Pender Islands Big Tree Registry measurement guidelines

Raincoast Conservation Foundation
Field Package | September 2020

Pender Islands big tree registry measurement guidelines

Acknowledgements

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Introduction to the Pender Islands Big Tree Registry

The Pender Islands Big Tree Registry was launched by Raincoast Conservation Foundation in partnership with Pender Island Conservancy and local grassroots group, Pender Earth. It is a citizen science project, driven by community interest and participation. Its goal is to locate big trees around North and South Pender Islands to draw public attention to the declining condition of Coastal Dougls-fir forests around the Gulf Islands and raise awareness about ways to protect these forests.

Why a Big Tree Registry?

Big tree registries have been found to be useful tools for 1) increasing public awareness about the importance of healthy trees and healthy forests; 2) identifying areas of high conservation priority; and 3) providing valuable information to help find protection for iconic trees. The Pender Islands Big Tree Registry will increase public awareness of forest conservation challenges on the Gulf Islands, while creating actionable opportunities to contribute to tangible solutions. It will also encourage folks to get outdoors to search for, and identify, big trees!

iNaturalist

iNaturalist is a completely free, online platform through which people can share biodiversity information and support each other in learning about nature. By simply taking a photo (or uploading one from your camera roll), iNaturalist helps you identify plant and animal species and records the locations of your observations. Fellow users can verify all the observations you make, which will upgrade them from "casual" status to "research-grade". Due to this ease of use and accessibility it is often used in educational programming and bio blitzes

Though iNaturalist is accessible to anyone with a smartphone, you must be over the age of 16 to create an account. If you'd like to participate in the registry but are younger than 16 it is recommended that you follow "Option 2" outlined in the following section and download *Seek*, a species identification app hosted by iNaturalist with no age restrictions that can be used without creating an account.

How to nominate a big tree for the Registry

There are two ways to nominate a big tree for the Pender Islands Big Tree Registry.

Option 1: Using iNaturalist	Step 1: Download the free iNaturalist app to your smartphone Step 2: Join the project "Pender Islands Big Tree Registry" (see Appendix One for a detailed description on how to join) Step 3: Make an observation (i.e. take a photo through the iNaturalist app) ● Check out the "Nature Photography" tips provided in this guide Step 4: Measure the height (m), diameter at breast height (cm), and crown spread (m) of the tree and take note of any special conditions or the surrounding understorey (instructions below). Step 5: Your observation must be manually added to the Pender Islands Big Tree Registry Project. ● On a new observation you will see a row of your photos at the top with the tree species listed underneath. Below this are several fields: "Notes", "Time & Date" (automatically filled by iNaturalist), "Location" (automatically filled by iNaturalist), "Location Visibility: Open", "It is captive or cultivated", and finally "Projects". Click "Projects" and select "Pender Islands Big Tree Registry". This will open a new page where you can enter your data. Fill in the fields you can and then click the check mark icon in the top right corner of the screen to save changes. ● These data can be added from the app in real time, or from your desktop after the initial observation has been made (if adding observations that you have already saved to iNaturalist see Appendix 2 for step-by-step instructions) ● Please add additional observations (e.g. remarks on tree condition/health; tree characteristics, notable features, and/or surrounding understorey etc.) to the Site Notes/Notable Features field. This is a great opportunity for familiarizing with iNaturalist byidentifying the surrounding ground cover species! Step 5: Wait for notification. Every tree that is nominated for the Pender Islands Big Tree registry will be verified by a qualified big tree measurer. Once your nomination has been verified it will be officially added to the Registry. **Tip:** Keep your eye on the Journal Entries added to the iNaturalist page. These will contain updates and tips on how to use iNaturalist.

Option 2: Using PDF datasheet	Step 1: Download and print the data sheet OR record necessary fields in your own notebook Step 2: Find the big tree you would like to nominate and record its location (latitude & longitude) using Google Maps or another GPS enabled map on your smartphone Step 3: Measure the height (m), diameter (cm), and crown spread (m) of the tree and record. Add any additional observations (e.g. remarks on tree condition/health; tree characteristics; any notable features etc.) Step 4: Take photos! ● Check out the "Nature Photography" tips provided in this guide Step 5: Use the online Google Form to officially nominate your tree and send any photos to **bigtree@raincoast.org** Step 6: Wait for notification. Every tree that is nominated for the Pender Islands Big Tree registry will be verified by a qualified big tree measurer. Once your nomination has been verified it will be officially added to the Registry.

Important safety considerations

- Always be aware of your surroundings when exploring the forest, watch out for raised roots, branches at eye level, and other safety hazards.
- While the effects of the COVID-19 pandemic are still being experienced it is important to maintain social distancing while big tree hunting, especially when hunting with, or encountering others who may be outside your bubble.
    - When borrowing equipment, make sure to sanitize it before returning it.
- Be respectful of private property.

Measurement guidelines

Thank you in advance for your participation in the Pender Islands Big Tree Registry. This is a community-based initiative and its success depends on people like you who are willing to spend some time under the canopy hunting for big trees! Remember that big tree hunting is a fun way to collect information on Coastal Douglas-fir forests and connect folks with the trees and forests in their neighbourhoods. If at any time you encounter challenges or frustrations using iNaturalist or measuring trees, remember that all nominations will be verified by a qualified professional. The only *required* measurement is the diameter of the trunk, the rest can be collected during the verification process, but we encourage you to give the other measurements a try! If you have any questions or need any additional information please send an email to **shauna@raincoast.org or bigtree@raincoast.org**.

Important notes and tips

- All measurements must be taken following the guidelines outlined in this field package.
- It is easiest to measure trees with a partner.
- If a tree is "big" to you, it is big enough for the registry!

- The only required measurement for a nomination to be accepted is the trunk's diameter at breast height (DBH) as it is the easiest to accurately measure. All other measurements can be taken by a qualified tree verifier at a later date.
- All measurements collected should be entered in metric units:
    - Height (m)
    - Diameter (cm)
    - Crown spread (m)
- In addition to these measurements we are interested in the sites where these big trees are growing. Take note of the surrounding understorey (you can use iNaturalist to identify some of these understorey plants!) and other notable features about the tree and surrounding area.
- All tree nominations will be verified by a qualified measurer. You will know your tree has been verified once a numbered tag is attached to your tree. If a tree is nominated twice the first person to have nominated it will be recognized.
- Always record the date of measurement. iNaturalist should automatically record this for you.
- In the "Measurement Notes" field (printable data form) or "Notes" field (iNaturalist) please include a concise description of techniques/equipment used to collect measurement information and any difficulties experienced.
    - This information will not be publicly displayed if using the datasheet, but will appear publicly on the iNaturalist Project page. It will be used to improve field guide instructions
- If using iNaturalist, the geographic coordinates will be included in all observations. Please note the location that iNaturalist identifies is sometimes inaccurate, make sure you check the map before submitting your observation as you may need to manually update it. If your observation falls outside the location parameters (i.e. off Pender Island) it will not appear on the Project page. If using the printable datasheet please use Google Maps, another GPS-enabled app, or a handheld GPS unit to find the location information for your nomination.
- If you don't have the tools available to measure trees at home, the Pender Islands Conservancy office at Hope Bay will lend Raincoast's measuring tools out in exchange for a piece of photo ID. Please check their opening hours and plan accordingly.
- If you are looking for further information and tech tips for using iNaturalist, keep an eye on our Project Journal where we post solutions to common problems and other helpful information.

