



# Chuckanut Community Forest

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## Restoration Design Plan

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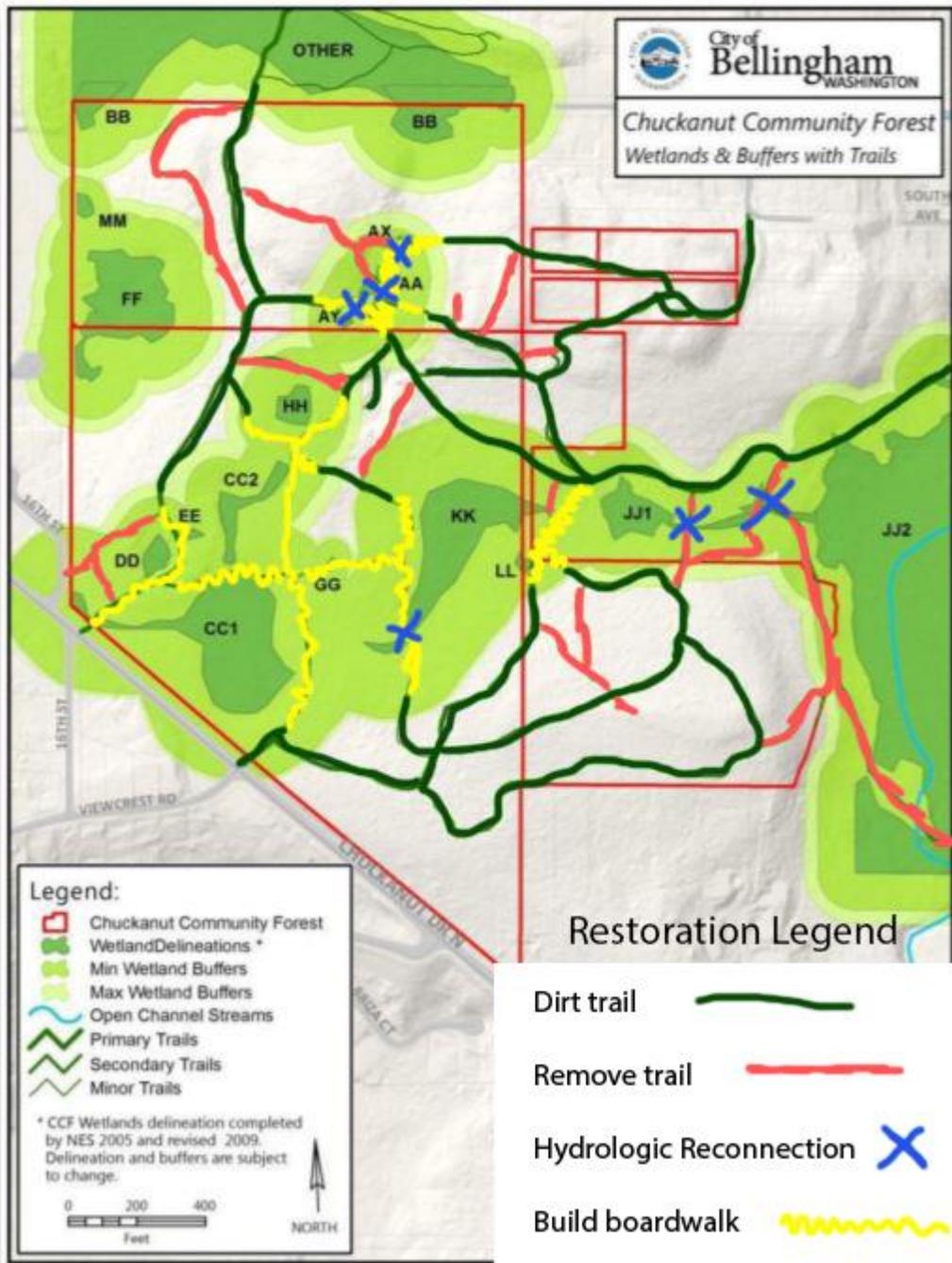
The Chuckanut Community Forest provides an environment for many plant and animal species as well as enjoyment to the human patrons who walk its paths. Constant human presence, however, has begun to degrade the health of the forest. New paths are being formed and old paths are widening to the size of roads. This stomps out vegetation, compacts the soil, and decreases viable habitat for the non-human inhabitants. This also deteriorates the hydrologic connections between the wetlands; a fundamental element in the conservation and creation of the Chuckanut Community Forest. Regular treading over hydrologic connections compresses soils and prevents subsurface flow between wetlands during the wet seasons, thus decreasing the size of the wetland and fracturing the habitat. The widening of trails has also decreased the pleasure of human patrons, who indulge in the solitude of dense forest trails.

