



PNW Native Coppice Garden

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Society of Ecological Restoration

Overview

Propagation by cutting livestock is a quick and inexpensive way to produce new native plants. Livestakes are often installed at restoration projects to increase biodiversity, provide habitat for wildlife, and control erosion. This article provides a general guide UWBG UW students may also benefit from plant ID experience and harvest their own native cuttings for school projects.

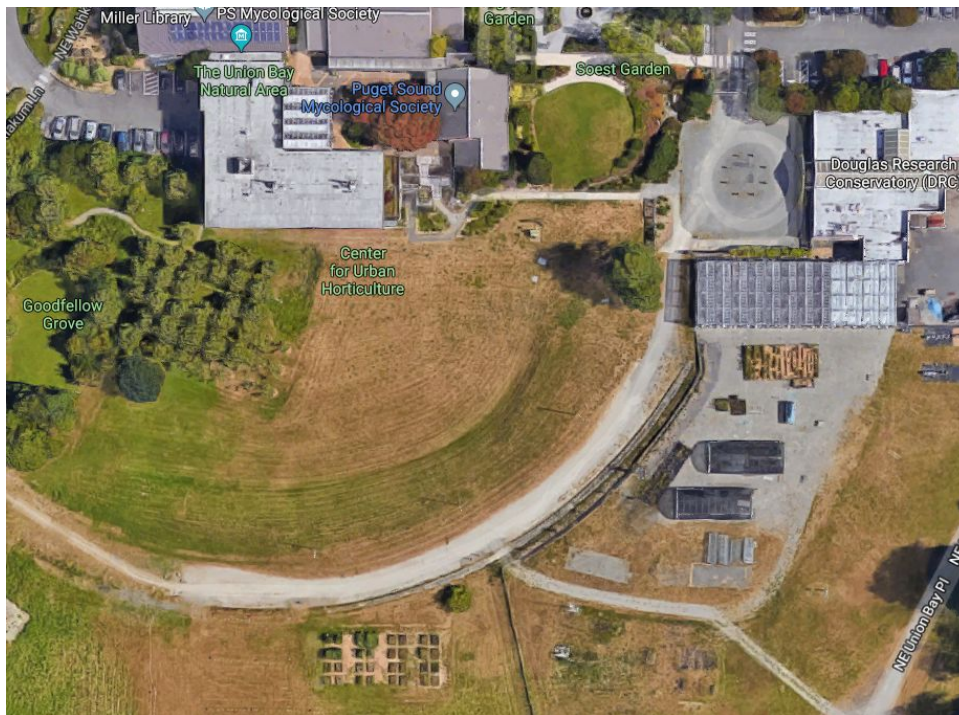



Image from Google Maps

Coppice garden will be located on the east half of the rectangular garden beds on the southern bottom of the map.

While researching for how to manage a coppice garden, I found that most sources use willows and cottonwood for Short Rotation Coppice (SRC), where the goal of stake harvest is for energy (biofuel or firewood). I contacted a few local native nurseries to see if they have input on the topic, and most nurseries replied that they harvest their livestock from the wild. Which wasn't helpful. Due to limited resource, most of my research was done on SRC style management because their goal is to also promote plants to grow stakes even if



they are not intended for restoration purposes. Overall, this paper provides a general guideline on how to grow coppice plants and it leaves room for experimentation. Further monitoring and try-and-error will help us understand how to efficiently produce quality livestakes in the future.

Planting Area

The location of the coppice garden will be based near the nursery hoop house. The UWBG owns the property that's a grassy, leveled open field with 32 raised garden beds that are currently not in use. 16 of these garden beds will be under the care of SER-UW for the coppice garden project. The southeast-most bed is reserved for planting Camassia bulbs, which leaves 15 for coppice plants. These beds were previously planted with roses and vegetables, and have not been maintained so they are filled with weeds. Some weathered-looking irrigation systems also exists in these beds, but they will need to be reinstalled.

