

Sugar Pine Foundation Planting Lesson



Sugar Pines, the most princely of pines with enormous cones hanging at the end of its long, octopus-like branches, has five needles in a bunch.

What are Sugar Pines?

Sugar pines (*Pinus lambertiana*) belong to a group of trees known as white pines which are also referred to as a 5 needle pines because their needles grow in bundles of 5. What other trees belong to this group? In California: whitebark pine, western white pine, foxtail pine, limber pine, and the oldest: the bristlecone pine! Sugar pines are famous because they are the largest pine species (up to 250 feet tall) and also have the longest pine cones in the world (up to 24 inches in length). They provide excellent food and habitat for wildlife and have thick, fire resistant bark. They also have a sweet sap which is why they are called “sugar” pines.

Further questions:

- *What kind of trees do you see everyday?*
- *Note the characteristics of the plants around your area: is it dense or open, is the soil dry or moist, what is your elevation and aspect (i.e. which cardinal direction are you facing)?*
- *Do you see any sugar pines? How many and in what areas? Are they healthy or sick?*



Why are Sugar Pines dying?

Sugar pines historically accounted for 25% of Tahoe's lake level forests but are now less than 5% due to logging, fire suppression and a non-native invasive fungus called white pine blister rust. Once infected with Blister rust more than 90% of sugar pines will not survive!

In the Comstock Era (1859 -1878), the Tahoe forest was clear cut because wood was needed for firewood, building and to shore up mine shafts. Since then, the forest grew back as a predominantly even-aged Jeffrey pine forest - with sugar pine only on rocky hilltops and other locations difficult to access. Fire suppression through the 20th century allowed for a lot of vegetation growth and therefore an unnatural accumulation of dried wood and forest litter (a.k.a. forest fuels). White fir, unlike sugar pines, tolerate shade and thrive in a dense forest which is why you see so many of them in our forests today. Since 2010, a large part of the Tahoe forest has been thinned in an effort to improve forest diversity and health. These treatments have opened up spaces that allow light to reach the forest floor and created the perfect conditions for planting sugar pine seedlings.

Further questions:

- *Why are non-native species a threat to the ecosystem?*
- *Where did old growth sugar pines remain after the Comstock logging?*
- *Why is it important to restore sugar pines and forest diversity in general?*



How do we restore Sugar Pines?

Scientists and land managers have agreed that the only way to restore white pines is to find trees that are resistant to the disease, and gather their seeds and plant the next generation of trees. The Sugar Pine Foundation has identified 66 resistant seed trees in and around the Tahoe Basin. We collect ripe cones from these trees every fall. A nursery helps germinate and grow the seed we collect into 1 year-old seedlings, which volunteers help us to plant every spring and fall. The seedlings are planted in clearings and other forest openings such as recently burned forests, fuel reduction projects, avalanche paths, eroded slopes, old logging roads, former construction sites, etc. The survival rates are best on the wetter slopes of the West Shore and north/east facing aspects. Hot, dry, sandy, rocky, south facing slopes are less favorable.

Watch our short film “The Seedling” to learn more about the Sugar Pine Foundation:

<https://youtu.be/D5D65IIQEB4>

Further questions:

- *What is a good place to plant a sugar pine seedling?*
- *Do I have space for sugar pines in my yard? Where?*
- *What areas could benefit from some sugar pine seedlings? Why?*



How can I help?

Plant!

We need help planting seedlings every spring and fall! Every year is different, but planting usually takes place in October-November and April-May. You can get seedlings from us directly through our [Shop](#) or at a planting. Stay up to date with our plans each season through our [Calendar](#) and by following us on [Facebook](#)!

If you are planting on your own, please refer to the detailed Planting Instructions below in this document!

Become a Citizen Scientist!

Join our [Sugar Pine Restoration Monitoring Project](#) on CitSci.org to add your data: where you planted, how many trees you planted, if and when you watered, and the number of surviving seedlings you count on each visit over the years! You can download apps for [iPhone](#) and [Android](#) phones to make data recording quick and easy!

Watering and monitoring your sugar pine seedlings in their tender first 3 years will greatly increase their chance of survival! While it would be phenomenal to get data for how seedlings fare over the course of their lifetime, we certainly don't expect this of our Citizen Scientists!

Logging where you plant, when you water, photographing your trees, and counting how many trees survive over their first 3-5 years is incredibly useful data for us - we'd love it if you can commit a few years to this rewarding project!

Water!

Bringing your friends and family back to water your trees in the summer is incredibly helpful. These babies need your help to survive our hot, dry summers! Joining our CitSci project as a Citizen Scientist and Steward will help us learn about how much watering aids survival, which types of planting sites are most favorable and how our next generation of sugar pines is faring!

Please refer to the detailed Seedling Care Instructions included below in this document!

Take Photos!

Please take photos and videos and share them with us! Send us photos at admin@sugarpinefoundation.org or tag us on social media when you post!

