

# Chuckanut Community Forest Restoration Design Project

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## Restoring Compacted Soils

To restore compacted soils where trails are to be removed or narrowed, my approach would be through community service. Not only is this free for the city, but it gives people a connection to the place through helping restore it. To conduct this project, everyone would bring their gardening tools, shovels, rakes, rented plows and deep ripper machines to conduct deep tillage and deep ripping at least 4 feet down in the soil, incorporating leaf litter along the way. To maintain the newly uncompacted soils, deep rooted native plants (see figure 1.) will be planted to prevent erosion and deter people from re compacting said soil. The community could reach out to local hardware stores and see if they would be willing to sponsor the project by donating rental equipment (plows, ripper blades). Another possible way to restore the soil is through Western Washington University classes, perhaps teachers could offer extra credit to students that volunteer their time restoring soils. Finally, environmental science and biology classes could take field trips to The Chuckanut community Forest to help with this massive project while at the same time getting hands on experience about what their learning.

## Restoring Vegetation

One way to restore vegetation would be to have a community event, gathering seeds in the summer. Then, everyone would germinate and raise the seedlings. We could also reach out to local garden centers to see if they would be willing to participate in raising said seedlings, with local garden centers help, the number of plant species we could raise up would drastically increase. After the seedlings are mature enough to plant, we could host yet another community Forest restoration project in which we plant the seedlings in areas with foliage loss, removed trails, and narrowed trails in the fall to guarantee the seedlings get enough water and have an easy transition. Mixing leaf litter into the dirt when filling in the holes would allow the seedlings to thrive with the addition of a natural, local fertilizer I presume that just sustainably gathering seeds would not give us enough plants. To completely replace all the native vegetation, the city would have to get involved and pay for the plants, sourcing them from local Bellingham native plant nurseries. The seedlings would be protected by wrapping the trunks of tree seedlings in recycled plastic sheeting, as well as creating plant protection fences out of rope and large sticks found around the community forest (Figure 3). These fences would be put in place immediately after the seedlings were planted, just beyond the edge of the hole dug, they would be kept up for a minimum of two years. Larger more mature species would also be planted where they were needed to block off the entrances of removed trails as they would be more resistant to deer browse and trampling.

Figure 1. Proposed native plant species, location planted, and their function.

<b>Plant Name</b>	<b>Plant Type</b>	<b>Location</b>	<b>Function</b>
Skunk Cabbage	Perennial	Wetland areas	Keep people on trail/ boardwalk

Salmonberry	Deciduous shrub	Wetland areas	Physical/visual deterrence to closed trail heads
Western Red Cedar	Tree	Wetland areas/ wooded forest	Keep people on trail
Oregon Ash	Tree	Wetland Areas	Physical/visual deterrence to closed trail heads
Red Oisier Dogwood	Tree	Wetland Areas	Physical/visual deterrence to closed trail heads
Nookta Rose	Large shrub	Wetland Areas - Farther away from the trail	Keep people on trail
Devils Club	Large	Wetland Areas - At the head of closed trails	Physical/visual deterrence to closed trail heads
Cascade Oregon Grape	Large shrub	Wooded forest - Closest to sides of narrowed trails	Keep people on trail
Salal	Large Shrub	Wooded Forest - Five or so away from narrowed trails	Thickly planted salal will act as a deterrent to keep people on newly narrowed trails
Nettle	Perennial	Wooded forest/ wetland areas - Closest to narrowed trail	Thickly planted nettles will deter people from going off trail
Thimbleberry	Deciduous shrub	Wooded forest - Farther back at closed trail heads	Visual and physical deterrence from closed trails

Sword Fern	Evergreen shrub	Wooded Forest - All over the place, especially on closed trails	Narrows trails
Black Hawthorn	Large Shrub	Wooded Forest - Farther down closed trails	Physical and visual deterrence to closed trial heads
Ocean Spray	Medium Shrub	Wooded Forest - Near narrowed trails	Keep people from going off trail
Tall Oregon Grape	Large Shrub	Wooded Forest	Physical deterrence to closed trail heads, keeps people from going off trail

Deter Closed Trail Use

The opening of closed trails will be thoroughly planted using spikey, thorny, and toxic plants, going from shortest to tallest. An example of this could be in order from front to back, nettle, Oregon grape, devils club, salmonberry. Another example is dense nettle thickets with large thimbleberry shrubs in the back. More plant suggestions can be found on table 1. The structures or strategies to deter the use of closed trails and to direct visitors to sanctioned trails would be community designed signs and fallen woody debris laid on the sides of the trails. As well as plant protection railings created out of sticks found around the forest and rope (Figure 3). Creating a railing and keeping visitors on the trails. For the signs, I thought it would be fun to have a Bellingham wide kid designed sign competition. They would be given the basic information, something along the lines of “trail closed for restoration” but with anything else they choose to add or say or design (Figure 2). Medium small signs like the example below will be posted in each place that has a red x on the map to keep the restored areas out of harm’s way (Figure 4).

