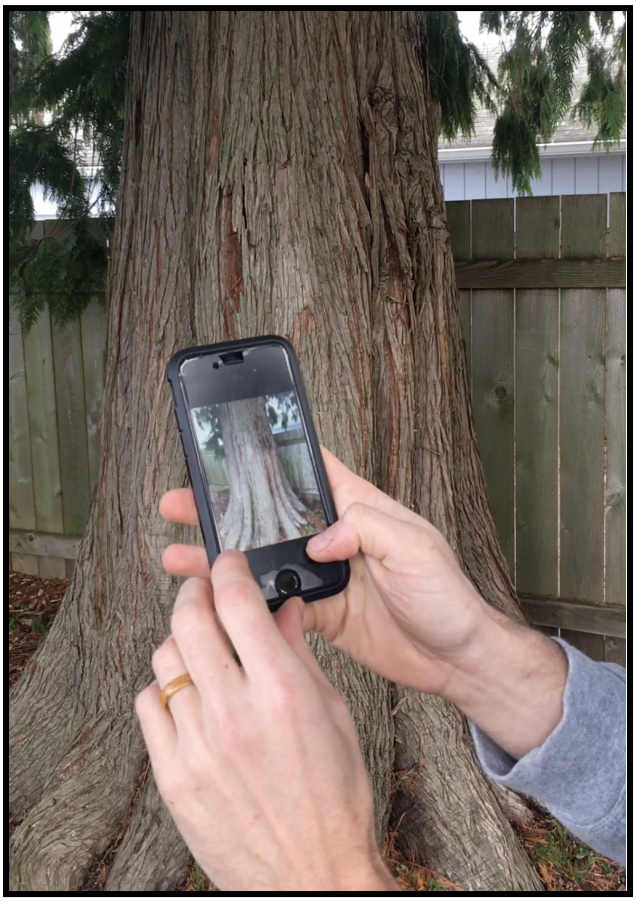
Western Redcedar Dieback Project iNaturalist - Field Manual 3.0



FOREST HEALTH WATCH COMMUNITY SCIENCE

October 2022 version

More information available at https://foresthealth.org/map

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JM Hulbert, Washington State University

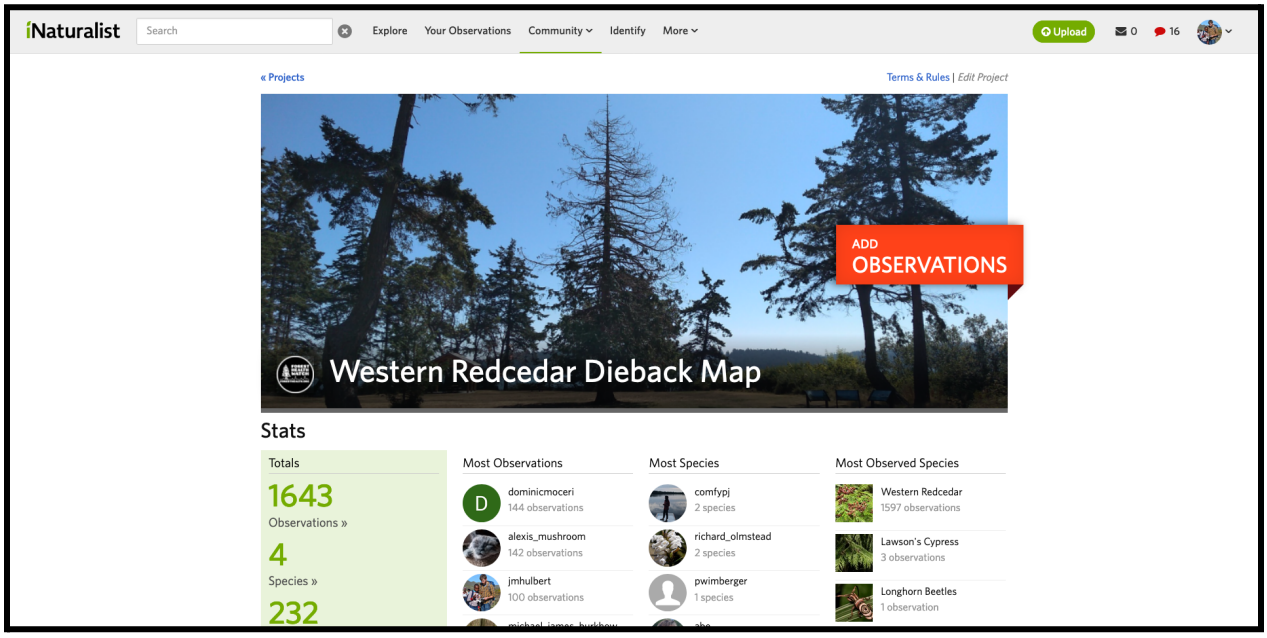
Table Of Contents

Introduction

The purpose of this document is to provide guidance for adding observations to the Western Redcedar Dieback Map project on iNaturalist.org. Below you will find instructions and photos demonstrating the process for contributing to the project and research.