Species information

The Pender Islands Big Tree Registry is focused on the native species of the Coastal Douglas-fir (CDF) biogeoclimatic zone. As such, we request that participants limit their observations to these species. On iNaturalist parameters are already set to only accept native species nominations. Below is a list of the species accepted, those starred are less common and some are more characteristic to the neighbouring zone, the Coastal Westen Hemlock, but can still sometimes be found in the CDF. This is of research interest and thus these species have been included.

Coastal Douglas-fir (*Pseudotsuga menziesii*)
Grand fir (*Abies grandis*)

Western red cedar (*Thuja plicata*)
Sitka spruce (*Picea sitchensis*)*
Western hemlock (*Tsuga heterophylla*)*
Pacific yew (*Taxus brevifolia*)*--MUST USE OPTION 2 FOR ID
Juniper (*Juniperus occidentalis*)*
Arbutus (*Pacifc madrone*)
Garry/Oregon oak (*Quercus garryanna*)
Big leaf maple (*Acer macrophyllum*)
Douglas maple (*Acer glabrum*)*
Vine maple (*Acer circinatum*)*
Red alder (*Alnus ruba*)
Bitter cherry (*Prunus emarginata*)*
Pacific dogwood (*Cornus nuttallii*)*
Black cottonwood (*Populus trichocarpa*)*

iNaturalist and its sister smartphone app, *Seek*, are extremely helpful with tree and plant identification. However, if you prefer to develop your independent identification skills, there are two highly informative guides to help you on your way: *Trees in Canada* by John Laird Farrar (most recent edition published in 2017) and *Plants of Coastal British Columbia* by Jim Pojar and Andy MacKinnon (most recent edition published in 2016).

Taking measurements

HEIGHT

Overview

Height is a difficult measurement to accurately collect, especially for taller trees. Dense forest can make it challenging to get a clear view of the tree top, and ground slope can add further complications. Due to these challenges, we recommend making more than one attempt to measure height. If possible try and re-measure from a different view point, and always double check your measurements. All heights will be verified by a qualified tree measurer after the nomination has been received.

Equipment

- Measuring tape
- Inclinometer **or** Smartphone with Smart Measure or iHandy Carpenter installed
- Calculator (with cosine & tangent functions)
- Brightly coloured flag or chalk

Instructions

To measure the height of a tree, you must first put some distance between yourself and the tree. Best practice is for the distance between yourself and the tree to be greater than the total estimated tree height. As you move away from the tree use your measuring tape to record the distance between

yourself and the tree. Make sure to maintain a sightline to the top of the tree. If the tree has a significant lean it should be measured with the lean to the right or left, not toward or away from you.

Calculating tree height requires the use of basic trigonometry: *H= TanA x D*

H = Height

A = Angle to the top of the tree

D = Distance from the tree

Level Ground

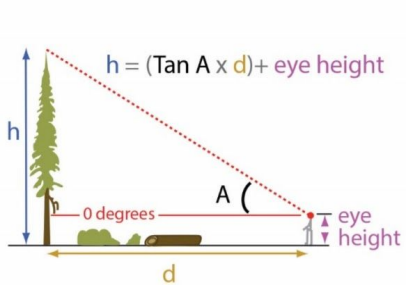
To find the height of tree on level ground you need to know your eye height (height of your eye above the ground)

Measurements needed:

- Distance to tree (*D)*
- Tree top angle (*TanA*)
- Eye height from ground (*Eye Height*)

The equation becomes:

H= TanA x D + Eye Height



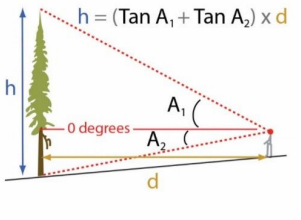
Moderately Sloped

To find the height of the tree up slope (base of the tree is below eye-level) or down slope (base of the tree is above eye-level) you need to know the angle to the tree base.

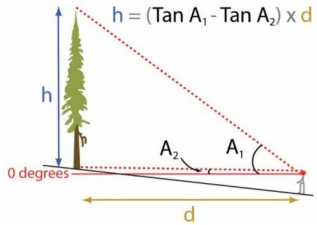
Measurements needed:

- Distance to tree (*D)*
- Tree top angle (*TanA*$_1$) and Tree base angle (*TanA*$_2$) (sloped ground)

Up-Slope Equation
(added)
H= (TanA$_1$ *+ TanA*$_2$*) x D*



Down-Slope Equation
(subtracted)
H= (TanA$_1$ *- TanA*$_2$*) x D*



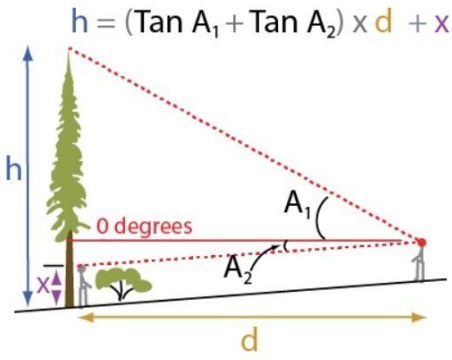
Obscured Base

To find the height of a tree without being able to see the base, you need to mark a place on the trunk (with chalk or flag)) and measure its height from the ground. Alternatively, have someone stand at the trunk base, and measure the angle to the top of their head. If underbrush is obscuring visibility have them use the flag to increase visibility.

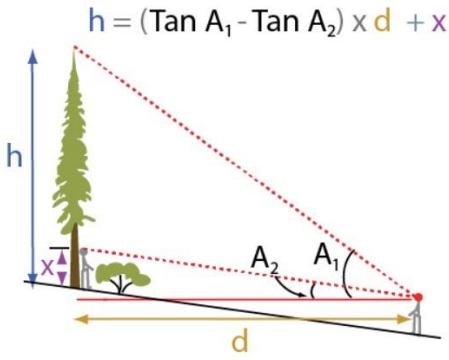
Measurements needed:

- Distance to tree (*D)*
- Tree top angle ($TanA_1$) and Tree base angle ($TanA_2$) (sloped ground)
- Height of trunk marker (*x*)

Up-Slope Equation
(added)
$H= (TanA_1 + TanA_2) \times D + x$



Down-Slope Equation
(subtracted)
$H= (TanA_1 - TanA_2) \times D + x$



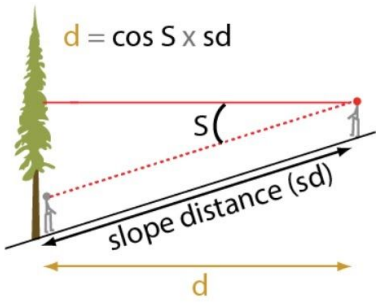
Steeply Sloped

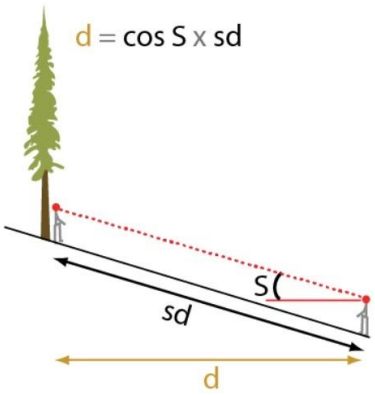
To find the height of a tree in situations where the ground is sloped (up or down) more than 6 degrees (10% slope) you will need to measure slope distance. Once you measure slope angle and slope distance, horizontal distance can be calculated.

First you must calculate the distance (*D*) using slope.
Measurements needed:

- Slope (*S*)
- Slope distance (*SD*)

$D = \cos S \times SD$





Then, use your newly calculated *D* value to follow the "Up-Slope" or "Down-Slope" equation laid out in the "Moderately Sloped" section above.