In addition to signs like this at all the possible ex-trails, there will be signs at each entrance of the Chuckanut community Forest outlining the main trails as well as the restoration work that is happening and why it is important to follow the designated path. Finally, there will be very bare bones signs at important trail junctions to help people stay on the main path and get to where they are going. These signs could either be laminated prices on paper attached to wooden stakes or something sturdier made from recycled plastic and would be on the small

side of medium so as not to detract from the forest experience. There could also be a fun competition for teens and adults asking them to make the best trail closed signs they possibly can out of durable recycled materials.

Figure 2. Example signage



### Restrict Visitors to Narrowed Trails

To restrict visitors to narrowed trails, there are a few options. The first using fallen woody debris to outline the narrow trail, which would also be a community service activity. The next option is to line each narrow trail with spiny plants like stinging nettle, taller Oregon grape, salmonberry, and thimbleberry (Figure 1.). Another way to keep trails narrow in areas that are wetlands is using boardwalks (Figure 5). These would be relatively easy to construct and would prevent people from taking wide paths around the standing mud or water. This would also allow maximum hydrologic connection between the wetland patches. Another method that could be used is plant protection railings constructed out of larger sticks and rope, keeping folks on the trail.

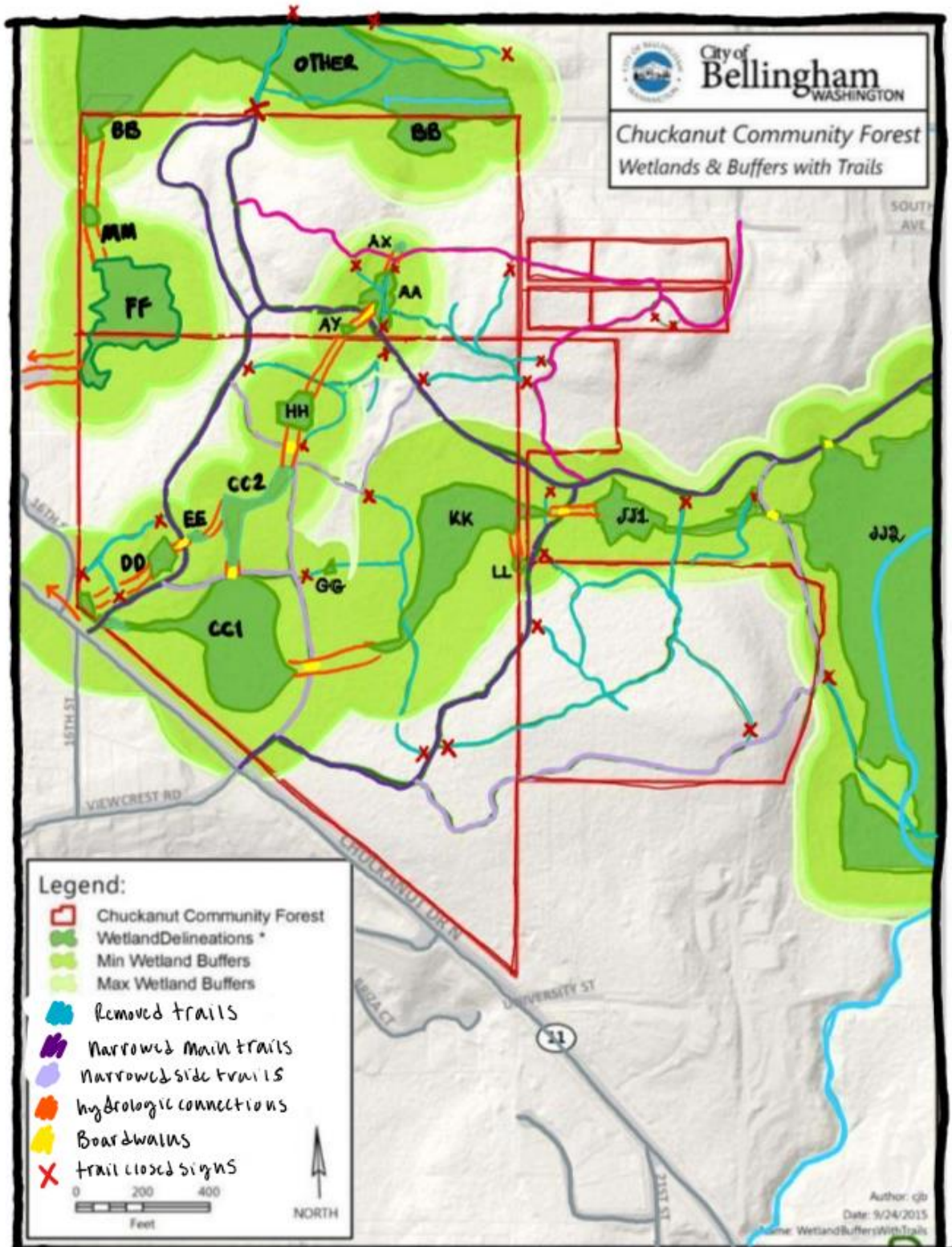
Figure 3. Plant Protection Railings



<https://www.aspentrailfinder.com/braille-trail/>

Map and Description of Mitigation Structures

Figure 4. Map of the Chuckanut Community Forest



## Restore Hydrologic Processes

The main structure to mitigate Wetland loss is the use of boardwalks, specifically in the form of bog bridges (Figure 5). These allow people to enjoy the wetland all they want without harming the wetland in the slightest. In addition, these bridges would be made from local and sustainably sourced wood. These bog bridges would rely on logs laid across the hydrologic channel. Then, boards of wood would be placed on top and nailed to the logs creating a cheap and simple boardwalk that is raised above the water table. In addition, to make these ADA and stroller compliant, they would be 36 inches wide all the way across.

Figure 5. An example of a bog bridge



<https://www.fs.fed.us/t-d/pubs/pdfpubs/pdf07232804/pdf07232804dpi72.pdf>