Summary of Steps to Participate

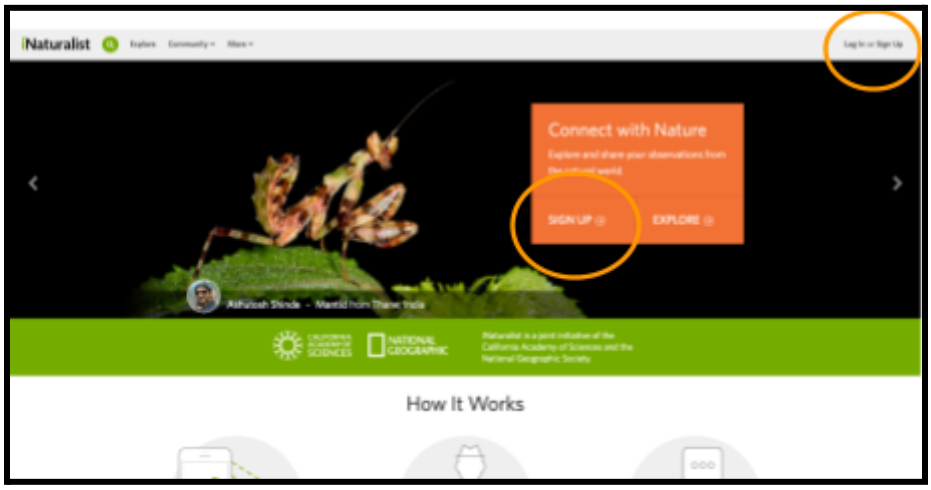
1. **Create an account on iNaturalist.org**
2. **Join the Western Redcedar Dieback Map project**
3. **Add an observation of redcedar via mobile app or internet browser**
4. **Tag Western Redcedar Dieback Map project in the observation**
5. **Answer required (and optional please) project questions about the observation**
6. **Share the observation!**



Create login in iNaturalist

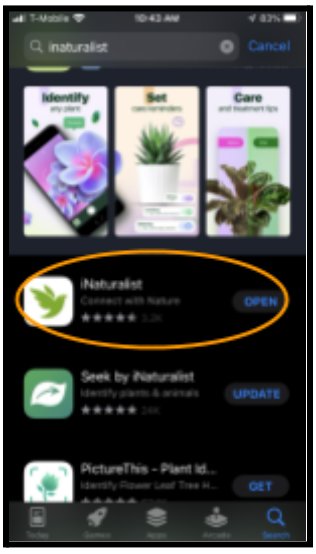
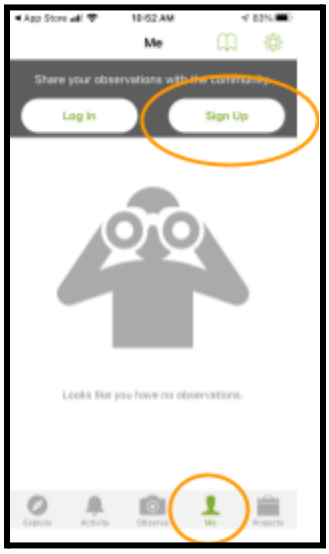
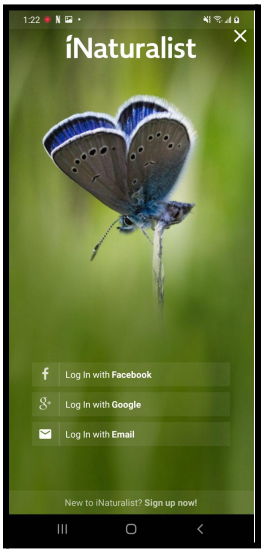
Using Desktop Computer (Internet Browser)

Browse to https://inaturalist.org on your computer, then click on the 'sign up' button or click 'Login or Sign Up' in the upper right corner of the page.



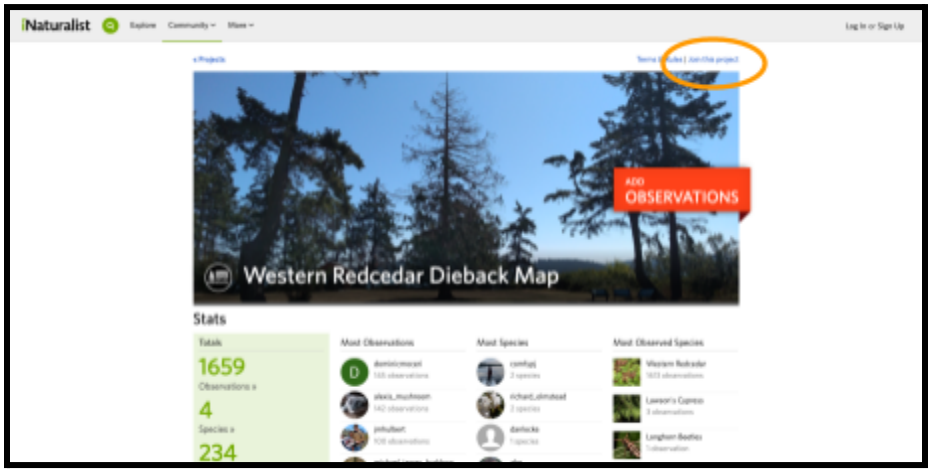
Using Mobile Application

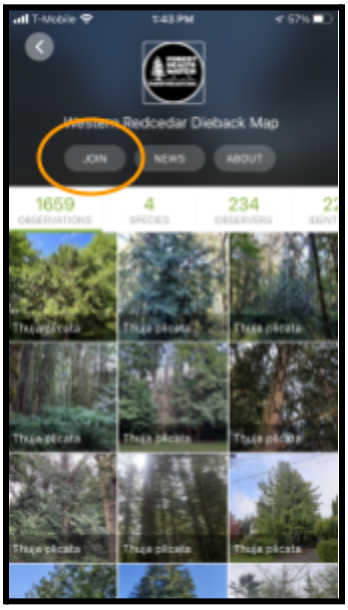
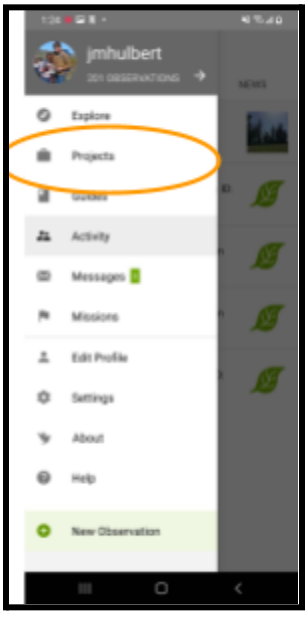
Download and open iNaturalist from App Store or Play Store. Sign up or login from the 'Me' tab at the bottom on iOS).

		
iOS	**iOS**	**Android**

Join the Project

Browse to the Western Redcedar Dieback Map project (https://www.inaturalist.org/projects/western-redcedar-dieback-map) or search for 'Western Redcedar Dieback Map' in the projects tab of the iNaturalist mobile App, then click 'join this project' or 'join', respectively.



