be able to see.

7 Save your data.
At this point, you must SAVE your observation before proceeding to your next 1/2 mile mark.

The application will ask you:

1. Number of lingering hemlocks

NOTE: this will not appear if you select "single lingering candidate"
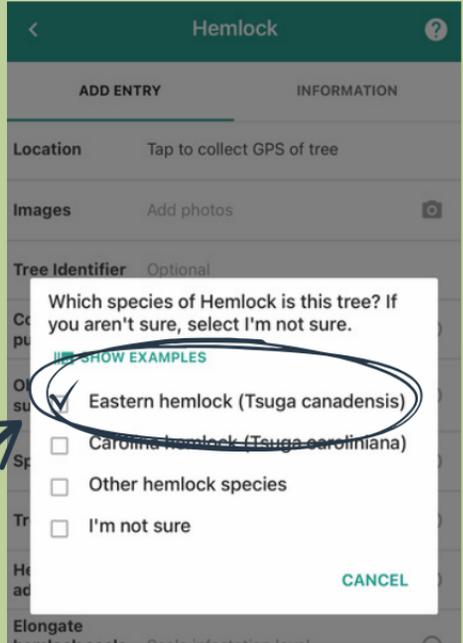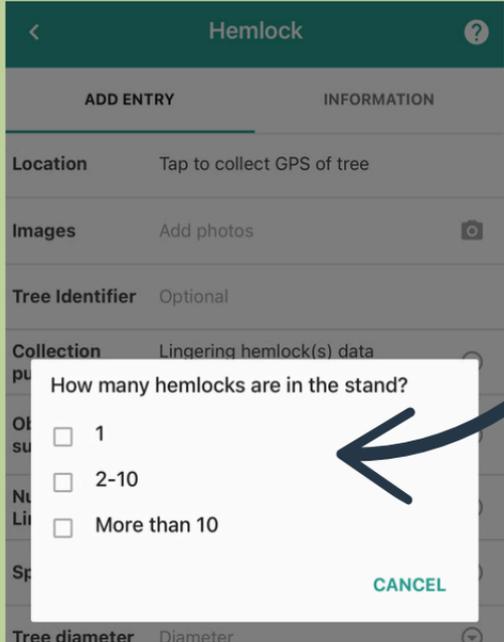
2. Species

14

The application will ask you:

3. Tree Diameter

Step 1:
Measure from the base of the trunk up to 4.5 feet (54 inches)

Step 2:
At the 4.5 feet level, measure the circumference of the tree trunk in inches

Step 3:
Enter data into the TreeSnap app
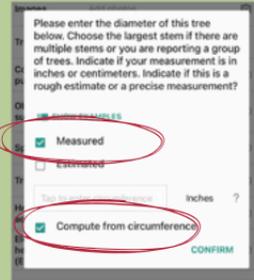
If you observe a single lingering hemlock, you will measure the circumference of the tree trunk at 4.5 feet.

If you observe a group of lingering hemlocks, you will measure the circumference of the tree trunk at 4.5 feet of the largest tree (as measured by circumference).

In the TreeSnap application, it is important that you select "measured" and "compute from circumference". Be sure that the unit of measurement reads "inches" and that you have measured using inches.

Special Tree Diameter Notes:
Forked Trunk

You might encounter abnormalities in tree growth such as a forked trunk like this.

- If the fork occurs at or above 4.5 feet, measure the circumference as normal.

- If the fork is below the 4.5 feet mark, measure the circumference of both trunks and add these values together.

4. Hemlock woolly adelgid

<u>Step 1</u>: Inspect the branches of eastern hemlock for hemlock woolly adelgid.

not infested

infested

Images   Add photos   📷

Do you see hemlock woolly adelgids (HWA) on this tree(s)? Please examine and then average HWA infestation across multiple branches.