Each raised bed is measured 4'5 wide, 6' long and 1'2" deep from ground level and can hold approximately 1 cubic foot soil in each bed. The frames are held by untreated 2" by 6" wood planks that will need to be periodically maintained for structure. Beds are lined with black fabric on the bottom to contain roots.

From October to December 2017, Friday work party volunteers helped remove unwanted weeds, blackberries and dug out surface soil. Derek decided to keep the bottom soil because they are good mineral soil with little weed contamination. In the end, I estimated we will need 6 cubic yards of topsoil to refill the beds for planting. In December 2017, 6 cubic yards of winter/supreme topsoil mix was ordered from Pacific Topsoil Inc. and delivered to us.

Since the garden is located by the popular Union Bay Natural Area trail entrance with regular citizen and faculty flow, educational signs should be put up once the plants are installed. Educational signs can highlight topics like environmental restoration, livestakes, and species in the coppice garden.

Species

Below are a list of potential species that could be harvested for livestakes or cuttings. Willows are not limited to the two species listed and more varieties could be implemented as needed.

	Sitka Willow (<i>Salix sitchensis</i>)	Pacific Willow (<i>Salix lucida</i>)	Black Cottonwood (<i>Populus trichocarpa</i>)	Quaking Aspen (<i>Populus tremuloides</i>)
Care of parent plant	Full sun to part shade Moist soil	Full sun to part shade, moist soil Frequent watering required in summer	Full sun, well drained soil	Full sun, moist to well drained soil
Number per bed	2 plants per bed max to allow enough spacing	2 plants per bed max to allow enough spacing	2 plants per bed max to allow enough spacing	2 plants per bed max to allow enough spacing for root growth
Shaping	Parent plant main trunk should be cut off 3-6" above ground during the first winter to promote lifestake production.	Parent plant main trunk should be cut off 3-6" above ground during the first winter to promote lifestake production.	Parent plant main trunk should be cut off 6" above ground during the first winter to promote lifestake production.	Parent plant should be pruned back regularly to promote root growth as above ground vegetation can't be used as cutting.
Cutting method	Stakes should be cut at 2 buds to the base at around 1" diameter and 18-24' length.	Stakes should be cut at 2 buds to the base at around 1" diameter and 18-24' length.	Stakes should be cut at 2 buds to the base at around 1" diameter and 18-24' length.	Cuttings must be harvested as roots. Root cuttings should be ½ to 1" in diameter and >6" in length.
Other info	High stake success rate, fast and good rooter. Parent plant can be started as a stake.	High stake success rate. Fast and good rooter.	High stake success rate. Can tolerate drier conditions than willows but should not be planted	This species cannot be successfully propagated by stem cutting alone. Some