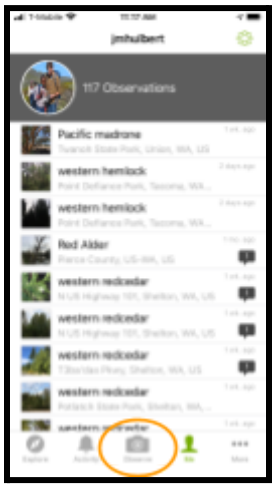
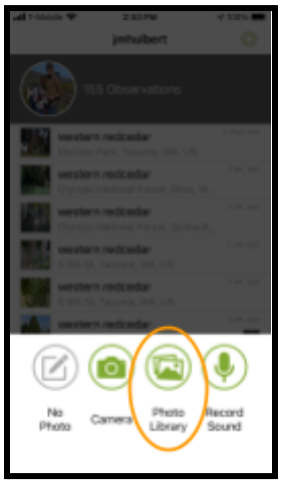
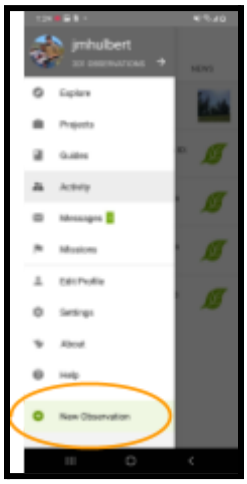
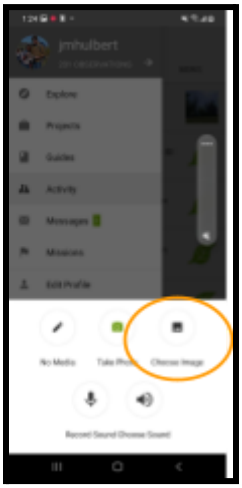
		
iOS	**iOS**	**Android**

Add an Observation to iNaturalist

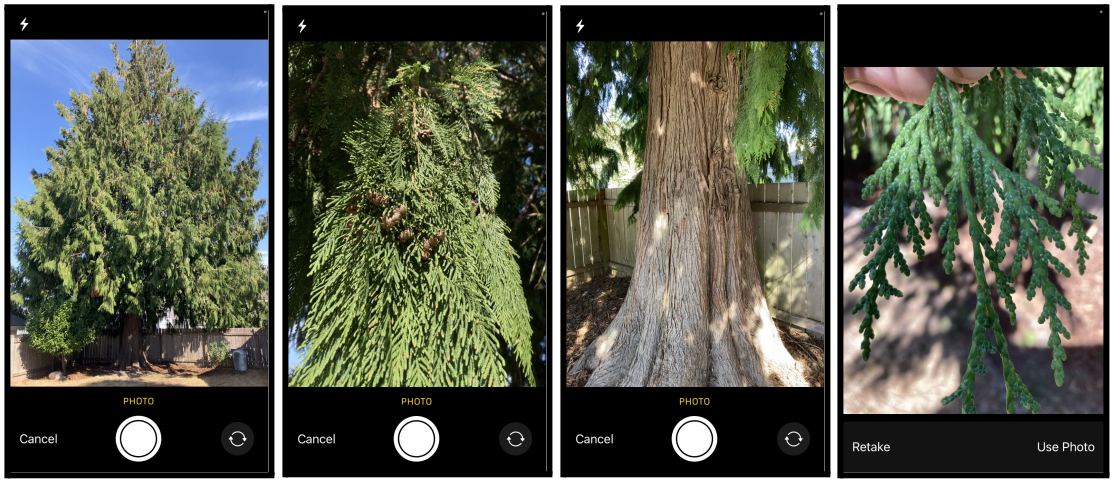
Add an observation to iNaturalist from your phone or internet browser. Note we recommend taking photos and then adding the observations from your computer, the 'Photo Library' (iOS) or 'Choose Image' (Android) options to select photos from your device.

Mobile App

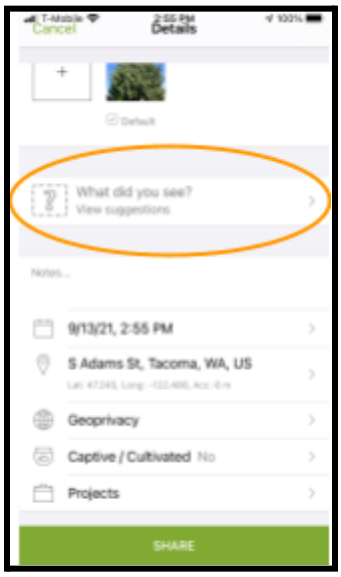
1. **Tap 'Observe' (iOS) or 'New Observation' (Android)**

			
iOS	**iOS**	**Android**	**Android**

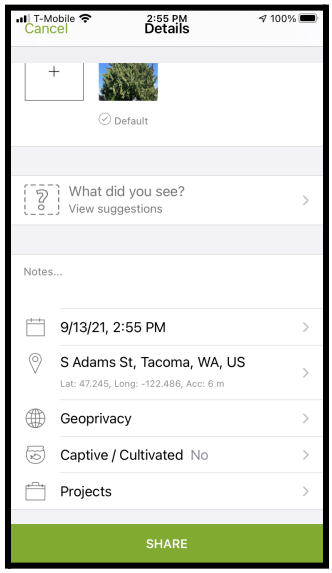
2. **Tap to select up to four photos**
    a. **Please include four photos with your observation: 1) whole tree, 2) cones (if present), 3) bark, and 4) underside of newest needles.**



