The Ecological Restoration of Esquimalt Lagoon

Understanding the Importance of Restoration Through the Lens of Invasive Species Removal and the Restoration of Bee Creek

Removal of Invasive Species
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Esquimalt Lagoon, photo by Miranda Maslany

Introduction

As part of our place making assignment, our group chose to focus on researching ecological restoration at the Esquimalt Lagoon. Namely, we focused our research on studying invasive species and the restoration of the sand dunes by Coburg Peninsula as well as Bee Creek. The Society of Ecological Restoration (SER) defines restoration as, "...the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed" (SER, 2004). Our aim was to determine whether the coordination, collaboration, understanding and funding for ecological restoration of the Lagoon is sufficient to maintain healthy ecosystems and habitats. Our research was based on an array of secondary research as well as primary research gathered from two interviews conducted within this course. Throughout our research, a field visit, and two interviews, we gained a broad insight into the ecological conditions of the site and how restoration has played an important role in shaping a sense of place. Thus, the purpose of our research is to provide a contextual understanding of the Esquimalt Lagoon restoration efforts and to offer additional solutions to help improve the site's ecological integrity. Furthermore, we discuss the importance of ecological restoration within the broad context of place making and its implications for the Esquimalt Lagoon.

PART 1: Invasive Species

Scotch Broom at Esquimalt Lagoon, photo by Miranda Maslany

Introduction

For this section, our focus was to study the restoration efforts to remove invasive plant species within the Esquimalt Lagoon. We discuss the importance of invasive species removal in this area to provide context for our research. The emphasis of our research focuses on the Coburg Peninsula where most of the restoration efforts have taken place. In addition, we discuss several solutions that have been suggested to improve the site's ecological integrity and offer some of our own solutions through our research.

Why are invasive species an issue in the Esquimalt Lagoon?

Invasive plant species present a significant ecological threat, for they can modify the surrounding habitat by altering nitrogen levels within the soil or preventing the establishment of other species from being able to grow (Myers, Denoth, & Shaben, 2004). This can result in significant changes in biodiversity and is particularly harmful to local ecosystems over long periods of time. Some invasive plant species have long lasting impacts on habitat, which makes restoration of native plant communities impossible or greatly delays restoration efforts even after the invasive plants have been removed. An example of this includes exotic nitrogen fixing legumes in nutrient poor conditions (Vitousek, 1990, as cited in Myers, et al., 2004). Scotch Broom, a species that is especially pervasive within the Esquimalt Lagoon, is a variety of legume which has the unique ability to fix nitrogen and thus can greatly modify the soil conditions and the nutrients within them (Myers, et al., 2004).

It is vital that invasive species are removed as quickly as possible in order to ensure ecological health and integrity of the Coburg Peninsula and Esquimalt Lagoon. "Without restoration activities, Coburg Peninsula would most likely lose its community of dune, beach, and wetland ecosystems to an exotic species filled landscape or an area with little vegetation at all (Kwasnicia, 2008, p. 31). To date, Esquimalt Lagoon has been invaded by numerous exotic species. Most notably, Scotch Broom and Himalayan Blackberry are the most pervasive species on-site. However, there is an extensive list of additional invasives that are present within the upland, freshwater and marine habitats of the lagoon. Invasive species present a significant challenge to the local habitat and wildlife populations for they have the ability to damage or degrade ecosystems. In particular, Scotch Broom (Cytisus scoparius) is one such invasive that has extensively invaded most Garry Oak savannah ecosystems throughout Washington, Oregon, and British Columbia despite being native to the Mediterranean (Shaben & Myers, 2010).

Invasive Plant Species in Esquimalt Lagoon

Below is a table compiled by the Capital Regional District (CRD) that lists some of the invasive plant species that have been identified in the Esquimalt Lagoon (CRD, n.d.*b*). As mentioned above, Scotch Broom is a particularly persistent invasive species in this area. For the purposes of this report we have excluded invasive animal species that are included in the original CRD chart, as our focus is primarily invasive plant species.

Table 1. CRD list of invasive plant species.