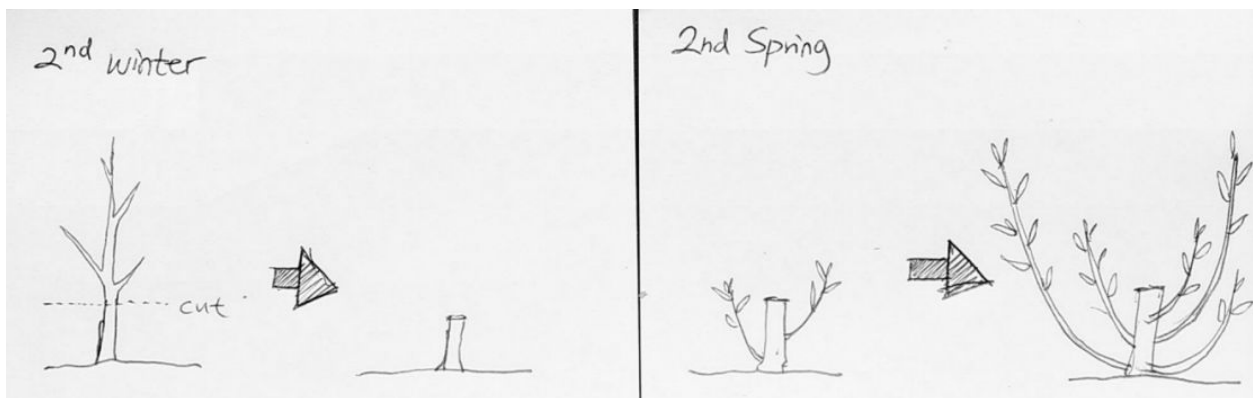
			under power lines due to height of tree.	roots must be harvested.
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	Twinberry (<i>Lonicera involucrata</i>)	Snowberry (<i>Albus Symphoricarpos</i>)	Red Osier Dogwood (<i>Cornus sericea</i>)	Pacific Ninebark (<i>Physocarpus capitatus</i>)
Care of parent plant	Full sun, moist to well drained soil.	Well drained soil and full sun	Prefers wet soil	Thrives in high moisture wetland soil
Shaping	Naturally grows in a viney, messy form. Should be fine with some pruning.	Snowberry naturally grows in a bushy form so no shaping required.	Parent plant's main trunk should be cut off 3-6" above ground during the first winter to promote livestock production.	Ninebark naturally grows in a bushy form. Thinner branches can be trimmed off to increase size of desired stakes.
Number per bed	3-4 plants per bed	3-5 individual plants per bed	3-4 plants per bed	3-4 plants per bed
Cutting method	Plant will be vine-like, select for long, straight hardwood branches.	Snowberries have thin branches. Select for hardwood stems that's at least the size of	Select for straight, long branches that's around ½" to 1" in diameter and 2-3 ft.	Select for straight, long hardwood branches around ¾" to 1" in diameter and 2-3 ft.

		a headphone cord.		
Other info	Rooting hormone can be used to promote root growth.	Snowberry will also send out side shoots that can also be harvested by severing the runner.	Stakes do best in very moist soil	Stakes do best in very moist places like riverbank

Plant Care

The general trend for stimulating side shoot growth on tree species is to cut off main stem from the plant during the winter after the first year of growth. While with shrubby species like snowberries, the plant can be left alone and grow in a natural shape.



This is a reference drawing of how the plant should be treated initially to shape for stake growth. The 1st winter is when the plant is first planted, and one year of natural growth should be allowed to establish root systems and increase survival. After plant enters dormancy in the second winter, the plant could be “beheaded” from 1-2 nodes above ground with a sharp and sanitized utensil. Do not harvest more than 10-15% of the parent plant as it will severely lower the photosynthesis capacity to keep the plant alive. We rather limit our harvest in the beginning to allow greater yield later on. As the parent plant grows larger and more mature, bigger stakes can be harvested with higher yield.