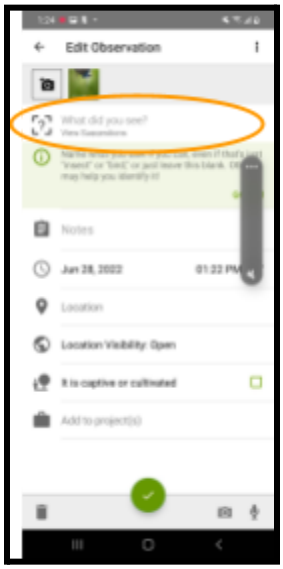
3. Identify the Organism in the Observation



iOS



iOS

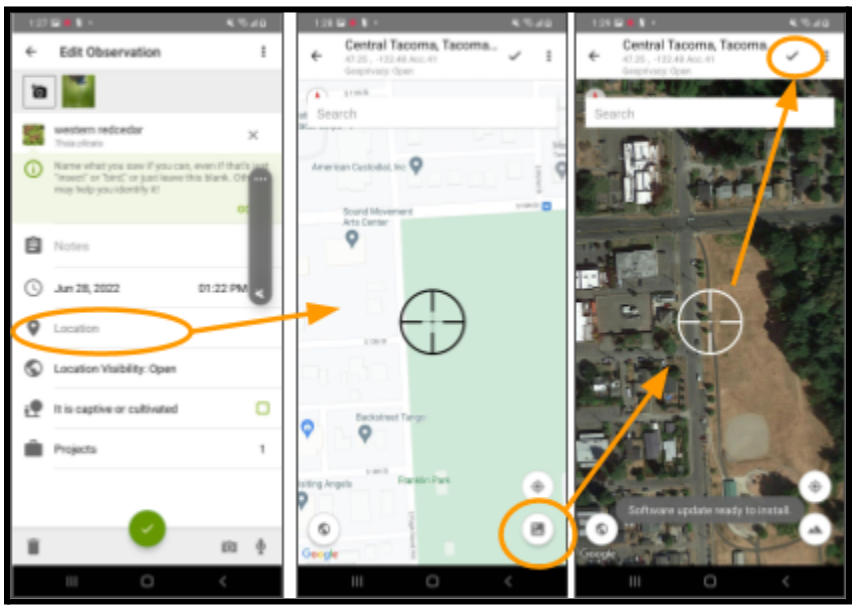


Android

4. Record Location

a. **The location will be automatically added with photos if you give your phone permission to record location when you take photos.**

b. **Otherwise, click on location, zoom in to the place on the map, and click the check box (Android) or back arrow (iOS).**

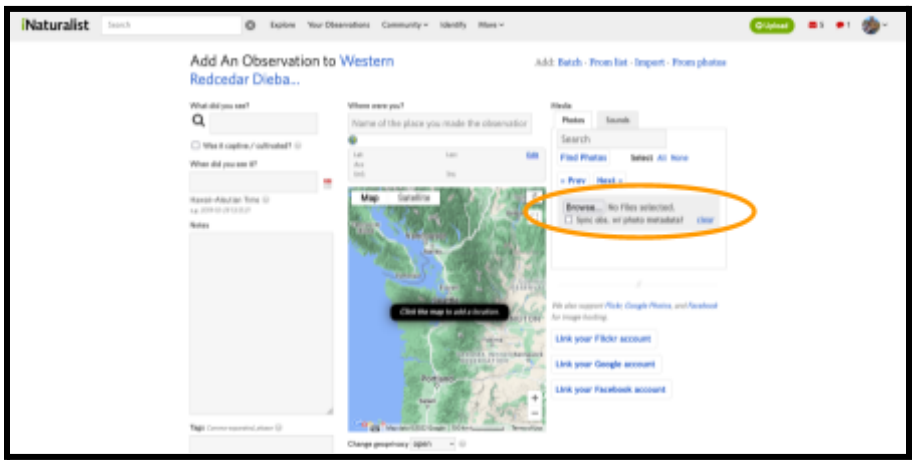


Android

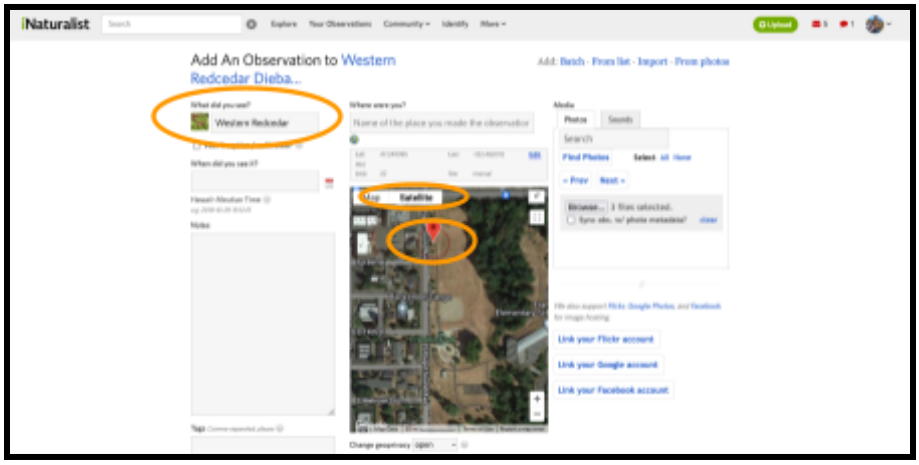
Internet Browser

1. **Browse to Western Redcedar Dieback Map project (https://www.inaturalist.org/projects/western-redcedar-dieback-map) and click 'add observations'.**