All height diagrams from: BC BigTree Field Package

DIAMETER

Overview

A commonly collected data point in forest studies is circumference, which is then converted to diameter. This measurement is known as "diameter at breast height" or DBH. Standard practice is to collect this measurement at 1.37 m (4.5 ft) from ground level (i.e. " breast height") on the uphill side of the tree if on a slope. If a burl or obstruction makes this location unrepresentative of the trunk's actual circumference, measure at the most suitable point (outlined below) and take note of the actual measurement height. There are specialized DBH tapes that allow one to collect this measurement without doing any calculations, which big tree hunters can borrow from the Pender Islands Conservancy office at Hope Bay during opening hours (please note that this will require leaving a piece of photo ID or similar to ensure all equipment is returned). However, if you'd prefer to use your own equipment, all you need is a measuring tape or a non-stretchy string/rope and something to measure it with.

Equipment

- Measuring tape **or** non-stretchy string/rope **or** DBH tape (on loan from Pender Island Conservancy office)
- Ruler or metre stick
- Calculator (to calculate DBH)

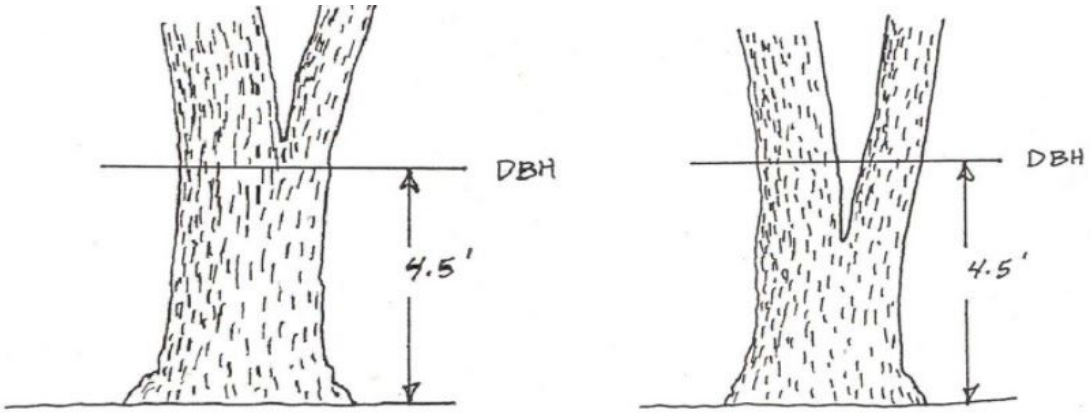
Instructions

If using a DBH tape, notice that one side measures circumference, the other has done the calculations for you and thus measures DBH. You can be sure you are using the correct side by inspecting the tape, if you see "ø DIAMETER" just past the 4 cm mark you have it right! These tapes conveniently have a metal hook at one end, making this measurement easy to collect even without a partner. Connect the metal hook to the tree at breast height (1.37 m/4.5 ft) and wrap it around the circumference of the trunk. Pull

the tape taut making sure it has not been obstructed by any burls or branches. Where the tape intersects with the 0 cm mark is the final diameter of the tree.

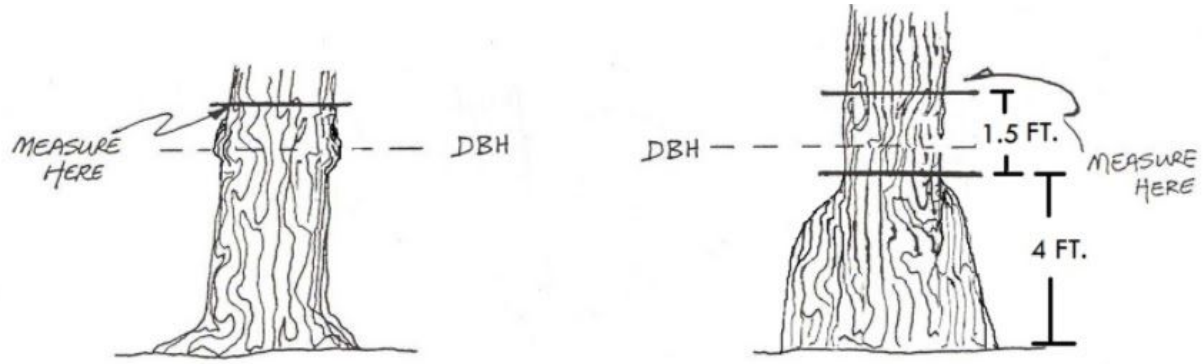
If you do not have access to a DBH tape, use a string or flexible measuring tape and follow the procedure outlined above. Carefully mark the point where the end of your string intersects with its body using your thumb, and then measure the length from that point to the end using a ruler, meter stick, or tape measure. You now know the circumference of the tree. To find the diameter divide the circumference by π (3.14159). For example, if your tree has a circumference of 100 cm, divide 100 by 3.14159. The DBH is 31.8 cm.

Forked Trees



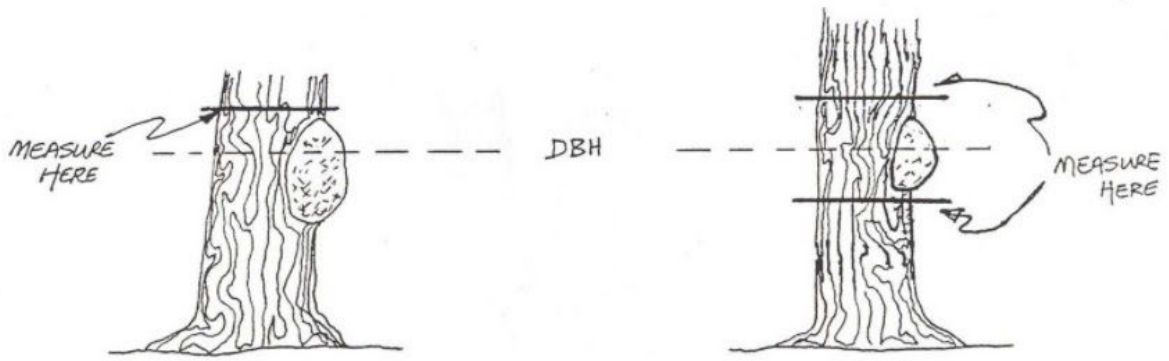
Measure as one tree if fork occurs at or above 4.5 feet (left). Measure as two trees if fork occurs below 4.5 feet (right).

Burl/Bulge/Excessive Butt Swell



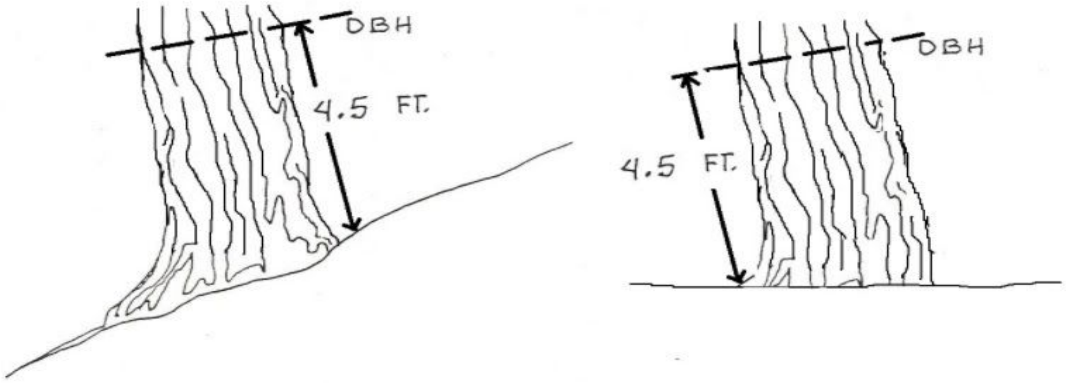
If a tree has a large burl or branch obstructing your tape, measure directly above a bulge or branch whorl (left). On trees with extensive butt swell, measure at least 1.5 feet above the butt swell (right).