▐▌🖼 SHOW EXAMPLES

☐ Yes, H = Heavily infested

☐ Yes, M = Moderately infested

☐ Yes, L = Lightly infested

☐ No HWA present

☐ I'm not sure (e.g., cannot see the branches from the ground)

CANCEL

<u>Step 2</u>: Select the option that best fits your observation

Level of hemlock woolly adelgid (HWA) infestation

Light:

Moderate:

Heavy:

5. Elongate hemlock scale

This observation data is not of interest for this study.

Please skip.

6. Other Stressors

Do not overthink this data field.

Take a look at the tree and if there is obvious evidence of damage, select yes, if not, select no.

If you select yes, there will be a "comment" section later where you can provide more detail about your observation.
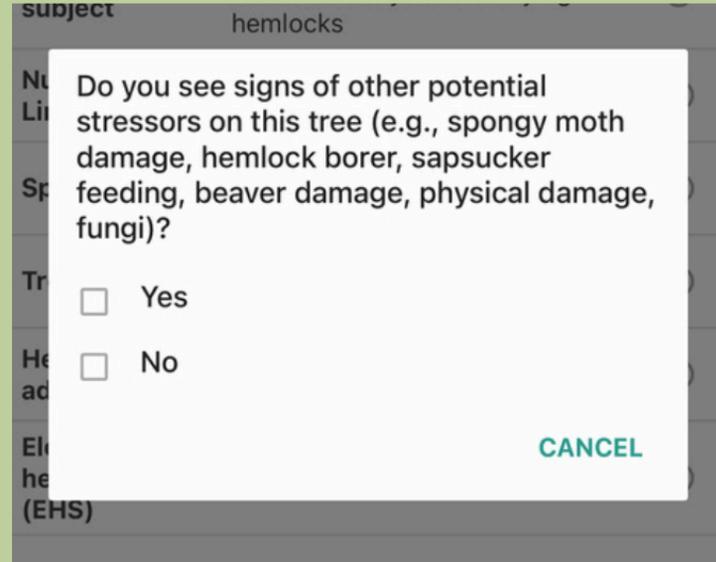
subject hemlocks

Do you see signs of other potential stressors on this tree (e.g., spongy moth damage, hemlock borer, sapsucker feeding, beaver damage, physical damage, fungi)?

☐ Yes

☐ No
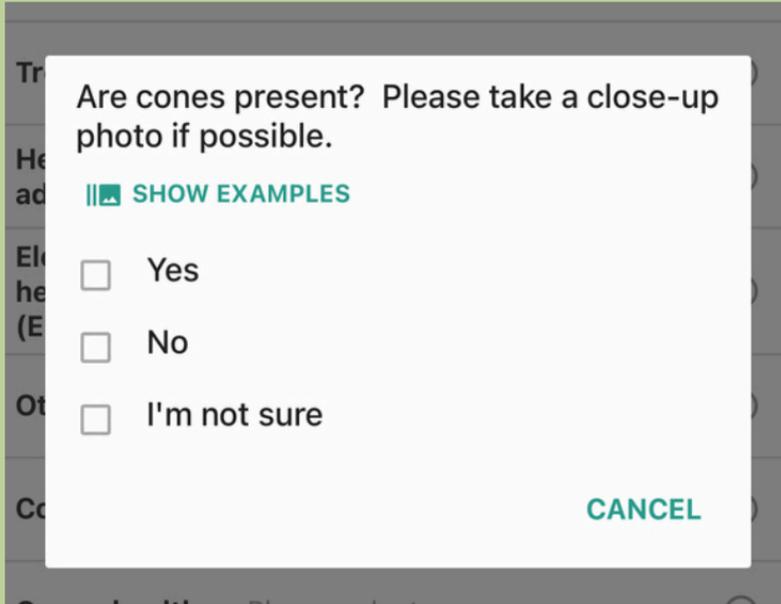
CANCEL

7. Cones

Are cones present? Please take a close-up photo if possible.