2. **Select Photos from Computer**



3. **Identify the Organism in the Observation and Drop a Pin in the location**

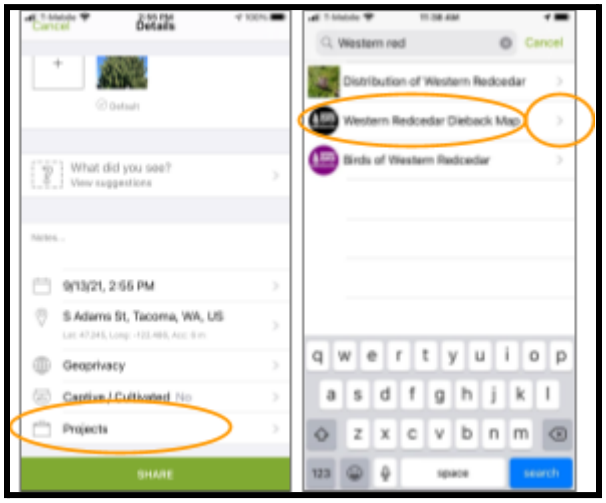


Tag Project and Answer Questions

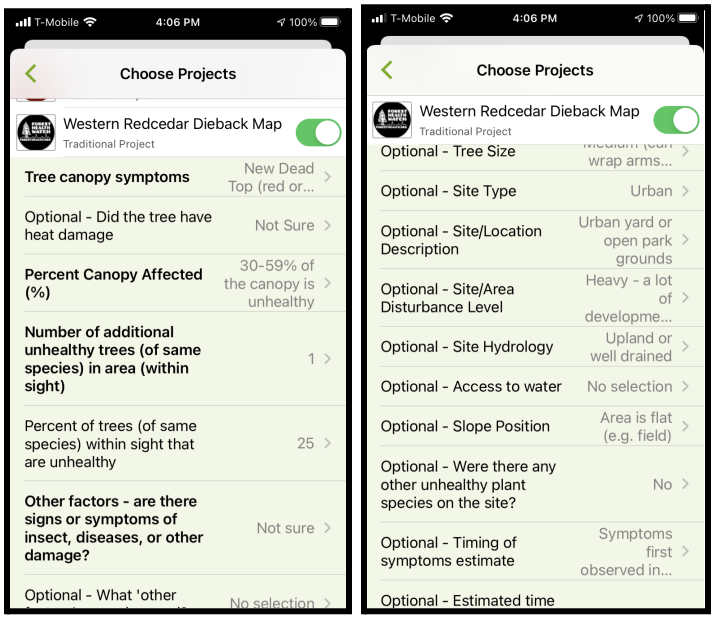
Mobile App

Tag the project in the observation edit field before hitting share. Otherwise, you can edit the observation after it has been shared.

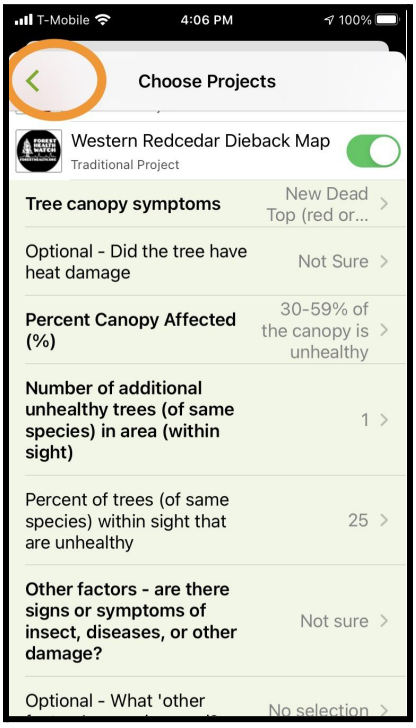
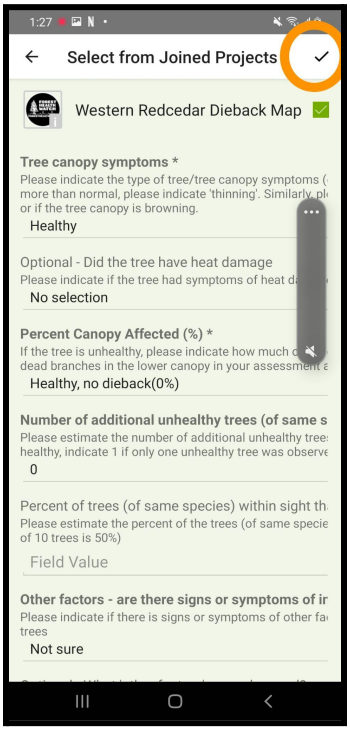
1. **Click on Projects and Search for Western Redcedar Dieback Map, then click the arrow (iOS) or check box (Android)**

	
iOS	**Android**

2. **Answer project questions**
    a. **Note answers for the bold questions are required before the observation can be added. The other questions are optional.**
    b. **See the Tree Health Classification Field Guide for guidance on symptoms.**