Use #spf2020 on all trees planted this year. If it is not 2020 then #spf2021, #spf2022, etc ...

Detailed instructions for Rephotographing your seedlings as they develop are included in the Seedling Care Instructions if you are interested in taking your seedling photography to the next level!



A Message from our Executive Director:

<https://vimeo.com/389071228>

Planting Instructions

- **WHERE TO PLANT?** - Forest openings where the tree will have plenty of light and space to grow. Beneath a mature tree is not a good idea.
- Pro Tip: Micro habitats by a log, rock or a nurse plant are ideal!
- **Before digging, REMOVE ALL THE “DUFF”** - pine needles or other decomposing forest litter that is on top of the soil. Scrape duff off to the side until you have bare mineral soil.
 - Pro Tip: “Duff is the stuff that makes trees grow tuff.” Keep it nearby to use it later as mulch around your newly planted tree.
- **DIG A HOLE** - as deep as your shovel spade is long, about 8-10” deep. If you are encountering rocks or having an unusually hard time, try a different spot.
 - Pro Tip: Don’t toss your good soil away as you’re digging. It is best to place it beside your hole so that you can quickly and easily refill the hole with this native soil.
- **PLACE YOUR TREE in the hole** - keep the roots straight up and down! NO J ROOTS.
 - Pro Tip: Make sure the hole is deep enough that all of the roots are at least 1 inch beneath the level of the ground. Dig a deeper hole if necessary!
- **Refill the hole with SOIL.** Do not refill with duff, pine needles, rocks or other debris. Sometimes some small rocks and pine needles will sneak in - that’s ok.
 - Pro Tip: It is better to “mine” soil from nearby to properly refill your hole with soil if you have to. Try not to leave craters behind by refilling as you can.
- **COVER ALL OF THE ROOTS WITH SOIL.** It is very important that ALL of the delicate little white roots are covered with soil. Take your time and pay attention to do it right.
- **Do the “TREE DANCE”** - Carefully “dance” around your tree, packing the soil around the roots. You can also pack the soil with your hands as you refill, but the tree dance is easier and more fun. Packing the soil is important so the roots don't dry out.
 - Pro Tip: Kids are the perfect size and weight for tree dancing. Also this works great for adults as long as you step carefully.
- **Do the TUG TEST.** Gently but firmly pull on the stem of your tree to make sure it does not easily come out. If it comes out then you must start over and replant if necessary.
- **MULCH with all of the DUFF you initially removed.** Covering the bare soil with 1-2” of duff prevents the soil from drying out. It works just like mulch in your garden.
- **BUILD A TREE SHRINE.** Surround your tree with pine cones, rocks, sticks and whatever else you have available. This makes it easier to find on future watering missions.
- **WATER** your newly planted seedling. It is not necessary, but it does help.
- **PLANT AGAIN** - Walk 10 ft in any direction and plant again. It’s a good idea to concentrate your trees so they are easier to find on later watering missions.

Here's a GREAT instructional tree planting video:
<https://www.youtube.com/watch?v=dMIXScJfP9>

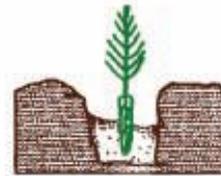
Basic Tree Planting Steps:



4.2.1 Insert shovel vertically with blade reversed push handle forward, then pull soil back and out of hole. The hole should be large enough so the entire root plug easily fits into it.



4.2.2 Straighten back of hole and insert seedling at proper depth. The top of the root plug should be at least 1 to 2.5 cm below the soil line as long as the foliage will not be buried.



4.2.3 Hold the seedling in place and fill the hole half way with moist soil.



4.2.4 Fill the hole with moist soil, pack with your hand and cover surface with a mulch of loose, dry soil.



4.2.5 This properly planted seedling had its original plug buried 1 to 2.5 cm below this soil line. None of its foliage is buried.



4.2.6 Avoid the "Death Stomp." Packing the soil with your foot or planting tool severely compacts the soil and decreases seedling growth.

Seedling Care Instructions

Hopefully you have become a Citizen Scientist and joined our [Sugar Pine Restoration Monitoring Project](#) on CitSci.org! **Whether you're a Citizen Scientist or not, caring for your seedlings is critical to their success!**

It takes 3-5 years for native species like sugar pines to establish their roots and become self sustaining. Seedlings that are watered and taken care of have more than a 70% chance of surviving. If left alone, maybe 25% will survive.

As a Citizen Scientist, you will help us by recording when and how much you water, photographing your trees as they grow, and regularly counting your surviving seedlings to monitor survival over their first 3-5 years.

Citizen Scientist or no, after planting, it's incredibly helpful to monitor and water your baby trees! Tag teaming with friends and family members is a great way to share this responsibility and ensure that your seedlings thrive! Read on for what you can do for your babies!