Genetic Diversity

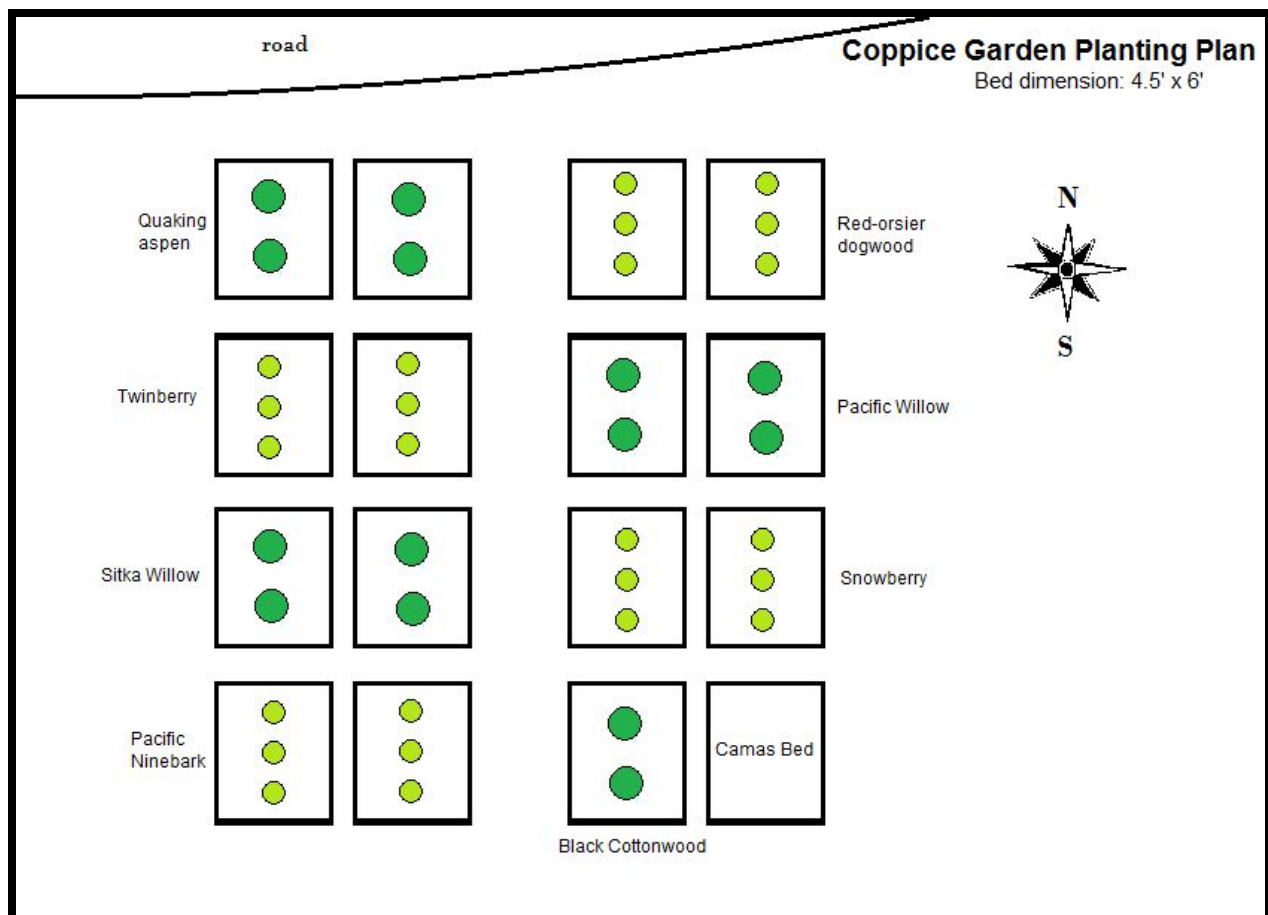
The goal of environmental restoration is to establish habitats that’s not only healthy and thriving at the moment, but also diverse and resilient. The nursery makes an effort to avoid cultivating monogenetic plants by sourcing its plants from different regions. The same

effort should be made in the coppice garden so each species of stakes are genetically consisting of at least 2 sources.

In addition to plant different genetic lines of coppice plants, we will also collected wild willow stakes when it comes to restoration works to further increase genetic diversity. We should use as many sources of stakes as we can.

Planting Plan

The following picture is a tentative layout of where each species go in the garden. To prevent the larger willow and poplar species from out-shading smaller plants and each other, I placed them alternatively by row and column. Black Cottonwood should be sufficient with one bed because Professor Ewing noted that the species spread easily by seed and will establish sites without human introduction.



Maintenance

Irrigation in hot summer months is required for all plants. Some species, such as Pacific Ninebark, will need more moisture than others to do well. There are some old existing irrigation lines in the garden beds that should be replaced.

Weeds will also inevitably grow in the garden beds so regular weeding is recommended. This is a great way to occupy volunteers on a clear day.


Stakes should be harvested during the winter dormant season, between December to February after the leaves have fallen off. [King County](#) recommends that stakes should be cut off with a sharp, sanitized tool to minimize damage and risk of infection to the parent plant. The top end of the stake could be brushed with latex paint to prevent water loss. Side branches should be trimmed and stakes should be stored in a cool, moist place and be installed in desired area as soon as possible.