Canker/Deformity



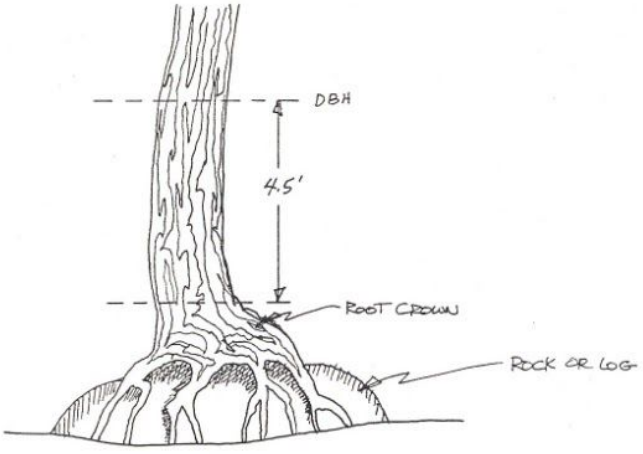
If a tree has a large burl or canker, measure above the deformity and adjust the diameter down slightly (left), or take two measures equidistant from DBH above and below the deformity, and use the average (right).

Leaning Tree



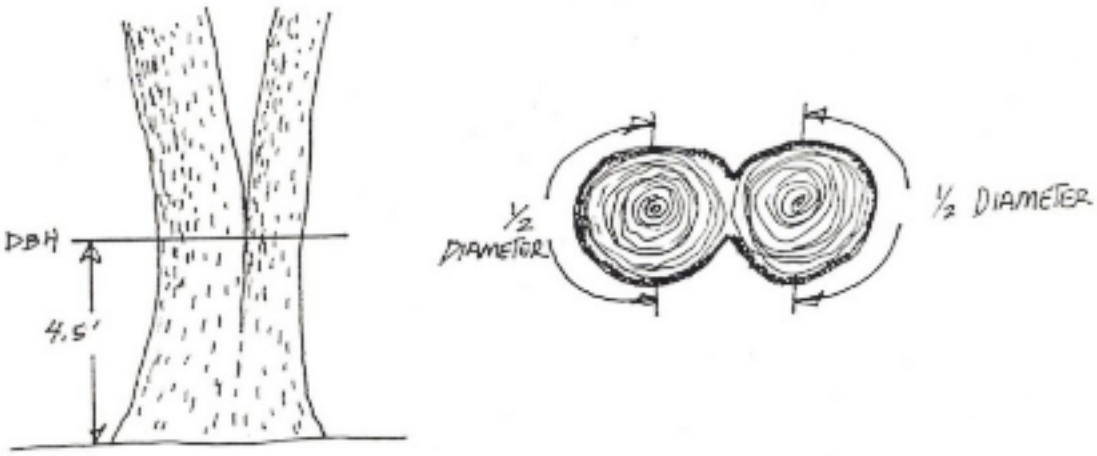
If a tree is leaning, the tape is held perpendicular to the tree bole, and is measured on the uphill side of the tree if on a slope (left); on the short side of the lean if on flat ground (right).

Raised Root Crown



If a tree's roots are above above ground, measure at 4.5 feet above the root crown.

Grown Together



If two trees have grown together, count as two trees. Measure halfway around each, and double the measurement.

DBH diagrams from: Open Oregon Educational Resources

CROWN SPREAD

Overview

Crown spread is easily measured with a single measuring tape, but might be made easier by using a markers on the ground.

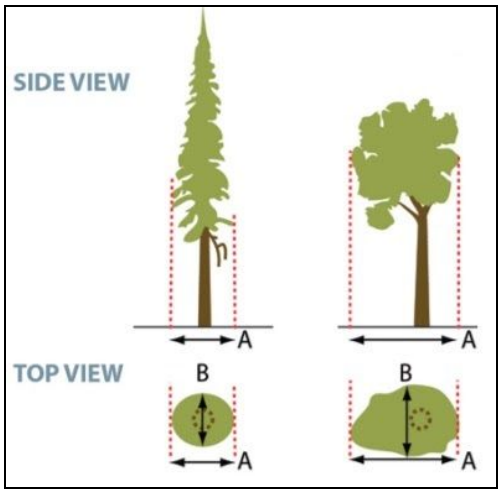
Equipment

- Measuring tape

Instructions

Many trees have an irregularly shaped, uneven crown. To account for this, two measurements must be taken. First, the crown must be measured from branch tip to branch tip at its widest point. The second measurement must be taken at 90 degrees from the first, again at the crown's widest point. Finally, the two measurements must be averaged. This measurement might be easier to collect if using a branch or other marker on the ground to indicate the position of each branch tip above.

$$Crown\ spread = (Width\ 1 + Width\ 2) \div 2$$



Crown spread diagram from: [BC BigTree Field Package]

NATURE PHOTOGRAPHY

Alex Harris, Raincoast's own talented nature photographer has provided some simple tips and tricks for taking effective photographs of big trees:

- Use portrait orientation (i.e. keep your phone vertical)
- Try to get low to the ground and take photos from the base of the tree up.
- Take photos of anything specific to the tree
    - Examples: seeds, cones, leaves, any signs of disease or infestation
- Make the tree the focal point of the image, by keeping it at the centre of the frame (especially if there are many other trees around it).

Measurement verification

The approval of your nomination will come after your identified trees have been verified by a qualified "tree measurer". The Pender Islands Big Tree Registry is managed by a Raincoast staff member, who has been approved as a qualified tree measurer and who will perform all big tree verifications. This will include attaching a numbered tag with a website URL to the tree. These tags will signal to others that the tree is important and being monitored. It will also spread awareness about the Registry and help get new volunteers involved. Please note that these tags are as small and unobstructive as possible to minimize any negative effects on the trees.

Once your nomination has been submitted expect to wait up to a month to see your tree in the official registry. If you are interested in being present when your tree measurements are being verified email bigtree@raincoast.org to set up a tree measurement appointment.