Habitat	Invasive plant species
Marine shoreline Areas	European Beachgrass (*Ammophilia arenaria*) Japanese Weed (*Sargassum muticum)*
Freshwater/Streamside/Wetland Areas	Eurasian watermilfoil (*Myriophyllum spicatum*) Reed Canary Grass (*Phalaris arundinacea*) Purple Loosestrife (*Lythrum salicaria)*
Upland Areas	Scotch Broom (*Cytisus scoparius)* Himalayan Blackberry (*Rubus discolor)* Orchard Grass (*Dactylis glomerata)* Common Holly (*Ilex aquifolium*) English Ivy (*Hedera helix*) Laurel-leafed Daphne (*Daphne laureola*) Gorse (*Ulex europaeas*) Canada Thistle (*Cirsium arvense)* Sweet Vernalgrass (*Anthoxanthum odoratum*) Hedgehod Dogtail (*Cynosurus echinatus*)

Invasive Species Management

"Eradications of invasive species often have striking positive effects on native biota" (Zavaleta, Hobbs, & Mooney, 2001, p. 454). Invasive species can be eradicated through a number of various methods, including physical or chemical removal. However, at the Esquimalt Lagoon the use of chemical herbicides are prohibited (G. Beauvillier, personal communication, May 21, 2013). Thus, invasive species management must rely entirely upon manual labour to physically remove all invasives by hand. This is a

gruelling task for volunteers and restoration managers since it is next to impossible to remove all traces of invasive growth using this method (Stuart, 2012). Therefore, the best strategy would be to focus on mitigating the current extent of invasive growth and preventing new seeds from proliferating on site. This can be accomplished through relying on outreach and education to inform members of the public as to how they can prevent seeds from being spread and informing them of proper removal techniques.

Research Focus

The Coburg Peninsula has had the one of the largest restoration focuses in Esquimalt Lagoon, with significant attention given to invasive species removal, planting native species education and outreach (Kwasnicia, 2008; Esquimalt Lagoon Stewardship Initiative (ELSI), 2007*a*; G. Beauvillier, personal communication, May 21, 2013). In the 1920's a road was built along the Coburg Peninsula, increasing foot traffic, and encouraging the spread of invasive species along the dunes (Kwasnicia, 2008). The dunes along the Coburg Peninsula are highly used, the high level of foot traffic disturbs the ground which encourages the spread of invasive species such as broom and several invasive grasses in that area. Specifically, trampling within the dunes decreases the native species in the area. The main factor for restoration in this area is reducing trampling (Kwasnicia, 2008).

Methods to reduce foot traffic included providing pathways using logs to direct foot traffic and reduce trampling. Native bushes were also planted along the edge of the dunes' perimeter to create natural fencing. One main issue, however, is the frequency and severity of storms that pull waves onto the dunes, redistributing the placed logs. The City of Colwood is responsible for creating these paths however it is challenging as it requires time and effort to replace the logs (Kwasnicia, 2008).

General Challenges and Considerations

Stakeholders

There are many stakeholders within the Esquimalt Lagoon that work together through ELSI. These include: the Esquimalt community, environmental groups, Royal Roads University institutions, the Department of National Defense, various levels of government and First Nations. Communication between these groups can strengthen the success of restoration efforts.

One example is when 11 hectares of land along the Esquimalt Lagoon was sold to a developer. The new owner, Corporate Hospitality Development, consulted with ELSI seeking information and insight into the importance of the land and how to manage it properly (ELSI, 2007*c*).

Funding

Continual funding is needed to support the efforts of continual invasive species management. During the dunes restoration project in 2007 the City of Colwood contributed $25,000 to the project in funds and staff time (ELSI, 2007*c*). The City of Colwood draws funding for this out of the general Parks budget, but does not have an allocated invasive species budget. A allocated budget for invasive species removal is being worked towards within the City of Colwood (G. Beauvillier, personal communication, May 21, 2013). The Evergreen Foundation funded the restoration of the dunes discussed above in 2006. ELSI received $8000 to create a restoration project of the Coburg Peninsula (ELSI, 2007*c*).

Multiple uses of the area

The community uses the Esquimalt Lagoon for commuting on the road that runs through the Coburg Peninsula, an emergency route and for recreation. The Coburg Peninsula is a popular spot to go for walks, walk dogs, go for picnics, view wildlife and

enjoying the sun. The lagoon therefore benefits the community as a recreational hub, however, the foot traffic as mentioned above has increased the disturbance and spread of invasive species within this area (Kwasnicia, 2008). These challenges are key to understanding how the outreach and educational components have play a critical role in managing the Coburg Peninsula.

