# **Restoration of a Potential Future Salmon Spawning Habitat**

Oak Bay High School

Canada

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### Abstract

Bowker Creek is an eight kilometer long, 30% daylighted, and highly modified urban waterway in Greater Victoria. Historically (pre 20th Century), Bowker Creek was an active salmon run to both Chum and Coho species. In 2015, an 80 metre stretch of the riparian habitat was restored along Bowker Creek. However, due to over use by various stakeholders (students, staff, community members and wildlife), certain areas of the riparian zone have not flourished as anticipated. How can we successfully restore the riparian habitat while maintaining public access? With increased shaded areas, distinct pathways, fencing, and signage, native plants such as nootka rose, willow trees, and red osier dogwoods will have the opportunity to thrive in enclosed areas. The proposed zig-zag, mulch pathways will ensure less erosion, and guarantee stakeholders are limited to certain sections of the creek bank. After restoring the riparian habitat of this stretch of Bowker Creek, the native plants will allow for plenty of shade over the creek, and be dense enough that stakeholders are uninterested in venturing into the native landscape. The students, staff, community members, animals and especially salmon will coexist comfortably in Bowker Creek's riparian habitat.

### 1 Introduction

Bowker Creek is a modified urban waterway that is approximately eight kilometer long and passes through the municipalities of Oak Bay, Victoria, as well as Saanich; as shown in figure 1.



Figure 1. Watershed Map of Bowker creek

There are many small tributaries and wetland areas throughout and along the creek. In the past it was home to many different species of wildlife such as anadromous Coho and Chum salmon; although it is not the case presently, it is the hope again for the future. It was once also a source of food and water for local First Nations, the Songhees and the Esquimalt. The rich marine ecosystem at the creek mouth has been maintained and supported by outflow nutrients for centuries.

The development of the creek commenced in the 1800s and has only increased in speed and magnitude since. Agricultural land developments were some of the first changes made followed soon after by residential, commercial, and industrial modifications to accommodate urban life; as shown in Figure 2.



Figure 2. Urban Development of Bowker Creek, 1854 to 1930.

A large part of the creek's path has been diverted due to residential and commercial buildings, and construction sites. Altering the creek's path as well as enclosing much of its original body in underground pipes was undertaken in order to facilitate urban development. Sixty-three percent of the channel is now confined to culverts (with no riparian zone) functioning as municipal stormwater drainage; approximately 50% of the watershed is composed of roads, parking areas, and other impervious surfaces.

The Capital Regional District (CRD) is responsible for the Bowker Creek Initiative, a collection of local government and community groups in the Greater Victoria community who have created the Bowker Creek Blueprint; a 100 year restoration plan. This plan was put into action in 2010 and has since made many advancements maintaining the support of municipalities in which Bowker Creek passes through (Saanich, Oak Bay and Victoria), developing rainwater management sites, organizing water testing, and restoring isolated sections of the creek. The Friends of Bowker Creek is another group focusing on the restoration and enhancement of the creek. They have successfully restored the a creek section at the Monteith Street allotment gardens, with work continuing through the past decade. In January 2022, the Friends of Bowker Creek received permission from the Department of Fisheries and Oceans to accommodate a salmon egg box for the reintroduction of the Chum salmon eggs into the creek. The lengthy process to receive this permit entailed conducting extensive water quality testing, invertebrate sampling and a riparian habitat assessment. Thanks to these efforts, for the first time since chum salmon last laid eggs in the creek nearly a century ago, salmon are back in Bowker Creek.

This project has a specific focus on the riparian area of Bowker creek, originally not restored with the intention of producing riparian habitat suitable for a salmon bearing section of the creek. The intention was to create a multi-use area for students, the community and wildlife, unlike the Monteith site which is intended to be a more naturalized riparian ecosystem. It is the goal of Oak Bay High School's Water is Life program to work on improving the Oak Bay High section to a salmon bearing state, by improving and developing the creek cover, and protecting the native riparian plants to allow for more biodiversity.

## 2 Methods

2.1: Analyzing the site, figuring out what needed to be changed and why.

2.2: Comparing Bowker Creek to Monteith - Gerald

2.3: Possible solutions, what we decided to move forwards with

### 2.1: Analyzing the site and Identifying





Figure 3. - Bowker Creek 'unofficial trail'

Photos were taken of a 20 meter stretch of the riparian habitat of Bowker Creek to help target those areas with the most significant damage. These pictures helped identify native species, invasive species, and undesignated pathways made by various stakeholders; mainly deer, ducks and people. The majority of invasive species in the riparian zone identified were blackberry (Rubus Fruticosus), ivy (Hedera Helix), yellow willow (Salix Lutea), policeman's helmet (Impatiens Glandulifera), and invasive knotweed (Polygonum Spp.). Native species such as the nootka rose (Rose Durandii), red osier dogwood (Cornus Sericea), and white willow (Salix Alba) were installed as part of the \$738,000 restoration of Bowker Creek in 2015, but were overtaken by the invasive flora and fauna. With loss of native species (seen in figure 3), a plan to install distinct fenced-off pathways was determined to be the best way to accommodate public use while conserving the land. To improve the probability of users following the pathways, signage explaining the purpose of the solution was fabricated, and then displayed on the wooden poles.