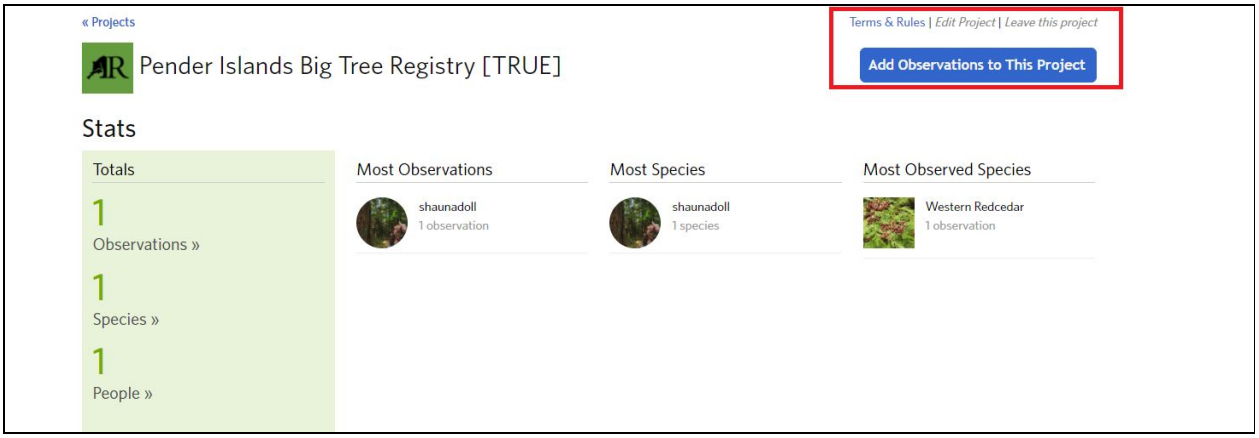
Appendix One

How to join the Pender Islands Big Tree Registry on iNaturalist

Desktop

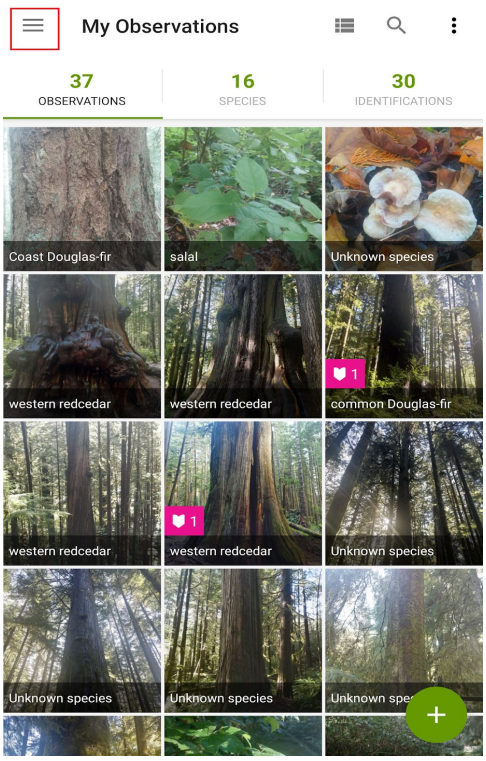
1. Visit The Pender Islands Big Tree Registry landing page on iNaturalist: https://www.inaturalist.org/projects/pender-islands-big-tree-registry-true

2. On the upper right corner of the homepage you will see a link that says “Join the Project”. Click the link to join.

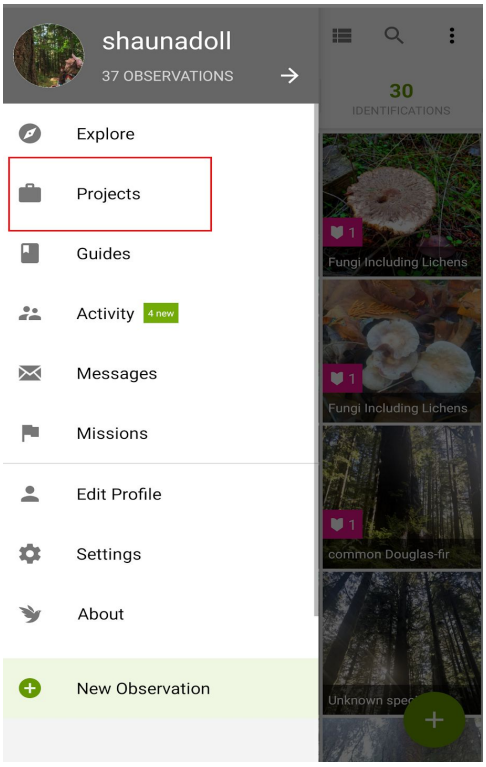


Phone App

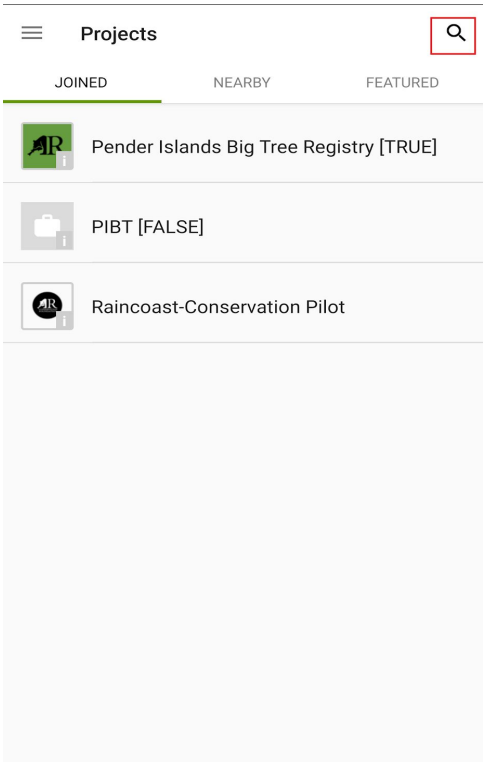
1. Start on your account homepage where you see all of your Observations. In the top left corner you will see a menu button (three horizontal lines). Click it.



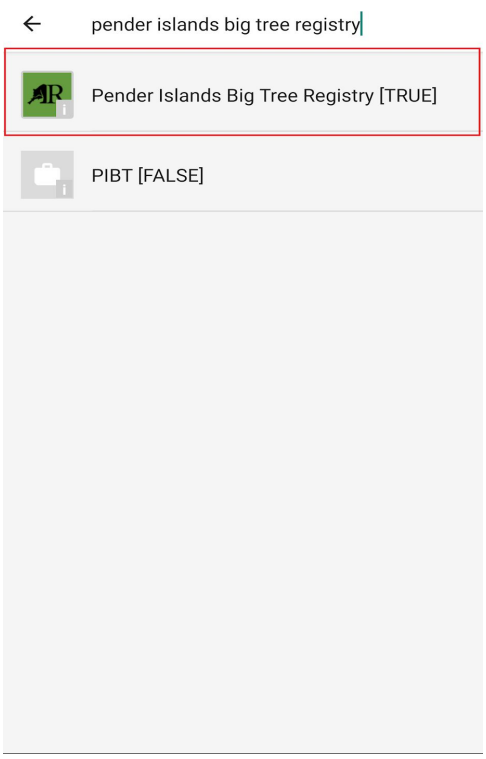
2. A menu will open on the left side of your screen. Click “Projects”.



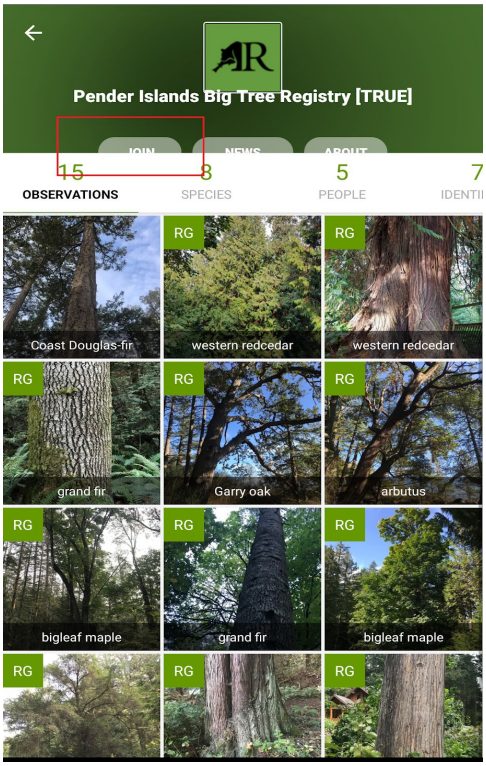
3. Step 2 will open a new page that will display all of the projects you have already joined, or if you have not joined any projects it will display “No Projects Found”. In the top right corner you will see the icon of a magnifying glass. Click the icon and type “Pender Islands Big Tree Registry” in the search bar.