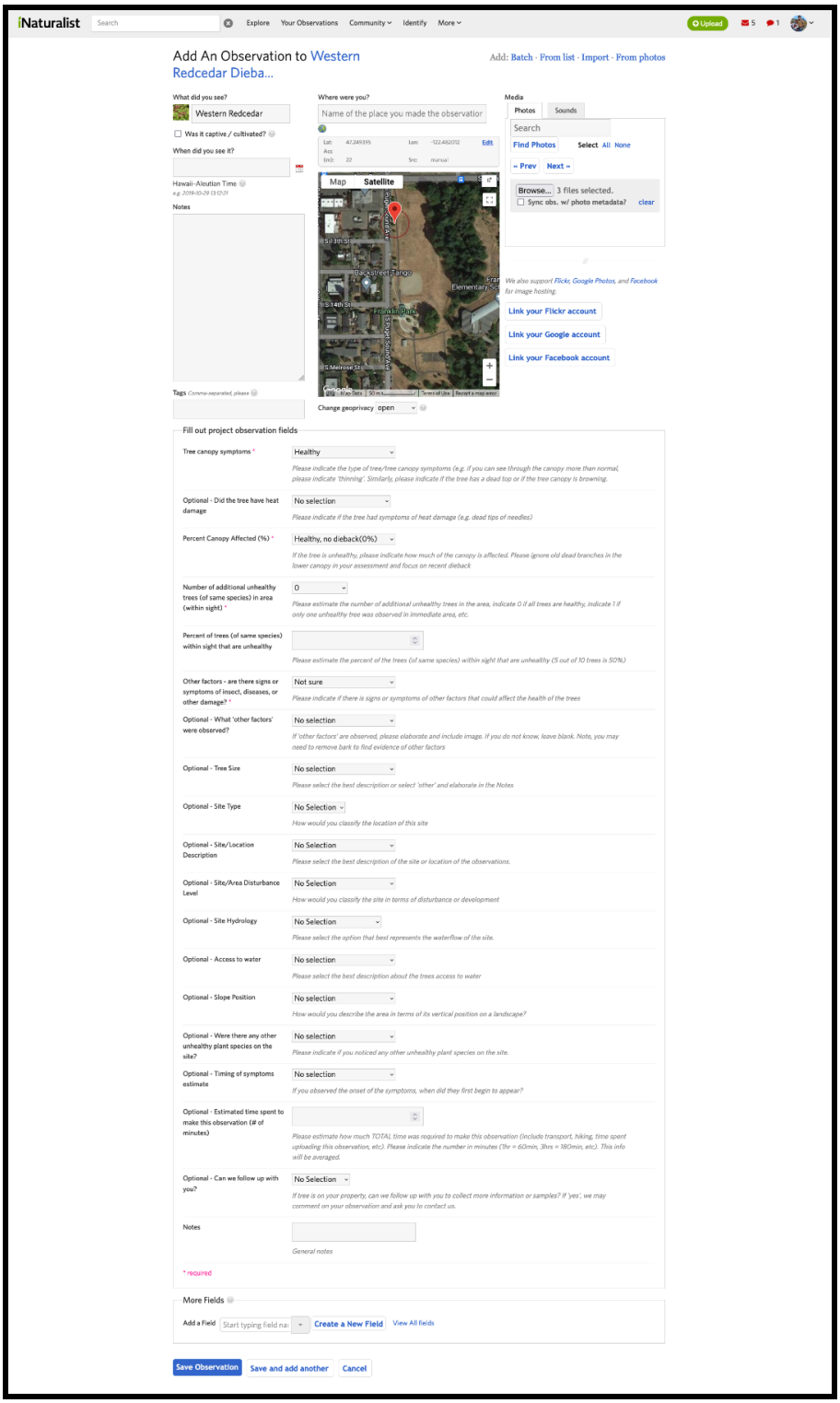


3. **Tap check box (Android) or back arrow (iOS) after answering questions**

	
iOS	**Android**

Internet Browser

Note, if you clicked 'Add Observation' from the project page in your web browser, the project questions will be at the bottom of the page.

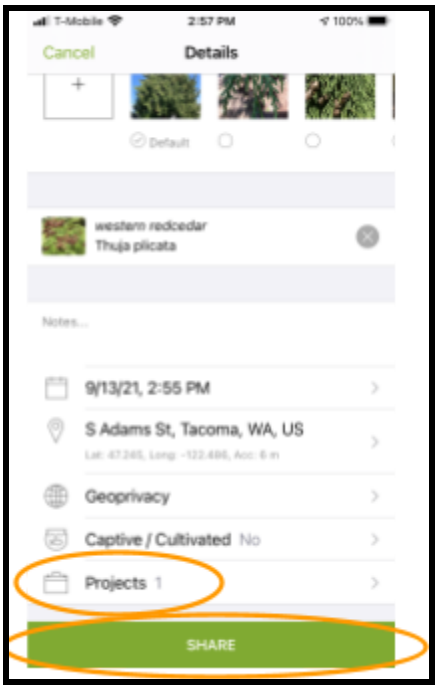
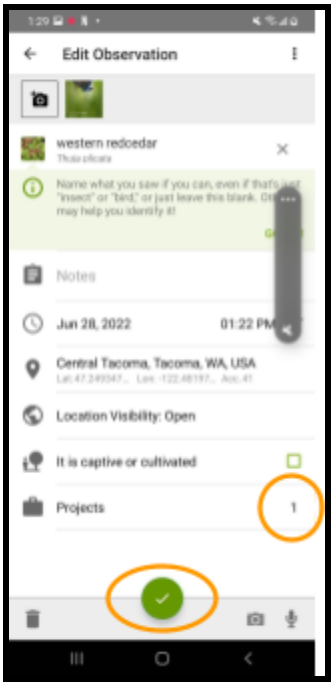


Share the Observation!

