TREE SAPLINGS IN THE EUGENE MILLRACE: POSSIBLE CORRELATION BETWEEN BLACKBERRY GROWTH AND DIMINISHING RIPARIAN TREE DIVERSITY

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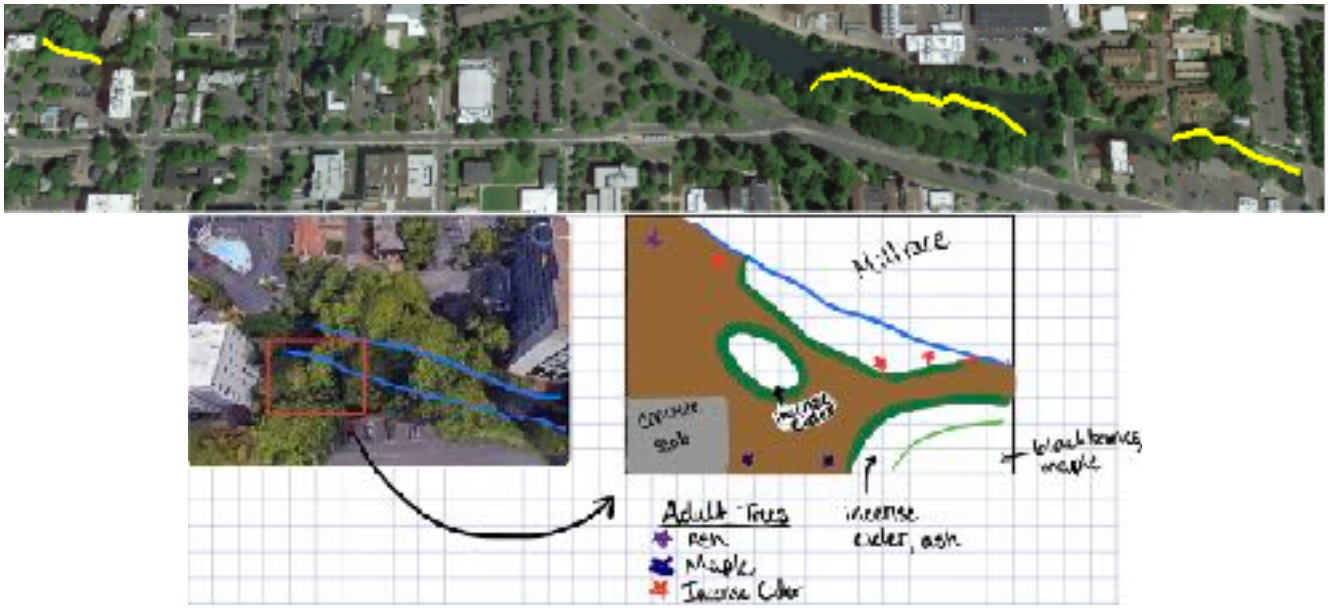
Introduction

The Eugene Millrace used to be a source of power and recreation. It was originally two sloughs from the Willamette artificially joined to create a manageable waterway for power. The millrace built the Eugene we know today. Unfortunately, after numerous budget cuts and a changing recreational culture, the millrace is now a stagnant pond that many people see as polluted and trashed. While the millrace is an artificial riparian ecosystem, both native and invasive species are growing along the bank. The millrace can be a smaller sample for the Willamette River to look at plant diversity in Eugene riparian areas. Along the river, cottonwoods and willows should be more common, but due to dams and riverbank reinforcement, more conifers are growing along the riverbank instead. Initially, I wanted to investigate how the tree species composition of the millrace is changing and make a prediction or the future if we choose not to restore the millrace.

The millrace is under new scrutiny after the announcement of the Knight Science Campus which will sit right next to it. For decades, many thought that restoration was unrealistic for the millrace due to lack of funding. However, the new campus will generate revenue and boost donations, so Eugene citizens and the University of Oregon community are investigating possible millrace restoration. When considering restoration or re-wilding, it is important to consider the ecological implications of both scenarios. I questioned how leaving the millrace to re-wild would affect the tree diversity to predict how unmanaged growth would develop. I used tree sapling surveying to see what is growing to predict what species can grow at the millrace.

During my research, I quickly realized that some places did not have visible saplings or had significantly fewer saplings. At those sites, I saw large clusters of *Rubus bifrons* and questioned if there was a correlation between their growth and the lack of saplings. My hypothesis is the blackberries are shading out tree saplings that need to grow in full sun, thereby lower the tree diversity over time along the millrace.