4. Step 3 will open a list of possible projects. Click “Pender Islands Big Tree Registry [TRUE]”



5. You will be taken to the homepage of the Pender Islands Big Tree Registry where you will see a “Join” button. Hit this button to join. A Terms and Condition notice will pop up, please read and agree to complete your admission to the project.

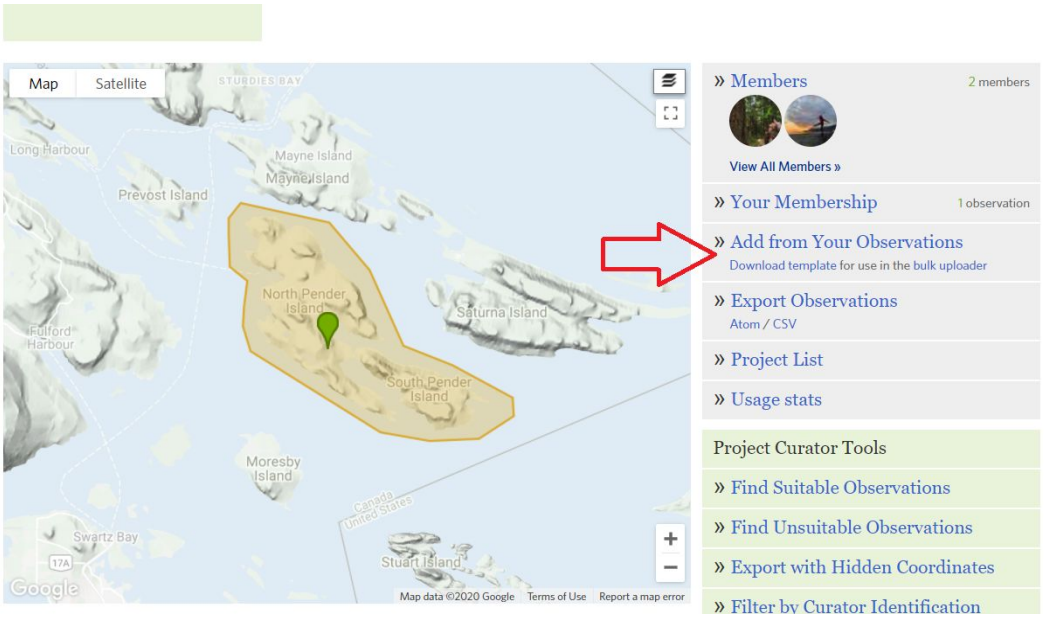


Appendix Two

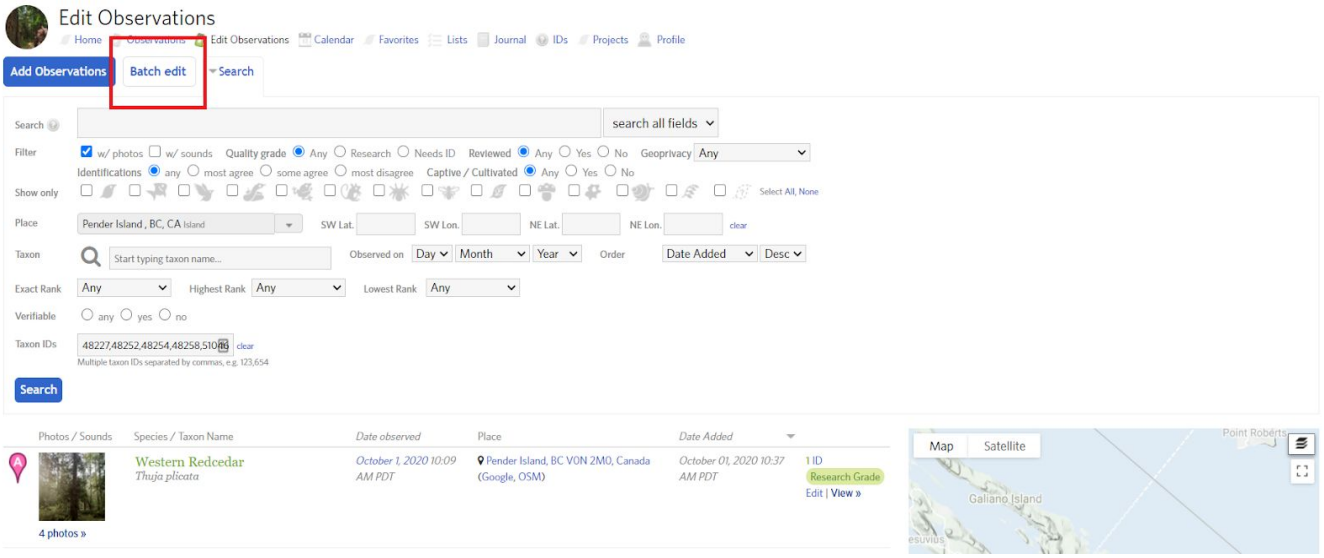
How to add existing observations to the Pender Islands Big Tree Registry on iNaturalist.*

**Please note that these instructions are for your desktop or laptop as this is the easiest place to transfer existing observations into the Pender Islands Big Tree Registry Project.*

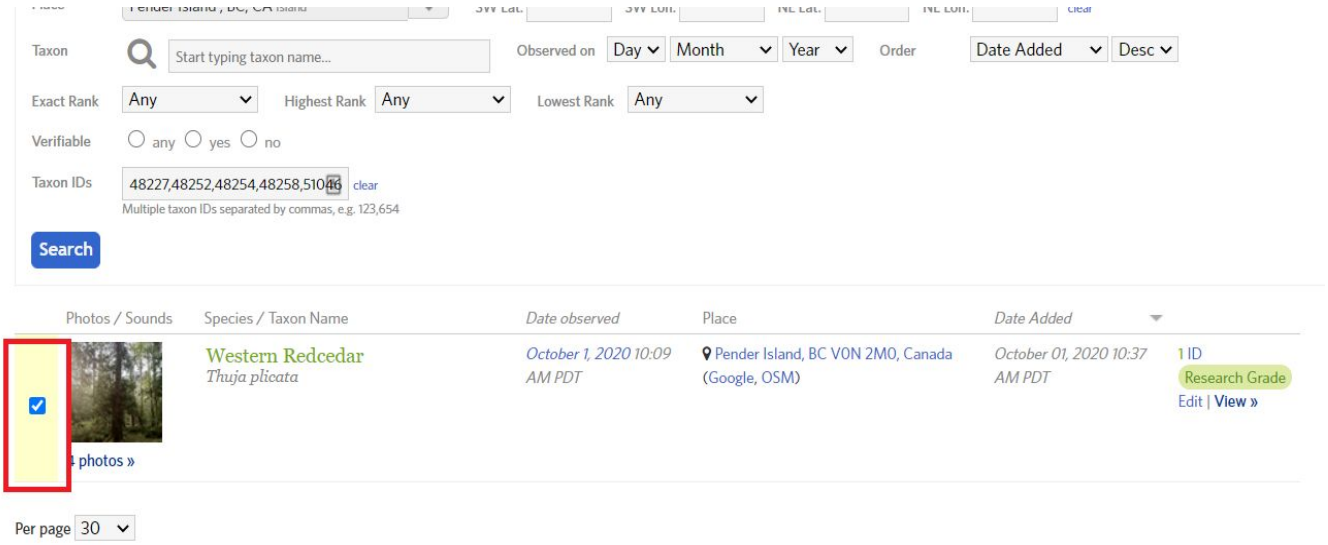
1. Visit the [Pender Islands Big Tree Registry] homepage and scroll down until you see the project map, on the right of the page you will see a link that says, “Add from your observations”. Click this link.