# 2.2: Comparing Bowker Creek to Monteith Gardens

The analysis of the Oak Bay High Section of Bowker Creek site resulted in an inquiry at a similar site along the stream: Monteith Gardens (see figure 4 for the location of Monteith in comparison to the Oak Bay High Section, with Oak Bay High being in the northwest of the figure, and Monteith in the Southeast area).



Figure 4. Map of the neighborhood, with Oak Bay High and Monteith circled

This Monteith stretch of the creek has been restored, with work beginning in 2008, making it an excellent site as an example of which to compare the Oak Bay High site. At the Monteith site, there is a three meter wide riparian habitat on both sides that continues for a short while until it transitions to an unobstructed creek flow until the Salish Sea. This site has a dense riparian habitat, making it the ideal place for salmon spawning. After consulting with the local expert on Bowker Creek; Gerald Harris, a clearer plan for the Bowker site at the school was developed.

#### 2.3: Possible Solutions

After comparing Bowker Creek at Oak Bay High School to the Monteith Gardens, an analysis of what could be changed regarding the overuse of the pathways at Bowker Creek was conducted. Numerous solutions were proposed, and later rejected for several different reasons not feasible (both financially and realistically), not viable, etc. One solution was then picked based on meeting the aforementioned circumstances. The solution was to put up post and rope fencing to create designated pathways with signage, (seen in figure 5)



Figure 5. Signs put up to explain the project

indicating the goals of the project, as well as where to go within the rope. This solution was picked based on the fact that it is feasible to execute, within the financial constraints and respecting the land on which we were working, not disturbing too many plants or habitats for local animals. To make this solution as cost effective as possible, wooden posts were donated by the Friends of Bowker Creek, and then holes were drilled at the top through which to thread rope (as seen in figure 6).



Figure 6. Post and rope fencing, with mulch

Red cedar mulch was chosen as a base for the footpaths based on its unique coloring as well as its equitable price. Before ordering any of these production materials, numerous precise measurements were conducted. The surface area of the soon to be constructed pathways was measured, as well as the preferred depth of the mulch, to yield an accurate figure. A manual rendering of the terrain was created to aid us in our visualization of the layout for the post and rope fencing. After all the materials were ordered and had arrived, the construction of the pathways finished in June. A post-driver was rented to help install the posts, and then the rope was strung between posts and secured and mulch followed soon after. Signage was put up to encourage all stakeholders to use the now accessible pathways. All that was left was to

reassess the state of the project at the start of the school year in September.

## 3 Results

In September we checked back on the state of the project, and despite needing a couple of minor repairs, it was accomplishing its goal of reducing the foot traffic in certain areas; as shown in figure 7.



Figure 7. Impacts occurring over the summer

In the figure above, the circled area shows the fallen sign, and not as noticeably in the background, there are weeds growing in through the mulch. In the Garry Oak meadow pathway, there was a noticeable difference in the density of the foliage, as shown in figure 8 (before and after, respectively).



Figure 8. Before - top photo, and After - bottom photo

During the summer and start of fall, with the absence of ducks as well as the lack of off pathway foot traffic from high school students, the native plants were able to prosper, aiding to emphasize the paths that were created at the start of summer. With the newfound prominence of these paths at the start of the school year, it was abundantly clear for students and other members of the community to circumvent the area under rehabilitation.

## 4 Conclusion

In conclusion, there are several steps from this project that could continue on in the

future to improve the restoration of the Bowker Creek riparian habitat. First, if the current pathways and post & rope fencing is maintained, this would help considerably to keep the riparian habitat in a healthy, biodiverse condition. To maintain the current state, the fencing materials would need to be replaced as required, the signage would require replacing every few months, and the mulch should be replenished yearly. Based on use from students and the community, actions would need to evolve based on need. Second, to further the restoration of this habitat, the current efforts could be expanded, as allowed by time and budget to include the remainder of Bowker Creek on the Oak Bay High School campus, as shown in figure 9.



Figure 9. Oak Bay High with the restored zone circled

Additionally, these efforts could also be expanded to restore more lost riparian habitat through to the mouth of the creek at Oak Bay. This is aside from the Monteith Gardens sections where restoration efforts have been underweigh since 2008. The expansion of this project has already begun with the addition of a new access point to Bowker Creek from the Garry Oak meadow (shown in figure 10), additional post and rope to further protect the creek's riparian habitat, and camas bulbs that have been planted around Garry Oak trees in the meadow.



Figure 10. New Bowker Creek access point

## 5. References

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