📷 SHOW EXAMPLES

☐ Yes

☐ No

☐ I'm not sure

CANCEL

Do you see cones on the Eastern hemlock(s) you see?

If yes, the app will add a data field for you to take a photo of the cones.

8. Crown Health

Take a look at the crown (part of the tree with living foliage) and assess its health.

Use the graphic here as well as reference photos in the TreeSnap application for support.

If you select "I'm not sure," the application will ask you to describe what you see to provide scientists more information.

subject

hemlocks

How healthy is the crown of the tree (or the overall canopy if reporting a group of trees)? Your best estimate of this is fine.

SHOW EXAMPLES

☐ H = Healthy (>80% healthy crown; deep green, dense foliage; skylight is mostly blocked when you look at the tree)

☐ I = In Decline (<80% - >20% healthy crown; foliage beginning to thin; foliage green-to-greyish; some skylight visible when looking at the tree)

☐ S = Severe Decline (<20% crown; many limbs dead, foliage sparse; skylight very visible when looking at the tree)

☐ I'm not sure (please describe in next field)

CANCEL

Crown position   Please select

Healthy

In Decline

Severe Decline
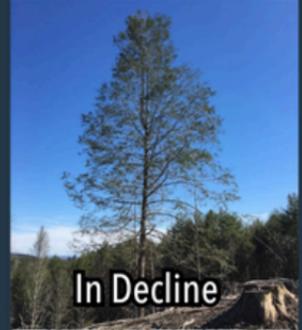
9. Treated

To determine whether a tree has been treated or not, look for intentional markings on the tree such as a spray painted dot at the base of the tree, or a metal tag.

If it does <u>not</u> seem to be intentionally marked, select "NO."

If you see what appears to be an intentional marking such as a spray painted dot at the based of the tree, select "YES."

metal tag
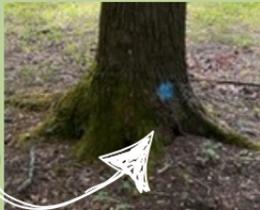
spray painted marking

Has this tree (or group of trees) been treated with pesticides?

☐ Yes

☐ No

☐ Don't know

CANCEL

You can add notes in a section later called "comments" to give more detail about your selection.

Don't overthink this -- go with your gut based on your observation.

22

10. Crown Position

Look at the lingering hemlock or tallest lingering hemlock if in a group.
Select which option best describes the crown position.

> What is the crown position of the tree (or the largest tree if reporting a group of trees)?
>
> ☐ Dominant, this tree's crown extends above other nearby trees
>
> ☐ Codominant, this tree's crown is level with or slightly below other nearby trees
>
> ☐ Overtopped, this tree's crown is entirely below other nearby trees
>
> ☐ Not applicable (e.g., tree is isolated, tree is on the edge, etc)
>
> ☐ I'm not sure.
>
> CANCEL

11. Canopy Closure

The canopy is the tree cover above you, if look straight up to the sky.

Stand next to your lingering hemlock or group of lingering hemlocks, look toward the sky, and choose the best option to match your observation.

very closed

medium

open

How "closed" would the total (hemlock and non-hemlock) forest canopy around the lingering tree(s) be in the summer?

☐ Very closed (>70% canopy closure, very little light would reach the lingering tree's foliage in the summer)

☐ Medium (>30% to < 70% canopy closure, patches of light would reach the lingering tree's foliage in the summer)

☐ Open (<30% canopy closure, abundant sunlight would reach the lingering tree's foliage in the summer)

☐ I'm not sure

CANCEL

Canopy closure Please select

12. Recent Growth

This data field is asking about the presence or absence of new growth.
Use the photos here and in the TreeSnap application to help and select the best option.

Is the tree (or group of trees) putting on new growth?