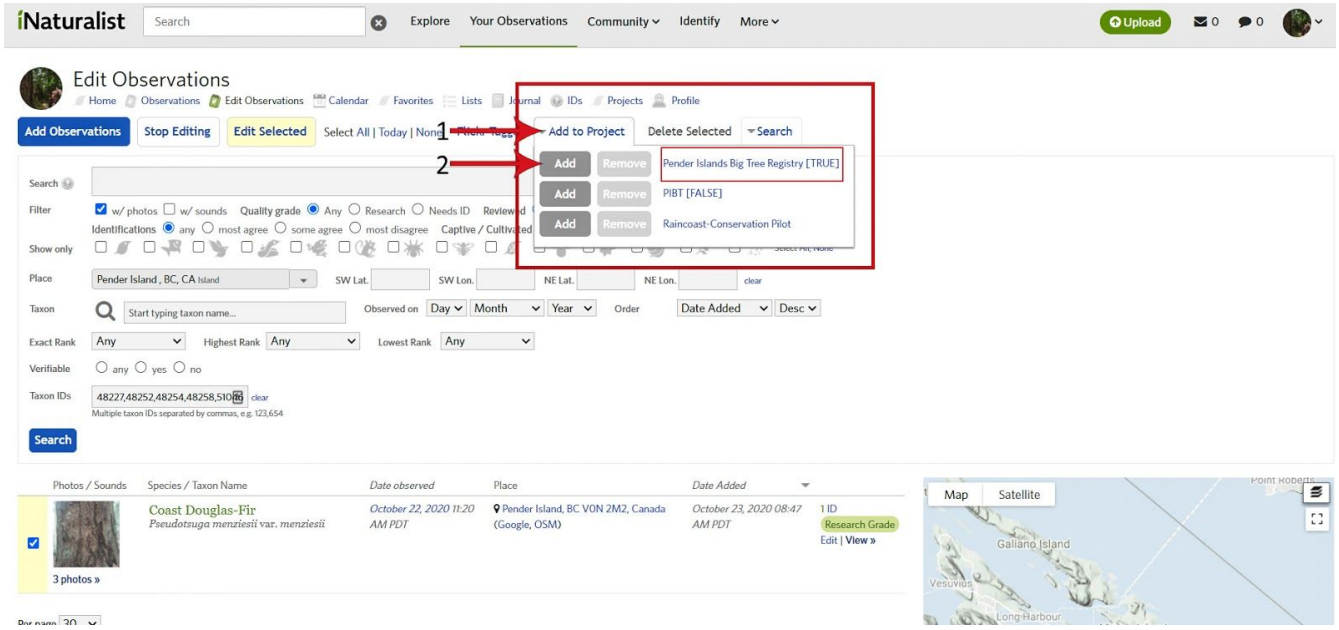
2. You will be taken to a page titled “Edit Observations”. Below the title you will see a blue “Add Observations Button” with a white “Batch edit” button beside it. Click “Batch edit”.



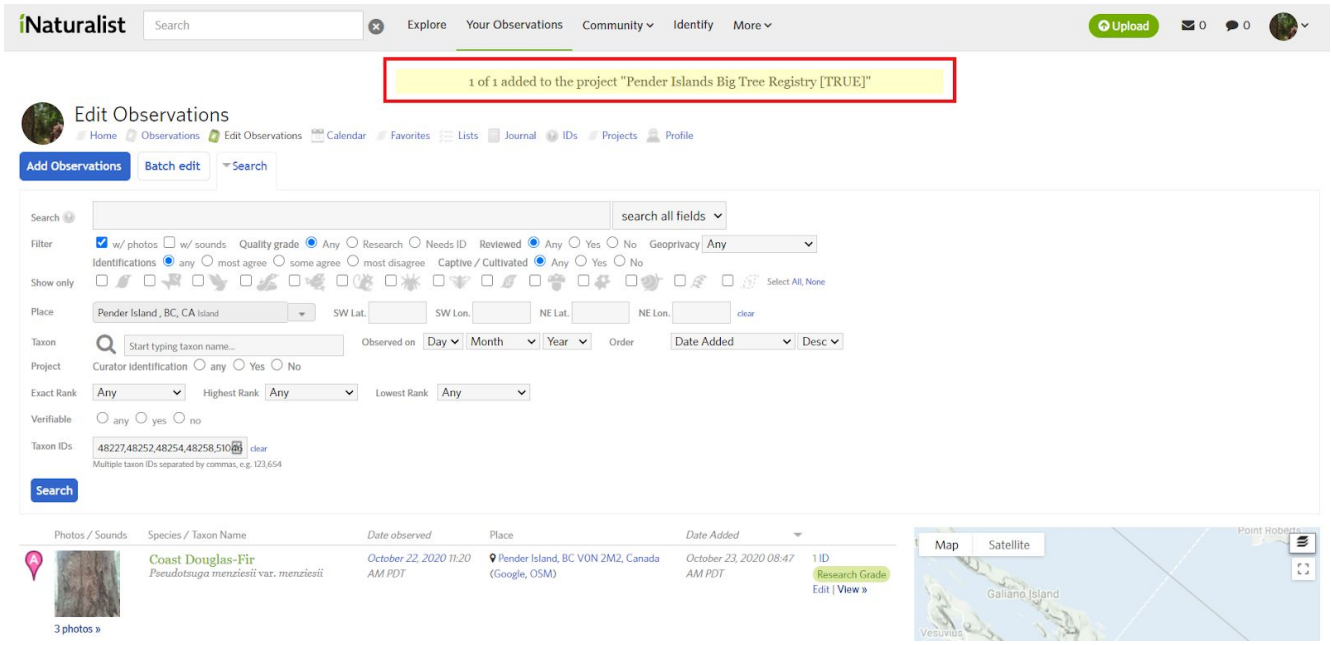
3. White boxes will appear to the left of all your observations. Tick the ones you would like to add to the Big Tree Registry.



4. Once you have selected all the trees you would like to add, scroll to the top of the page where you will see an “Add to Project” button. Click here to open a menu of the projects you have joined. You should see “Pender Islands Big Tree Registry”. Click the “Add” button to the left of the project name.

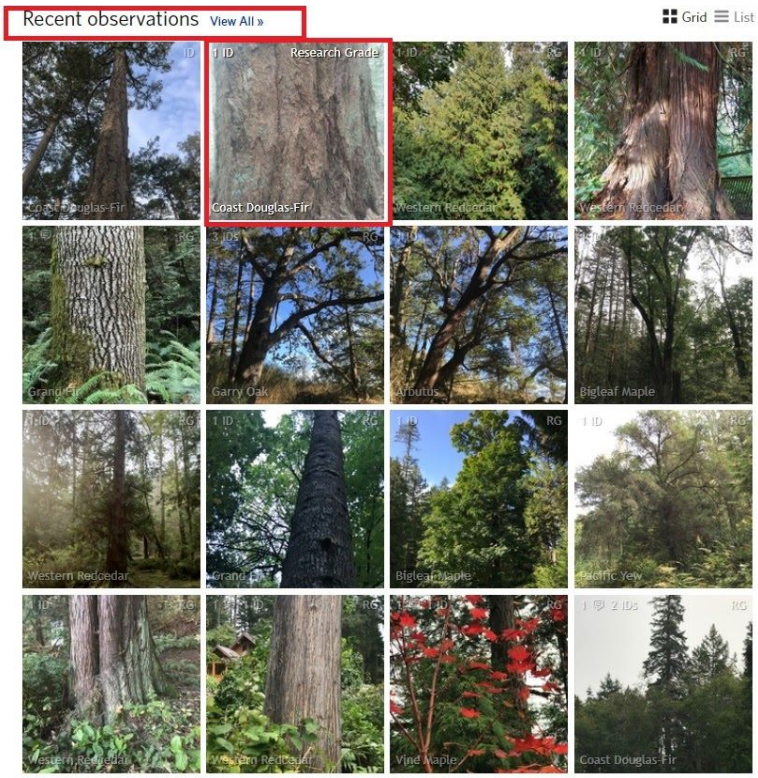


5. You will see a success message at the top of your page confirming that your observations have been added to the project.