My goal with this report is to lay out a strategy the Chuckanut Community Forest Park District may use to enhance forest and wetland health, visitor enjoyment, and the condition and range of non-human habitat. The outline will include methods for soil decompaction, long-term vegetation restoration, recompaction prevention, trail removal and narrowing, reconnection of hydrologic connections, vegetation selection, visitor advisory and community outreach. It will also include an assessment for long-term restoration success.

## Pre-Restoration

The first step in any restoration project is creating a master plan that will lay the foundation for the work needing to happen. In this project specifically, it is essential to spend the time building a well thought out Master Trail Plan. It should consider human recreation factors and desires, rehabilitation and improvement of the wetland and forest areas, future goals of restoration (i.e. reintroduction of salmon), and methods of mitigating undesired degradation.

The map below demonstrates the areas of restoration and changes in trail routes that have been compiled from the Chuckanut Community Forest Park District's Master Trail Plan. In addition, I have included my own recommendations that I believe would benefit the park and everything that spends time there.



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In conjunction with the Master Trail Plan, it is important to get clear on the restoration goals. The goals for this restoration project are as follows.

1. Decompact soils where trails are removed or narrowed
2. Restore vegetation that has been trampled
3. Prevent future recompaction and use of closed trails
4. Prevent future recompaction and widening of narrowed trails
5. Restore hydrologic connections between wetlands

After the completion of the Master Trail Plan, it is time to organize the moving parts and converse with others who do similar work. Most of the work will be done through work parties, based on volunteer participation. Reaching out to organizations like Nooksack Salmon Enhancement Association (NSEA) and the Whatcom Land Trust, for example, to inquire about tools, volunteer bases, and liability and legal aspects. It is also important to find and secure a company to build the boardwalks. The boardwalks are critical in not only allowing hydrologic connections to reform but can also allow for wetland growth without impeding visitor walkways. This creates less of a need for future mitigation.

Another important aspect of the process to decompact soils and restore vegetation is to create a temporary compost of dead leaves and other debris. This will be mixed with the decompacted dirt to return nutrients to the soils.

In addition, the proper species of plants must be selected to restore vegetation along narrowed trails, over removed trails, and near wetland hydrologic features, as to reconnect the wetland and improve habitat. I have listed vegetation suggestions for both the wetland and forested areas, but it is critical that before planting, the species are assessed carefully for their viability at the site. These are simply suggestions.

A major component of preventing patrons from destroying the newly planted vegetation is to plant and grow vegetation that will line the sides of the trail. Shrubs and bushes are a great choice; they grow densely and are tall enough, when fully grown, to be incredibly difficult to walk through. My suggestions for shrubs in the wetland and

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buffer areas are Black hawthorn, Black twinberry, Salmonberry, and Thimbleberry. In addition to shrubs, trees, such as Western Redcedar and Red Alder, and plants, such as sedges, Skunk cabbage, and Cattails, should be planted to improve the habitat for wetland creatures. Again, these are suggestions. The planted species must be compatible with the present species.

For the forested areas, my suggestions for shrubs are Stink current, Salmonberry, and Salal. My suggestions for trees are Douglas Fir, Western Redcedar, and Vine Maples, and my suggestions for plants or groundcover are Deer fern, Sword fern, Spiny Wood fern, and Lady fern.



The next step of the restoration process should be adding signage to inform the human patrons of the restoration work, trail closures, and construction that will be happening in the park. At each current park entrance, there should be the Master Trail Plan map, showing which trails will be closing, which will be narrowing, and where construction of boardwalks will be occurring. Ask the patrons to please plan to alter their route if their typical trail will be closed either temporarily or permanently. Give the specific days that the trails receiving boardwalks will be closing. The boardwalks should be built before any restoration work is done, as to not recompact the soils with the machinery used to build the boardwalks.

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Include signs that indicate personal responsibility to help improve the health of the forest. People are much more likely to do their part if you give them personal responsibility and inform them on how they play a major role in maintaining the health of the forest.

Signs should also be included throughout the forest. Add signs at the trailheads of removed trails stating that the trail will be closing, and restoration work will be occurring. Include a map, so patrons may alter their route. Include signs at the trailheads of narrowed trails informing the visitor that the trail will become narrowed. Include a sign at the boardwalk sites, stating the dates in which the trail will be closed to build the boardwalk. If a hydrologic connection is being reconstruction, inform the visitor of these changes as well. Again, the boardwalks should be done before any restoration occurs, as to not recompact the soils.

## **During Restoration**

Shortly before the work parties and boardwalk construction will occur, it is important to install the proper signage and fences to deter visitors from destroying vegetation and recompacting the soils, as well as for their personal safety. Fences should be made of thin logs, stand about 4 feet tall, and extend about 5 feet past the restoration area (for narrowed trails only) or closed off trailhead (for removed trails, hydrologic reconnections, and boardwalk installations).