Assessment of Current Solutions

Despite the aforementioned challenges, considerable effort has been put in place to control the amount of invasive species growth within the lagoon. The Esquimalt Lagoon Stewardship Initiative (ELSI) has developed an annual stewardship plan which "provides a framework for a coordinated approach to environmental management" (ELSI, 2011). On-going projects include dune habitat monitoring as well as annual volunteer based "broom bash." An additional document entitled, "Interim Management Guidelines for Coburg Peninsula," specifically focuses on enhancing visitor stewardship through increased awareness and understanding in addition to providing responsible recreation activities to avoid or minimize damaging effects to natural areas of the lagoon (Interim Management Guideline for the Coburg Peninsula, 2006). However, these initiatives could not be implemented without the help of dedicated groups of volunteers. In 2006, volunteers planted over 2,000 native plants in restoration plots around the lagoon (ELSI, 2008). Furthermore, ELSI gathered enough volunteers in 2008 to plant 843 plants and dedicate over 129 hours to assist with the dune habitat restoration project (ELSI, 2008).

Alternative suggestions for invasive species management include turning Coburg Peninsula into a conservation area in order to enable the recovery of degraded sites and to minimize stress placed upon intact habitat (Bein, 2005). However, based on our findings we believe that outreach and education are the single most important factors needed to successfully improve the ecological conditions at Esquimalt Lagoon. Implementing interpretive signs to inform the public about the threat of invasive species as well as how to effectively manage them will contribute to widespread public awareness and

education. This point was emphasized during our interview with Gordon Beauvillier, who stressed, “education and outreach is one of the most important things we need to concentrate on” (G. Beauvillier, personal communication, May 21, 2013).

Conclusion

Invasive plant species need constant management in the lagoon. These species are pervasive and prevent ecosystems from proper functioning and good health. It is important to emphasize that complete removal of invasive species is not possible, therefore, managing the invasive species within the Esquimalt Lagoon is critical. Challenges include managing the dunes, where there is high foot traffic which encourages invasive species such as Scotch Broom and Himalayan Blackberry to grow and spread. There are also challenges in managing different areas of the land as the lagoon has several ownerships.

PART 2: Bee Creek

Bee Creek, Esquimalt Lagoon, photo by Curtis Stephens

"[Bee Creek] is a wonderful place and you do fall in love with... there's so many people who come through there and talk about their experience with that property because it has such a history of being a healing place... It's interesting you know, hearing all those stories, it really makes you see what an important place it is in the community... I just really think that it's worth preserving" (J. Nault, personal communication, May 21, 2013).

Introduction

Bee Creek is a short 600 meter stream that flows into the the west shores of Esquimalt Lagoon, through Royal Roads University. It is fed by a natural spring that regulates the temperature and an even flow of water year round (ELSI, 2007*b*). Due to these natural features, the creek hosts a large population of several hundred cutthroat trout (Castelli, 2008). It was determined that Bee Creek could also support a salmon population as long as some restoration efforts were implemented (Castelli, 2008).

Current State of Restoration

In 2005, a small hydroelectric dam was removed from the creek as part of this restoration effort. In addition to this project, stream banks were revegetated in order to prevent stream erosion and to help with the aesthetics of the area (J. Nault, personal communication, May 21, 2013). These efforts have resulted in Coho Salmon fry naturally returning to the creek within the past year (J. Nault, Personal communications, May 21, 2013). To date, all restoration initiatives at Bee Creek have been in the lower reaches, where the creek meets the lagoon up to the location of the old hydroelectric dam which was removed. This area is owned by Havenwood estate, which is a developing company currently planning to build 6 large residential or hotel buildings (Hill, 2010).

All of the restoration work has been done by volunteers working with the permission of the Havenwood estate. In 2012, there were 286 total hours of work between 4 volunteers (Nault, 2012). This included removing invasive species such as reed canarygrass, spurge daphne, and non-native blackberries; and propagating a variety of native plants along the creek banks. Volunteerism has been the only strategy to

improve the ecological health of Bee Creek due the lack of available funds for the project. Being a privately owned piece of land, the restoration project does not qualify for government grants (J. Nault, personal communication, May 21, 2013). In order for a sustained restoration effort, the project will continue to rely on the service of volunteers.