To restore the hydrologic process, it is vital that all the remnant impervious surfaces from the old logging roads be removed. Like the previous ideas, this effort could be sponsored by local hardware stores. This would give everyone volunteering to remove these roads the heavy-duty machine power to do so and it would not cost the city a dime. The roads would be removed by using the same methods described to renew compacted soils, using plows and tillage machines as well as excavators and bulldozers in areas where access allows. In the Chuckanut community Forest, mountain bikers are responsible for a majority of the small, unmarked trails. These trails contribute to the erosion of the forest and degrade the surrounding habitat. An idea I had to mitigate this situation is to dig a pump track for mountain bikers in the Fairhaven park lawn. The pump track could be like a skate park where it is below the surface of the dirt. The extra dirt from this project could be transported to the illegally dug ditch that is currently draining the wetland. Another vital restoration issue is filling up the trench that is currently draining wetland. This too could be done through community service work parties; the dirt will be local and could be obtained from the excess that came from removing the roads and restoring the function of the wetlands.

## Monitoring and Evaluation Plan

Before any restoration is done to create a baseline, the soil porosity, vegetation density and vegetation cover will be measured on each trail. These measurements will be taken every quarter mile on opposite sides of the trail where restoration is planned on occurring. The width of the trails that will be narrowed will be measured every quarter mile to determine average width as well. Once vegetation is restored, plants will be randomly selected (with coordinates written down) and their height will be measured. These above measurements will be taken in the wetland portion of the CCF as well as the water flow. The effectiveness of signs will also be measured by recording the number and location of newly made trails. One year after the restoration, the variables above will be surveyed again, and the % growth will be determined from comparing the plant heights. The effectiveness of the trail narrowing will also be determined, and if it is not effective, the methods will be reevaluated. The integrity and effectiveness of boardwalks will also be evaluated using the methods above. This also includes hiring a competent wetland scientist to evaluate the effectiveness of the hydrologic connection restoration. Five years later, the same objectives as above will be surveyed again, and the same with ten years later. A final idea for surveying is to put up cameras in specific places and see what wildlife comes to visit, then posting the interesting footage online for all to see and enjoy.