Signs should be placed on the fences and updated signs should be placed at park entrances. Park entrance signs should include a map stating where the projects will be occurring and which days the construction and work parties are occurring, as well as inviting patron participation in the scheduled work parties. It should also ask patrons to plan their routes accordingly for the new changes, to please stay on the designated trails, and respect the restoration work happening. At removed trailheads, signs should state that the trail is officially closed and provide a map to plan an alternate route. At narrowed trailheads, the signs would be placed on the fences and ask patrons to please stay on the trail and inform them about restoration work occurring. At boardwalks, the signs should

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state which days the trail will be closed for boardwalk construction and restoration. They should also provide a map to plan an alternate route.

The work parties for narrowing and removing trails should begin with set up by the core crew and safety and tool instructions for the volunteers. The crew will inform the volunteer groups on the flow of the work party and how the day will look. After the volunteers are briefed and equipped, they will begin by decompacting the soils with shovels. The decompacted soil will be broken up extensively by the shovels. It will then be mixed with the compost, previously made from forest leaves and debris. Once the zone has been dug up and mixed with the compost, it will be ready for vegetation to be planted. Once the vegetation has been planted, mulch will be placed around the vegetation to add insulation as well as more nutrients. Zones should be done consecutively until complete.

Hydrologic reconnection work parties will begin similarly to trail altering work parties, except the aerated soils will not be mixed with a compost and will not be mulched. Planting of vegetation will not occur until the wetland connection is restored and approved by a wetland specialist. The goal here is to decompact the soils enough to allow surface and subsurface flows to reconnect.

## After Restoration

Once the boardwalks and hydrologic reconnection under boardwalks is complete, the fences and signs can be removed. The fences and signs at removed trail trailheads will persist as to create a deterrent, allowing restoration to continue. At trail narrowing restoration sites, the fences will remain until shrubs and bushes are tall and thick enough as to make it incredibly difficult to walk through them. If the vegetation never becomes thick enough, the fences will stay and remain maintained.

In order to assess the efficacy of the restoration methods, I have included a table with indicators of evaluating the effectiveness of the restoration efforts after one, five, and ten years. The assessment evaluates the 5 initial restoration goals listed under the *'Pre-Restoration'* section.

Assessing effectiveness of wetland restoration projects							
	Name	Effective at 1 yr	Not effective at 1 yr	Effective at 5 years	Not effective at 5 yrs	Effective at 10 yrs	Not effective at 10 yrs
1	<b>Decompaction of Soils</b>	Vegetation is not easily pulled up. Signs of vegetation not planted by work parties has begun to sprout.	Vegetation has not taken root. No visible vegetation grows on its own.	>10% of ground is covered in vegetation (not planted by work party)	<10% of ground is covered in vegetation	>60% of restoration site is covered in vegetation.	<60% of restoration site is covered in vegetation
2	<b>Vegetation</b>	<10% of vegetation has been stomped or trampled. <50% of vegetation is not easily pulled up	>10% of vegetation has been stomped / trampled. >50% of vegetation has not taken root and is easily pulled up.	>30% of vegetation has doubled in size. >40% of originally planted species have survived	<30% of vegetation has doubled in size. <40% of originally planted species have survived.	>80% of vegetation has doubled in size.	<80% of vegetation has doubled in size.
3	<b>Preventing human degradation</b>	Fences and signs remain intact. <20% of restoration site has visible footprints.	>20% of site has visible footprints. Visible signs of patrons walking around fences. Mud puddles from tread are forming	<10% of site has visible footprints	Fences still stand. >10% of site has visible footprints. Visible signs of patrons walking around fences. Mud puddles from tread are forming	No visible signs of footprints on closed or narrowed trail restoration sites.	Visible signs of footprints and/or mud puddles from treading on restoration sites.
4	<b>Hydrologic Reconnections</b>	Visibly wet surface in middle area of hydrologic connection during wet season.	No visible signs of water flow in the middle of the hydrologic connection.	5-15% of hydrologic connection is covered in wetland species (such as skunk cabbage)	>5% of hydrologic connection has wetland vegetation	>70% of hydrologic connection has wetland vegetation boarding it.	<70% of hydrologic connection has wetland vegetation boarding it.

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## Works Cited

Eissinger A. 2017. *Chuckanut Community Forest Baseline Documentation Report*. prepared for Chuckanut Community Forest Park District, Bellingham, WA. [online] <http://www.chuckanutcommunityforest.com/files/CCF-Baseline-Documentation-Report-Final-5-8-17.pdf>