Importance of Education and Awareness

The method used to recruit volunteers in Bee Creek has been through education and awareness. The Pendray House, now home to the Coast Collective art gallery, is one such way that the restoration project is educating the public (Nault 2012). This includes introducing people to the restoration activities by answering questions and discussing the restoration efforts. Other educational activities included visits from the outdoor Kindergarten class of Colwood Elementary School, who were shown around Bee Creek and introduced to the trout that reside in the creek.

Threats

Development

There are a few main threats to the future ecological restoration efforts of Bee Creek. The "biggest [threat] is the development of the property" by the Havenwood Estate, which plans to develop a large portion of the area that Bee Creek runs through (J. Nault, personal communications, May 21, 2013). Currently, Havenwood Estate has granted 15 meters of protection on either side of the creek, however this can be rescinded at any time (Nault, 2012).

Funding

A second threat to the restoration project is a lack of available funding. As previously mentioned, being on privately owned land results in the project not qualifying for government funds. This has led to the restoration efforts being different than that of the dune restoration, as it is completely volunteer oriented. With this, there is much less overall hours put into the project, and therefore less work that can be done.

Land Ownership

The third problem is that a large section of the creek lies on Royal Roads University property, which is owned by the Department of Natural Defence (DND). Currently, the restoration efforts of Bee Creek have been allowed to take part exclusively on the Havenwood estate, and does not involve any section within Royal Roads. This has limited the extent to which the creek can be restored, resulting in an incomplete project.

Solutions

Threats to Bee Creek have primarily been combated through the use of education and awareness by the local community and relevant stakeholders. The high user area of the Pendray House has been the main site for raising awareness of the project, as a lot of informal discussions about the project have taken place there (Nault, 2012). These efforts have the ability to gain momentum in the restoration project and recruit new volunteers and interest in the project. Another method to improve the restoration project is to have better communication between Royal Roads University and the Havenwood Estate. This would make it possible for the entirety of the creek to undergo restoration efforts, while simultaneously gaining a larger workforce and more funding. Lastly, improving the creek habitat to host a salmon population will also solve the problem of dwindling protection. Under the Fish Protection Act, the B.C government must protect and provide recovery options for any salmon bearing stream (Fish Protection Act, 1997). If Coho Salmon begin to populate Bee Creek, as they appear to be doing (J. Nault, personal communication, May 21, 2013), then it would fall under this protection act; potentially saving it from development.

Conclusion

Bee Creek has undergone restoration efforts for ecological, political, and cultural reasons. The Coho Salmon restoration activities were largely driven by political and ecological factors, as a salmon population would result in Bee Creek gaining government protection; thus, ensuring its long-term ecological health. More recently, the restoration efforts near the Pendray House have improved the aesthetics of the creek to create a sense

of place amongst visitors. Moving forward, this restoration project must continue to raise awareness around the restoration efforts of Bee Creek, and improve communication between Royal Roads and the Havenwood Estate.

PART 3: Closing Remarks and Broader Significance

The process of restoring Bee Creek and removing invasive species around the Coburg Peninsula are critical to the restoration of Esquimalt Lagoon. Through our research, we found that these two initiatives share many similarities in how they must be managed. Both projects need to be carefully managed by multiple stakeholders, balance multi-land use conflicts and acquire a source of on-going funding and volunteers. A common solution that was repeatedly emphasized throughout our report included the need for outreach and education. Raising community awareness of the restoration efforts taking place at the Esquimalt Lagoon is thought to increase the amount of volunteers and foster further cooperation from the public. Public support and awareness is also another method for gaining political interest in the restoration efforts at the site and can help contribute to further funding to support outreach and education. Through our research we have seen how the restoration efforts for both Bee Creek and the removal of invasive species have strengthened sense of place within the community. Through volunteer initiatives various members of the community came together for a common purpose. We believe these initiatives themselves provide hands on understanding, appreciation and awareness to protect this area through contributing to a heightened sense of place and belonging within the community.

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