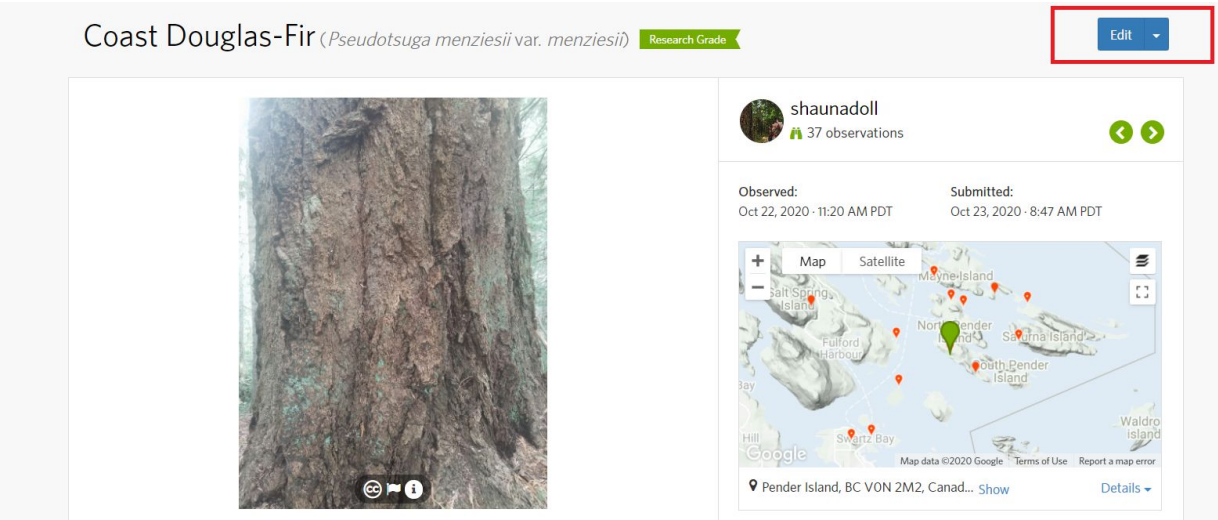


6. There are two possible outcomes resulting from Step 5:
    - If the observations you have added were part of the former Big Tree Registry Project page the data originally stored in the “Notes” section of your observation will have transferred over to the new project. Congratulations you are done!
    - If your measurement data has not yet been added to your observation follow steps 7~10.

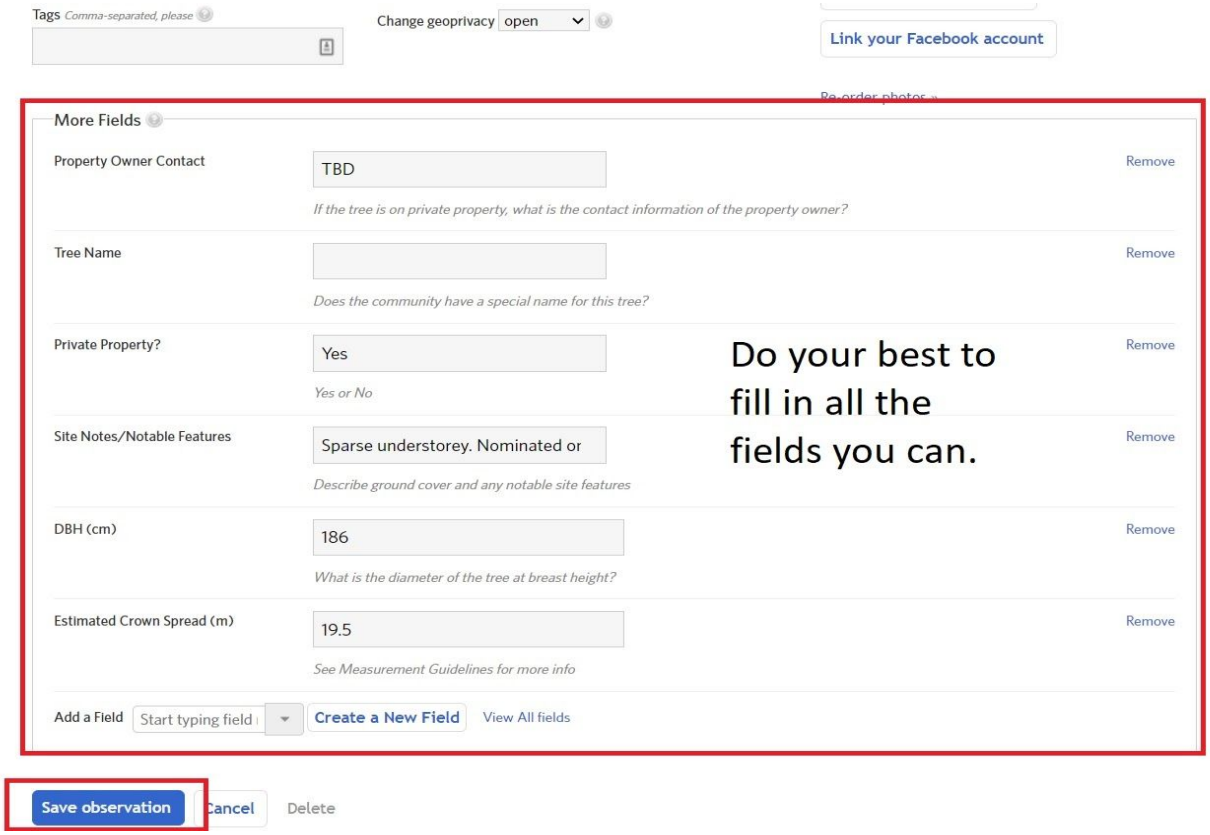
7. Find the observation you just added to the registry. You can do this by going to your observation homepage on iNaturalist and clicking on the observation there. Alternatively, you can visit the [Pender Islands Big Tree Registry landing page] and scroll to the bottom until you see “Recent Observations”. If you see your observation photo click it. If you don’t click “View All” to find it.



8. Once you have found your observation click on it. This will open a new window where you will see the details of your observation. In the top right corner you will see the “Edit” button. Click it.



9. A new menu will open up where you can add all kinds of information about your observation. If you continue to scroll down the page you will see a box containing the data fields specific to the Pender Islands Big Tree Registry including DBH (cm), Avg. Crown Spread (m), and Height (m). Fill in all the information you have. Then click “Save” at the bottom of the page.



10. Repeat steps 8 and 9 for all observations you are adding to the Pender Islands Big Tree Registry.

11. Congratulations! You’re done! The next time you visit the project homepage you will see your observations there!