SHOW EXAMPLES

- ☐ Branch tips are healthy with green needles
- ☐ Some branch tips are discolored or are missing new growth
- ☐ No new growth present
- ☐ No branches low enough to assess
- ☐ I'm not sure

CANCEL

branch tips healthy

Branch tips dead

13. Tree Markings

Looking at the lingering hemlock or group of lingering hemlocks, are there any flags, metal tags, spray painted symbols, etc. ?

metal tag

Is the tree marked, tagged, or flagged in any way?

☐ Yes

☐ No

☐ I'm not sure.

CANCEL

spray painted marking

14. Habitat

Select the habitat that best describes your location.

How would you characterize the habitat where the tree is located? Click all that apply.

- ☐ Forest → Mostly wooded (trees) area
- ☐ Wetland → An area that is always or sometimes under water
- ☐ Field → Open area, mostly grassy
- ☐ Roadside, urban, suburban, or park
- ☐ Riparian area → The edge of a waterway or wetland
- ☐ Steep slope → Dramatic incline or decline
- ☐ South or West facing slope → Dramatic incline or decline towards the South or West
- ☐ Hemlock is predominant tree → Mostly hemlocks

CONFIRM

15. Habitat Description

Provide more detail about the habitat to help scientists understand what you are seeing.

Describe the habitat in the area (e.g., wet seep, dry ridge top, moderate slope, flat):

Tap to enter

CONFIRM

Habitat   Riparian area

16. Training

Have you completed a lingering hemlock search training?

☐ Yes

☐ No

Select "Yes"

CANCEL

17. Surrounding Assessment (optional)

This is optional, but HIGHLY recommended by our scientific partners. This section will ask you to complete similar data observations you just completed about other trees in this space.
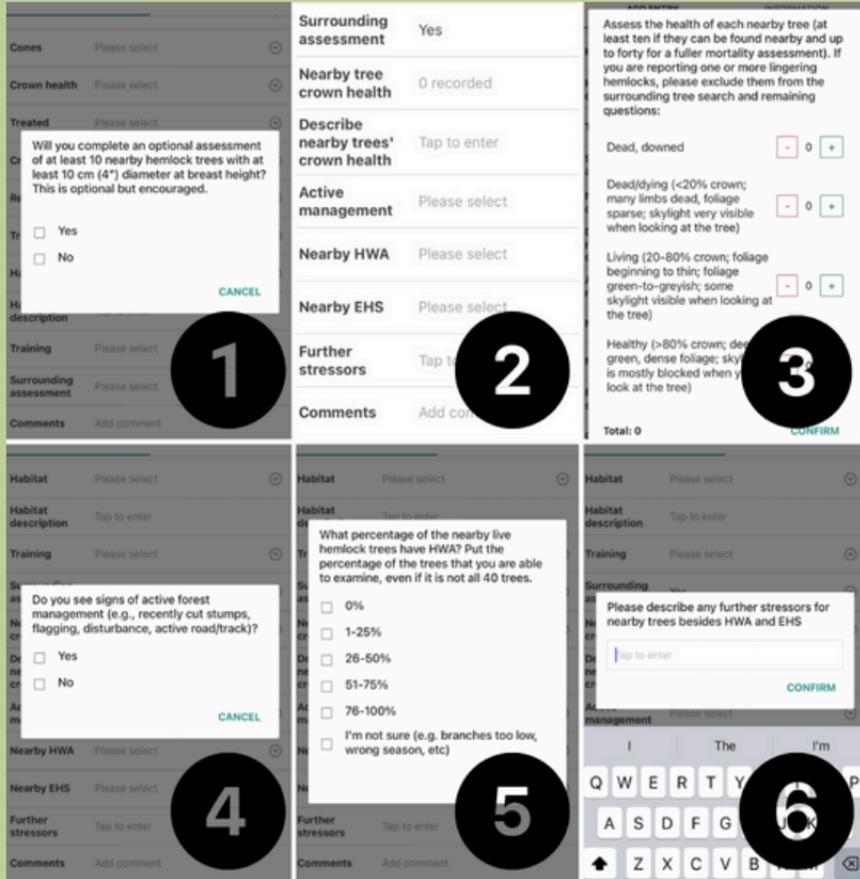
17. Surrounding Assessment (optional)

1. Select "yes"

2. These are sections included for your reference.

3. For each description, record the number of trees that match it. (use the + and - signs to change values)

4. Select yes or no based on what you see.

5. Ignore the phrase "even if it not all 40 trees", estimate the percentage of nearby trees that are infested with HWA.

6. If you notice any other stressors present, describe them here.

18. Comments (optional)

If there is any additional information you think would be helpful for scientists to know about your observations, this is the space to include these details.