Check that all of the questions are answered and a project is tagged in the observation. Please check there is a '1' or greater listed in the Projects section of the observation.

Nice! Now you're ready to share the observation!

If you're using the mobile App, finish adding the observation by tapping 'Share' or the check mark (Android).

	
iOS	**Android**

If you're using your internet browser, finish adding the observation by clicking 'Share the Observation' at the very bottom.

THANK YOU for participating as a community scientist!

Western Redcedar Dieback Symptoms

The below information is presented to help you identify symptoms and other factors more confidently. More information is also available at https://foresthealth.org/map

Yellowing Canopy

Western redcedar normally have vibrant green needles. However, sometimes when there are issues with the tree, the needles will begin to yellow.

Below are some examples of yellowing canopies and needles.

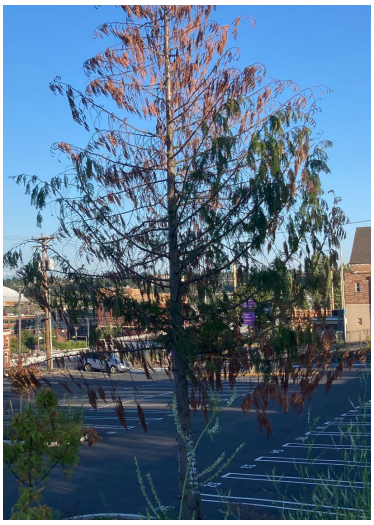
	 	
Yellowing needles on fire damaged tree. Photo credit: iNaturalist user Marissa6	**Top photo: yellowing needles in small tree, photo credit: iNaturalist user taywill Lower photo credit: JM Hulbert**	**Needles with yellow tips. Photo Credit: JM Hulbert**

Browning Canopy

Western redcedar needles turn brown to reddish brown when they die. Sometimes only a few needles will die, as with seasonal foliage drop (see below), but the tree is clearly struggling when entire branches or the whole crown turns brown. Browning canopies indicate the tree is dead or dying, albeit sometimes only a portion of the tree may die initially. See Branch Flagging below for more information about individual branch death.

In the late summer, the interior needles will brown and die back. This is completely normal, allowing the tree to grow new, healthier needles for the next year. This type of browning is considered healthy. See the seasonal needle drop section below for more information.





Trees with browning canopies. Photo credits: JM Hulbert

Top Dieback

A redcedar with deadtop is a tree that's canopy is dead at the top. The Western Redcedar Dieback Map project distinguishes between old deadtops and new deadtops. Trees with old dead tops may not have any needles, where newer dead tops may still have brown or dried needles attached to the branches.

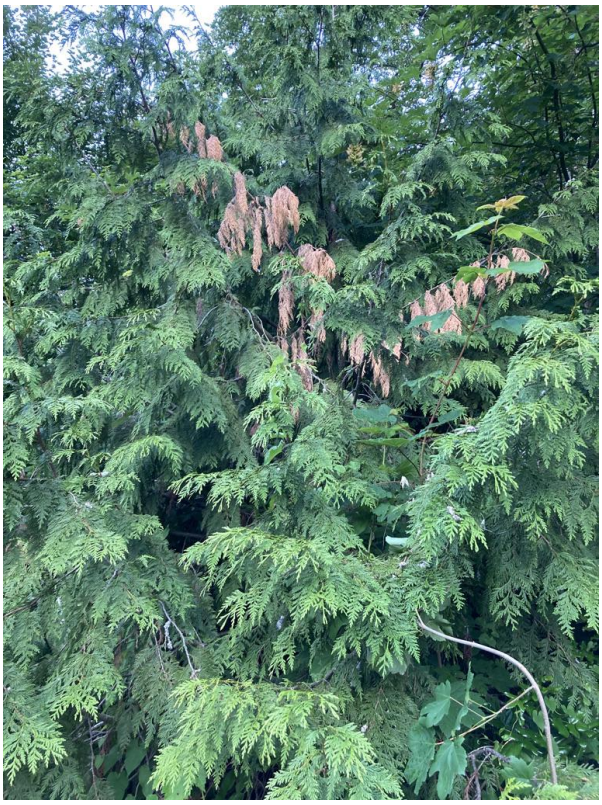
A tree is considered to have an old deadtop when the canopy has already lost all of its needles. The tree will either stay this way, while the rest of the tree may continue to survive and grow, or the rest of the tree will dieback as well. Not all trees with old deadtop will die completely.

A tree is considered to have a new deadtop when the top has died, but some of the needles remain on the branch.

		
Old dead top, photo credit: iNaturalist user jdx070	**New dead top, photo credit: iNaturalist user vlohr**	**New deadtop, some needles remain on branches, photo credit: JM Hulbert**

Branch Dieback/Flagging

Branch dieback is selected when individual branches are observed dying rather than entire parts of the canopy (in contrast to top dieback where the whole top dies). The branches typically turn brown and then drop the needles. Flagging is the forestry term for branches that turn brown inside of otherwise healthy canopies.



Branch flagging in western redcedar Photo credit: JM Hulbert

Branch dieback, dieback limited to lower section of one side of the tree. Photo credit: JM Hulbert

Thinning Canopy

Some unhealthy redcedar have thinner canopies than the typical full canopy of healthy trees. Thinning trees appear more transparent or see-through. Canopies thin when more needles are dropped than normal. If you can easily see the sky while looking through the tree canopy, it may be thinning.

Thinning canopies can lead to other symptoms like branch and top dieback. However, some trees with thin canopies may recover if conditions improve or become more suitable for supporting robust loads of needles.