Cost Estimation

Overall, the coppice garden should be a low cost project since it's built on existing infrastructures. The initial cost of the installation will be the soil, plants and repairing materials. Each cubic yard of soil is a little over \$30 after delivery fees, and each wood plank costs about \$10 at Home Depot and both should last for at least a couple years. The nursery has most of the plant species that are needed with the exception of Quaking Aspen, and potentially a few pots of plants to increase genetic diversity. Willow species could be harvested from the wild as stakes, but it will take longer for the plant to establish itself and willows are tricky to identify the correct species.

Care for Camassia Bulbs

The Camassia is a genus of perennial herbs that produce beautiful blue-violet colored flowers in Western Washington. The Camas bulbs are traditionally eaten as a staple by Native American tribes and hold significant ethnobotany value to this day. The Nursery currently grows two species of Camassia: *Camassia quamash*, or Common Camas, and the *Camassia leichtlinii*, or Great Camas. Both species naturally inhabits moist meadows and prairie depressions and have similar growing conditions. Great Camas are generally larger in both below and above ground growth and some differences in flower petals. After the flowers wither, seed pods will appear and the Camassia will self-seed into the soil. Bulbs may also divide into daughter bulbs, although incisions of the mother bulb might be required. Due to the slow growing rate of the bulbs and high popularity with SER-UW's the



public plant sales, propagation of Camassia by both seeds and small bulbs is highly encouraged.

All of the care info is referenced from Derek Allens and [USDA](#).

Harvest of Bulbs

After the Camassia has flowered and seeded, bulbs should be removed from the garden bed up following quiescent. Ideal harvest time would be after the leaves have died back so the nutrients return to the bulbs, and the plant becomes dormant. Between October to November. Seed pods could be collected after they turn light brown and crack open. If not collected, seeds will fall into the soil and become new plants with a tiny bulb.

Gently sift through the garden bed soil and pick out the Camas bulbs. Avoid digging forcefully to prevent damaging the bulbs. The size of the bulb could range from the size of a radish to as small as a grape seed. The bigger the bulb, the deeper in soil it's most likely to be.

Smaller bulbs that are planted in cones are fine with being left in the cones.

Storage

After the Camas bulbs are removed from soil, proper storage is important to prevent mold and degradation. Allow bulbs to dry and brush off excess dirt. Store bulbs in a paper bag in a cool, dark place. Check bulbs once or twice a month to make sure they are healthy. Some underground pests may eat away at the bulb, further observation on the impact of the pests should be taken.

Some bulbs will start to sprout new shoots around December. The bulbs that are breaking their dormancy should be prioritized to be potted.

Propagation

Both Camassia could be propagated by seed and daughter bulbs. Seeds requires a 90 day cool stratification period before germination. The cons of propagation by seed is that the infant plant will take many growing seasons before it will flower and be ready for sale. The size of the bulb also increases very slowly, and it might take at least 5 years for a seed to grow into a decently sized bulb.

Smaller sized bulbs could be planted into cones during winter season. Bulbs should be planted around 2-3 inches deep, with the pointy end on top. Planting these bulbs will be a slow process and a great way to occupy volunteers during Friday work parties on rainy

days. Remember to tag each species of Camas carefully because it will be almost impossible to distinguish the two species until they flower.

Currently, we are not sure of how to encourage a mature bulb to produce daughter bulbs. Some sources suggest scoring a star shaped mark on the bottom of a large bulb with a clean knife before planting. Nursery managers could conduct experiments with this method to confirm its validation.

Due to the sheer number of small bulbs the nursery currently have (several hundreds), any unpotted bulbs could be buried in the flower bed in the coppice garden that is reserved for camas. This is to allow the tiny bulbs to continue to put on size.



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An example of what daughter bulbs look like on the parent bulb.

Plant Sale Management

Camassia bulbs are very popular in previous plant sales and could be priced moderately high. Larger bulbs should be collected into small paper bags and priced by weight. Bulb size could be determined by measuring the circumference around the bulb. In the past, bulbs were sold by 1 oz bags that had 5-7 bulbs, and sold for \$7 per bag. The plan is to increase the price to maybe \$10 because we have been successfully sold out.

Medium sized bulbs should be potted in 1 gallon pots and should be in bloom for the spring plant sale.