Method



I first chose three different sampling sites at the millrace. On the map above, I outlined each section. The first is the end of the natural slough behind Barnhart Hall. The second site is the millrace pond which is home to waterfowl, attracts any nature-lovers, and is managed by the University of Oregon. The final site is where the new Knight Campus will lie because if there is partial restoration, this area is the most likely candidate. At each location, I surveyed what adult trees were present so I could decipher saplings and shrubs. Then, I identified saplings in the area.

For this project, a sapling is defined as a tree smaller shorter than six feet tall. I also noted what dominant species were present in each location besides the trees to try to determine other relationships. Above is a diagram of the first site where I outlined what adults and what saplings were growing in that section.

Results

Millrace Tree Species

Common name	Scientific name	Site 1	Site 2	Site 3
Norway maple	*Acer plantanoides*			Mature
Bigleaf maple	*Acer macrophyllum*	Mature		
White oak	*Quercus garryana garryana*			Mature
Scouler's willow	*Salix scouleriana*			Mature
Common hazel	*Corylus avellana*			Mature
White alder	*Alnus rhombifolia*		Mature	
Speckled alder	*Alnus incana*		Mature	
Black cottonwood	*Populus trichocarpa*		Mature	
Dicots	*Class Magnoliopsida*			Mature
Tree of Heaven	*Ailanthus altissima*	Mature and saplings		
Incense cedar	*Calocendrus decurrens*	Mature and saplings	Mature	

At each site, I recorded the mature and sapling trees there. As you can see in the table above, each location had a different canopy composition. Each location also had a different dominant species for vegetation. Site 1 had mostly Incase cedar and ivy, site 2 had mostly Himalayan blackberry and cottonwoods, site 3 had mostly oak and Himalayan blackberries. However, I only found tree saplings at site 1; this was also the only site with an open, sunny spot near the water. Both the Tree of Heaven and Incense Cedar need or prefer fun sun to grow, so it

makes sense that those two species are growing in the open sunny areas. The other two sites have open, sunny areas, but the pedestrian sidewalk bumps right up to the bank, or other human activity prevents trees from growing beyond the millrace bank. I did notice that both site 2 and 3 had many invasive shrubs covering the ground. In both sites, that shrub is Himalayan blackberry (*Rubis bifrons*). The Himalayan blackberry also grows in full sun and can speed rapidly through a riparian area. While there are several reasons why tree saplings are unable to grow in site 2 and 3, I concluded that Himalaya-berries are the best contenders. However I also considered water quality, human disturbance, and reproductive cycles. Many claim the millrace is polluted, so it is possible that the water quality is effecting what plants can grow near the water. The millrace is a public area, so it is also possible that human interaction and disturbance is preventing tree growth. I also considered that for some species, I may not be studying them at the correct time to see their saplings. With those considerations in mind, after looking through journals and other websites, the blackberries are the most likely answer to why trees are not growing in those sections.

Discussion

I originally expected to see trees growing all along the millrace, but see more conifers growing than deciduous trees. Instead, I found that invasive shrubs may be outcompeting more than just other berry shrubs, but trees also. For future research on the millrace, it is important to know what other ecological effect the blackberries may have on other native plants or animals.

But how did blackberries get introduced into the Pacific Northwest? Luther Burbank introduced the Himalaya Blackberry to the Pacific north-west int the mid1800's. The shrub grew

rapidly and could be found in riparian zones from Vancouver to San Fransisco. The blackberries get spread through birds and grow best in sunny, disturbed areas. Blackberries can grow in large thick plumes, covering any open areas, preventing trees or other native plants from growing. Many northwestern citizens are researching blackberries and express concern for Himalayan blackberry spreading and the threat to native berry plants. However, it is evident the Himalayan blackberries not only threaten native berry plants such as the salmonberry or the trailing blackberry, but Himalayan blackberry can also affect other native species in the ecosystem.

Looking at the millrace, many Eugene citizens seem to be for restoration of the millrace for recreational use or to make it esthetically pleasing. Some also argue that the millrace should be left to re-wild to support a wetland ecosystem near the river. Based on these results, I cannot suggest rewinding without management of some kind. Arguably, we have let the millrace re-wild for several decades now, and the banks are covered in invasive species, there is litter in the water, and the current pumps are outdated and expensive to run. Re-wilding is not a long term solution. All of the species that thrive on the millrace are there because of human disturbance; including the waterfowl. The ducks and geese that live there do so because they are used to people. The best option for the millrace is to try to eliminate invasive species, plant more native species, and close off some areas from the public so animals and birds who do not survive in disturbed areas can call the millrace home. Which the new campus, the millrace can be an opportunity to study wetland and riparian habitat restoration and use the millrace as a model for other natural areas in Eugene and the rest of Oregon.

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