19. Advanced Options (leave blank)

Please do not select these options because they will limit what data the scientists can see from your observations.

Comments

Additional Comments

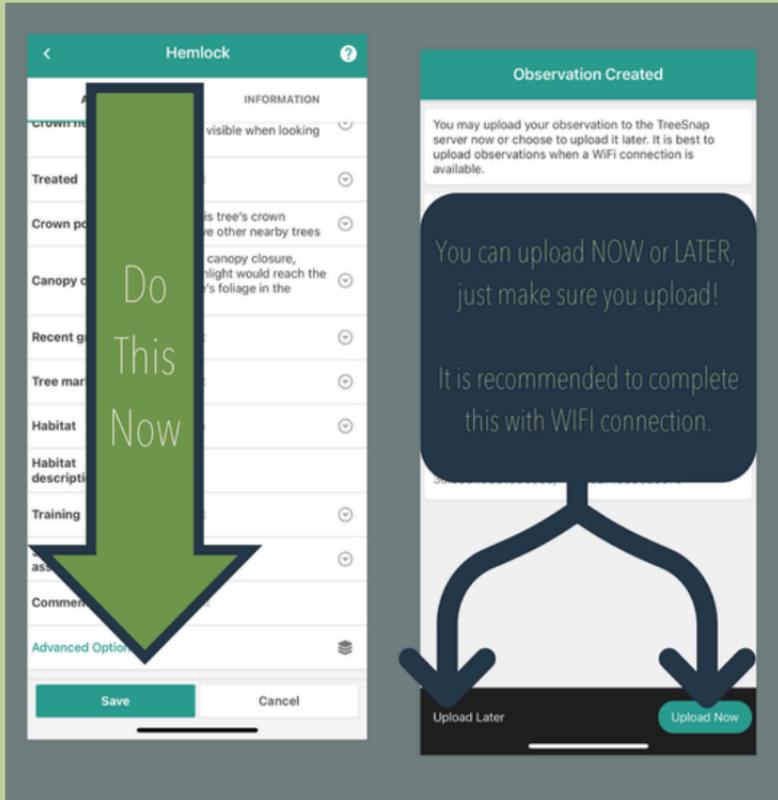Please do not select these

Advanced Options

Privacy Settings

Mark my comments as private
Comments will be shared publicly

Mark this observation as private
Observation will be shared publicly

Saving and Uploading Observations

You must <u>save your observation now</u> or your observation data will be lost.

The next screen will ask if you would like to upload now or later. It is preferred to upload now, but due to connectivity, accessibility to WIFI, or battery life, you may choose to upload later.

<u>What is important is that you:</u>

1. **Save your data NOW.**
2. **Remember to upload your saved data.**

Safety Considerations

As an Adventurer, you know that participating in outdoor activities such as hiking, biking, climbing, etc have inherent risks involved such as injury or wildlife encounters.

Before you head out on your trail, familiarize yourself with potentially dangerous local wildlife encounters to consider (animal and plant), pack a first aid kit, and complete any additional safety preparation you feel is necessary for your adventure!

IN CASE OF EMERGENCY   FIRST, CALL 911

Once you are in a safe situation, after the emergency, alert Adventure Scientists staff about the incident by contacting: (406) 579-9702. ONLY contact this number if you are reporting an incident.

Have project-related questions?
Email: forests@adventurescientists.org