PAY ATTENTION

Keeping an eye on your seedlings is the super important first step in and helping your seedlings survive! It's a great awareness activity that changes weekly, every season and every year. Paying attention to your seedlings increases their chance of survival and helps you know what they need! For example:

- when and how much to water
- if they might need some extra protection against pests
- if they need more mulch

It's easiest to check on seedlings planted in your yard or neighborhood, somewhere you can visit each week. Taking a hike to visit seedlings planted further afield is extremely useful if you can manage it - especially in the summertime!

If possible, check on your seedlings at least once a week!

WATER

Watering your seedlings is very helpful but the details of how much and how often are incredibly site-specific. It is hard to give a general prescription for watering because the trees have different needs if it is hot or cold, if we have had recent precipitation or if we are in a drought year.



The number one rule of thumb when watering is to make sure that the soil does not remain saturated!

When you do water, be sure to give them a good drink. Soak the ground when watering, but let the soil drain FULLY in between watering sessions. So even if you watered your trees two weeks ago and returned to find the ground still wet, do not water them until the soil has dried out again.

WHY?!

Because tree roots need to both drink AND breathe! The roots will drown and rot if the soil remains wet.

Differences in soils and sun versus shade largely determine how often you should water your seedlings. Sunny, exposed, and/or south-facing sites usually dry out faster and will need to be watered more often. Shady, north-facing sites not as much. Loose, sandy soils - including decomposed granite areas - need to be watered more frequently because they drain quickly. Sticky, clayey soils and soil with more organic matter (humus) retain moisture and do not need to be watered as often. Depending on the site, draining the soil could take a few hours or a

few days! In the heat of summer, sunny sandy sites could use water each day, whereas shady north-facing sites might only need water once a week.

As long as the soil is drying out between soakings, watering every 1-2 times each week should help most seedlings thrive in most places.

Summer is hot and dry and hard on baby trees trying to establish themselves. *Summer is the most important time to visit and water regularly!*

We thank all of you Citizen Scientists for logging your Watering visits in our [Sugar Pine Restoration Monitoring Project](#) on CitSci.org!

ADD MULCH

Forest litter, or “duff,” is Nature’s mulch. Covering the soil around the seedling with a thick “blanket” of duff - pine needles, sticks, decomposed wood, etc - helps shade the soil, retain moisture and even guard against frost. **Each tree should have at least 2 inches of mulch covering the root area.** We recommend covering the entire stem up to the first needles with a thick layer of mulch. Over time, these materials naturally break down and return to the soil. Re-mulching around your tree is very helpful and one of the easiest things you can do to increase survival rates. No need to use fancy gardening mulch - Nature provides everything you need! Sometimes you need to be resourceful to find material to mulch with, but usually there’s plenty around.

PROTECT



Baby trees are tasty treats for rabbits, deer and other animals.

This young seedling has been getting browsed by bunnies, but it keeps on coming back!

Don't give up on trees that appear to be too far gone. As long as the roots and some of the stem survives, they can live if given some help.

If possible and appropriate, you can protect seedlings with wire mesh or clear plastic cylinders. Big rocks, logs or a “treehouse” may help too. This is an extra credit project, for sure!

We do not recommend protecting trees planted on public lands. Better - and easier! - to do this on your own property.

FERTILIZE

Tahoe’s soils are quite nutrient-poor so, when used sparingly, common organic fertilizers will help your seedlings thrive! Compost Tea or similar organic products mixed with water and applied as a liquid are recommended. Inquiring with your local native plants nursery to find out what fertilizer they use is also a good idea.

REPHOTOGRAPH

Rephotography is the process of taking the same pictures over time to show how an environment changes. It's like a time lapse image but on the order of years and decades not hours and days. In fact, much of our understanding of what natural environments looked like historically comes from photos never intended for scientific use. We can now restore places using these old photos as a reference point to what it was like before logging, fire suppression and other modern changes occurred.

This is why it is important for you to take good pictures of your seedlings growing and thriving!

Rephotography Step 1: Decide how many trees to include in the rephotography project. We would love to get at least one photo of each tree for scientific purposes but if you planted 10 trees you can choose just 1 or 2 that are your favorites to photograph.

Rephotography Step 2: Seedlings are small, so **photograph low to the ground**. Be sure to include a couple of obvious and “permanent” or easily visible markers in the photo. You will use these markers in the future to take the same image so be mindful and take your time. Also, be sure there is room for your tree to grow in your image. Shoot a close image from 3-4 feet away. A medium distance from 10-20 feet away and a wide shot from 30-50 feet away.

PRO TIP! When shooting far away wide shots, have a person stand next to your tree so it's actually visible and for a size comparison

Rephotography Step 3: repeat this process roughly 4 times per year. Return for the same process once every season. Spring, summer, fall and winter. Be sure to choose a good time of day so the lighting helps your image. Ideally before 11 am or after 3pm.

Rephotography Step 4: Repeat as much as possible! We thank all of our Citizen Scientists for logging photos of your seedlings in our [Sugar Pine Restoration Monitoring Project](#) on CitSci.org! Monitoring, watering and photographing your trees in their first 3-5 years provides us with incredibly useful data!