

Welcome to the Cone Counters project!



Hello!

Below is a brief introduction to the Cone Counters project, examples of conifers and what new cones look like, and what to expect when submitting an observation to the Cone Counters project through iNaturalist. Thanks for your interest and get ready to count some cones!

Why count cones?

This project aims to understand patterns of tree reproduction at regional to continental to global scales, and focuses specifically on conifers and their cone production. Conifer cone production follows a pattern called “mast seeding” which means there is highly variable reproduction across years (most years there are none to few cones produced by trees, and some years there are *LOTS and LOTS* of cones produced) in a population of perennial plants. These mast-seeding patterns are often highly synchronized locally, which means trees may behave similarly to each other.

The goal of this project is to quantify new reproduction in conifers in as many geographic areas as possible to understand what drives conifer reproduction. To accomplish this goal, having people contribute data from a wide variety of locations is necessary.

What do conifer trees look like?

Conifers are trees that have needles or scale-like leaves, and produce cones that contain seeds. Conifers include pine, spruce, fir, hemlock, cedar, tamarack, etc.

What do new conifer cones look like?

New conifer cones are green or purple, these are the ones to count! If you see brown, woody cones, these are old cones from previous years (don't count these). *Note: data on trees with zero or a few new cones is as valuable as trees with many new cones.*



new white spruce cones



new Balsam fir cones

How to count cones?

- The best time to count new cones is in summer (June to August in the northern hemisphere).
- Choose trees that get a good amount of sun.
- Choose trees that are a size capable of reproducing (often at least 10cm (3.9in) diameter (31.4cm (12.4in) circumference).
- Measure the size of the tree trunk (diameter or circumference) at chest height (1.3m (4ft3in) above the ground).
- Use iNaturalist to determine the tree species.
- Count the cones.
 - Stand in one spot with a view of the tree (with at least the top 1/3 visible). Stay in this spot, and use binoculars for the count.
 - Tip: Start on the lower right side of where there are new cones, follow the branches from the trunk to the end of the branch, then move up to the next branch. Count up to the top of the tree, and then go down the left side of the tree to count all visible new cones.
 - Tip: If there are many cones, count in groups of 5, 10, 25, or 50 cones, then multiply the number of groups you counted by the number of cones per group.
 - Estimate what fraction of the cones you think you can see.



old, brown & open cones
(don't count these)



good cones to count

On social media? Post about the project on Twitter using #ConeCounters

Where should you sample from?

Anywhere! Your yard, neighbourhood, when camping, hiking, etc. As long as you choose a conifer tree (one or more!) to count, and note the location when submitting the form on iNaturalist. This is a multi-year project, so you could keep track of those trees across years, or samples can be one-time observations too. Do be careful to avoid sampling on private property without permission.

What you'll need:

- Binoculars
- Camera (phone or other)
- Tape measure or DBH (diameter at breast height) tape
- A place to write down measurements (if not filling out on iNaturalist as you go)
- Link to Cone Counters project on iNaturalist: <https://www.inaturalist.org/projects/cone-counters-assess-new-reproduction-in-conifer-trees> (QR code will link to website; or see below for form & email options).



Details on iNaturalist Fields (those with a "" are required)*

(Don't want to join iNaturalist? Either: enter this info in a form [HERE](#) – no sign-in required OR email the required info below to ConeCounters@gmail.com)

***"What did you see?"** – This field will be accompanied by a search bar. Type in the species you saw, or pick a suggested species from iNaturalist and we'll ID it later. Knowing the species of the tree observed allows us to look at species-specific and community-level patterns. It must be in the taxon Pinales (conifers).

***"Where were you?"** – This field will be accompanied by a map. Type in the location of the area you were in when you saw the tree.

***"Add media"** – Upload a photo of the tree you saw. Please take clear photos, and include a photo of the entire tree or at least the top 1/3 of the tree, a branch with needles, and the bark.

***"stemDiameter" OR "stemCircumference"** – One of these is required. Take the diameter OR circumference of the tree trunk at chest height (about 1.3m above the ground) using a measuring tape. This is also sometimes called "diameter at breast height" or DBH. Typically trees $\geq 10\text{cm}/4\text{in dbh}$ (31.4cm/12.4in circumference).

***"units for stemDiameter or stemCircumference"** – indicate if cm or inches

***"cropYear"** – This is the year in which the crop will mature and fall. For conifers, this will always be the current year (e.g., 2021 when counted in 2021).

***"cropCount"** – This is the number of new cones observed, using binoculars to count them.

***"cropFraction"** – Estimate of fraction of the total crop represented by the count, a decimal fraction between zero and one.

***"canopyClass"** – Canopy class determines where the tree is located in the canopy. (*Note: only select trees to use from 1-3*) Choose one of the numbers below to describe your tree:

1 = open grown (a single tree out in the open);

2 = full sun (a tree, usually taller than others, grouped with others, but is overtopping other trees and the entire crown is getting full sun);

3 = partially shaded (a tree grouped with others receiving some sun on the entire crown, it is partially shaded/overtopped by another tree or trees);

4 = mostly shaded (this tree is mostly overtopped by other trees and the crown receives little sunlight, may be shorter)

5 = full shade (this tree is completely overtopped and the crown receives no sunlight, shorter tree)

Optional fields:

“treelIdentifier” – An ID to remember the individual tree by later. If you know the species scientific/common name this could be “WS-1” or “PIGL-1” for a white spruce tree, for example. If you don’t know or aren’t sure of the species you can label it based on your location i.e. “MontrosePoint-1”.

“cropCount2” – Use this field if a second cropYear is visible and you counted those old cones (for conifers, crops from the previous season can be visible as old, woody brown cones from previous year).

“cropYear2” – This will always be the previous year for conifers.

“stemDiameter2” – Use this field if there is a second “stem” or trunk. Use this field if your tree’s trunk splits into two.

“stemDiameter3” – Use this field if there is a third “stem” or trunk. Use this field if your tree’s trunk splits into three.

“cropCount3” – N/A for conifer trees

“cropYear3” – N/A for conifer trees

“crownRadius” – in meters

“treeHt” – tree height in meters

“reproHt” – height to base of reproductive canopy

“refHt” – height of reference object in photo

On social media? Post about the project using #ConeCounters and follow [@LaMontagneLab](https://twitter.com/LaMontagneLab) for updates

Thank you for being part of this community science effort!

Sincerely,
Jalene LaMontagne
<http://lamontagnelab.weebly.com/>

Interested in doing this for deciduous trees? Check out <https://www.inaturalist.org/projects/mastif>