		
Photo Credit: iNaturalist user andersbm	Photo Credit: JM Hulbert	Photo Credit: JM Hulbert

Heat Damage

Many western redcedar trees were affected during the 2021 Heat Dome event in the Pacific Northwest. Heat damage typically consisted of scorched or dead tips of needles. The needle scorch may have occurred on only one side of the tree, most likely on the south western side of the tree.

	
Scorched needle tips, photo credit: JM Hulbert	**Scorched needle tips, photo credit: JM Hulbert**

Stress Cone Crop

The number of cones produced can also be an indicator of health. Trees that are stressed sometimes produce 'stress crops' of cones. Generally, we understand this phenomena to occur when a tree is so stressed, it dedicates most of its remaining energy to reproducing and spreading its seed. Keep an eye out for unusual amounts of cones, as it may indicate the tree is actually stressed.

	
Tree with massive cone crop, photo credit: JM Hulbert	**Branch with massive cone crop, photo credit: JM Hulbert**

Other Possible Factors Affecting Redcedar Health

There are many other factors that affect the health of western redcedar trees. For example, mechanical damage from equipment or fire may reduce the trees capacity to transport water from the roots to the needles. Therefore, it is important to note any other potential factors that could explain why the tree is unhealthy. Please take a minute to investigate any other possible factors that may explain why the tree is unhealthy. Below we present a few possible factors to watch out for.

Root Disease

Armillaria species

Armillaria species are fungi that can infect the roots of many tree species. They Western redcedar is moderately susceptible to *Armillaria ostoyae*, although infection is seemingly rare. Nonetheless, these root-disease causing fungi may become more important factors as trees become stressed from changing environmental conditions.

One can identify the presence of Armillaria species by searching for its white mycelial fan. The mycelia can feel spongy and sometimes the texture is compared to dried caulking found around the windows and bathtubs in your home. These mycelial fans can be found by peeling or scraping away the bark on lower trunks or exposed roots with a knife or hatchet.

		
Armillaria mycelial fan seen under bark on redcedar, photo credit: JM Hulbert	**Armillaria mycelium on cut rotten root, photo credit: JM Hulbert**	**Armillaria mycelium on cut rotten root piece, photo credit: JM Hulbert**

Insect Damage

Cedar Bark Beetle

Western redcedar is occasionally attacked by the cedar bark beetle. However, these infestations are typically understood as secondary effects on redcedar trees, following other primary factors that weaken the tree and increase susceptibility to colonization by the beetle.

Adult beetles bore into the soft tree cambium to lay eggs between the bark and the wood. Here the larvae hatch and feed on cambial tissues creating new tunnels and producing a gallery. Beneath the bark, these galleries are likely to be seen, along with larvae in the winter seasons.

		
Cedar Bark beetle galleries, photo credit: JM Hulbert	Insect hole in the trunk of a tree. Photo credit: iNaturalist user alexis_mushroom.	Douglas-fir Bark beetle surrounded by frass, photo credit: JM Hulbert

Invasive Plants

Some common invasive plant species to the PNW are shared below. Noting their presence can help understand their impacts on the health of western redcedar trees.

English Ivy (*Hedera helix*) - Common species of ivy brought over from Europe for gardens, now common throughout the PNW. It is fast spreading without containment and commonly found in forest undergrowth, climbing up trees.	Himalayan Blackberry (*Rubus armeniacus*) - Multiple species of blackberries were introduced to North America. A favorite of birds and rodents, the seeds are easily dispersed. They are difficult to gain control and remove because of deep root systems.	Scotch Broom (*Cytisus scoparius*) - Coming from the UK and Western Europe, Scotch broom is a prevalent invasive species within the PNW. Outcompeting most native species and having limited herbivory from native species, Scotch broom continues to thrive in most climates of the region.
		
English Ivy climbing tree. Photo credit: iNaturalist user SedgeQueen	Blackberry bush with developing fruit. Photo credit: iNaturalist user tomerler	Scotch broom found in Warrenton, OR. Photo credit: iNaturalist user jlmeek

Natural Seasonal Foliage Browning and Needle Drop

In late summer and into fall, needles will naturally turn yellow or brown and fall off. This natural drop of the older needles makes room for new needles. Note that trees with this symptom are considered healthy. Brown needles are generally only a concern if the entire branch (including newest, outer needles) is damaged or dying.

		
Normal, seasonal dieback seen in inner needles of branches, photo credit: iNaturalist user angelique_k	**Normal, seasonal dieback seen in inner needles throughout entire tree, photo credit: JM Hulbert**	**Note the seasonal needle drop is inner most (oldest) needles on the branch, photo credit: JM Hulbert**

Winter 'Sunscreen'

Western redcedar trees can produce a 'sunscreen' to protect their needles from cold temperatures. Trees with this sunscreen are healthy. The sunscreen can be distinguished from brown crispy dead needles by viewing the underside of the needles. Healthy branches with sunscreen will still be green and vibrant on the underside.

Redcedar with brownish tint from winter sunscreen, note lower branch still green. Tree will return to green color in summer. Photo Credit: JM Hulbert

Additional Resources

Forest Health Watch Home Page: https://foresthealth.org/

Western Redcedar Dieback Map iNaturalist Main Page:
https://www.inaturalist.org/projects/western-redcedar-dieback-map

Pacific Northwest Invasive Plant Council Home Page:
http://depts.washington.edu/waipc/index.shtml

Oregon Department of Forestry 'Why is my Tree Dying':
https://www.oregon.gov/ODF/Documents/ForestBenefits/TreeDeclinesRedcedar.pdf