SUSTAINABILITY SCHOLARS PROGRAM

Summer 2022 Sustainability Scholars Program Internship Opportunity

The UBC Sustainability Initiative (USI) is pleased to offer current UBC graduate students the opportunity to work on funded sustainability internship projects. Successful candidates work under the mentorship of a partner organization, and are immersed in real world learning where they can apply their research skills and contribute to advancing sustainability across the region.

- Visit the Sustainability Scholars Program website to learn how the program works and to apply.
- Be sure to review the application guide to confirm your eligibility before applying.

Applications close at midnight on Sunday January 30, 2022.

>> This is a Fraser Estuary Research Collaborative Project >>

The Fraser Estuary Research Collaborative (FERC) is focussed on advancing efforts to protect the Fraser River estuary in collaboration with key NGO and Indigenous partners. If you are interested in producing new knowledge and supporting Fraser estuary protection through scientific, technical, governance and policy innovations, the following project might be for you. Read on for more details.

Project title: Ecological Impacts and Demography of Resident Canada Geese in the Fraser River Estuary

Project Background & Overview:
Canada Geese (*Branta canadensis*) are native to much of North America. However, while native populations migrate to northern latitudes to breed, introduced resident geese often live and breed year-round in areas with dense human populations[1,2,3,4]. Coexistence between resident geese and humans in the Lower Mainland of British Columbia (BC) has brought forth various social and economic conflicts[5]. The geese were systematically introduced to the region in the late 1960s and early 1970s and quickly became abundant. Introductions and relocations throughout the region that followed were partly intended to increase hunting opportunities, but harvest rates did little to control the population and rapid urbanization coupled with new firearm bylaws minimized the influence of hunting on the population[6].

This project will specifically focus on non-migratory resident Canada Geese that breed and overwinter in the Lower Mainland and the Fraser River Estuary (FRE), as opposed to migratory Canada Geese that use the region only during spring and autumn migrations. The population size and growth of resident Canada Geese in the Lower Mainland have not been critically evaluated in over 20 years[6]. Their ecological impacts in the region have never been studied.

Addressing conflicts with Canada Geese in the Lower Mainland with a management program has been suggested by government agencies, but a lack of population and ecological data has been a significant limitation[5,8,9]. Although continued annual monitoring was encouraged in the 1980s and 1990s by federal agencies when problems linked to resident Canada Geese were receiving more attention, this never materialized[6,9].

Introduced resident populations in Southwestern BC have now been locally established for over 50 years, using estuaries during their peak growing season from early spring to late summer. Historically, these habitats only accommodated migrant Canada Geese as winter visitors or during migration periods[3,10,11]. Sustained periods of intensive grazing leading to major habitat degradation has been observed in Canada Geese[12,13,14] as well as Snow Geese[15,16] (*Anser caerulescens caerulescens*). Significant losses in estuarine marsh habitat have been linked to herbivory by resident Canada Geese in four estuaries on eastern Vancouver Island primarily due to the selective grazing and grubbing of Lyngbye's sedge (*Carex lyngbyei*)[13,17,18,19]. Lyngbye's sedge is a rhizomatous perennial that dominates estuarine marshes at most elevations in coastal BC, including the FRE. Most of Lyngbye's sedge net aerial primary production enters the estuarine food web as detritus on an annual basis[20], supporting the growth of diverse invertebrate communities preyed upon by higher trophic levels such as salmonids and birds[21,22]. Juvenile salmonids depend on marshes in the FRE for winter rearing habitat before they enter the ocean[23]. Lyngbye's sedge also plays an important role in maintaining marsh platform integrity through protection against water flow and waves[24,25], enhancing mineral and detrital sediment deposition[26,27], and reducing erosion through below-ground biomass production via rhizomes. Persistence of Lyngbye's sedge communities at channel edges in the FRE is vital in mitigating marsh recession and build resiliency to sea-level rise[28]. Loss of Lyngbye's also directly threatens the high carbon-storing potential of marshes in the FRE that act as a highly efficient carbon sink[29,30].

Project description

Current estimates of the population size of resident Canada Geese in the Lower Mainland are highly anecdotal or out-dated, and their ecological impacts are entirely unknown despite evidence of significant habitat degradation in nearby estuaries. The purpose of this project is to develop our understanding of the biotic pressures from invasive species contributing to habitat loss in the FRE, allowing for a more comprehensive diagnosis of the threats to remaining marshes. Sedge marshes in the FRE are especially vulnerable at their leading edges where the cumulative effects of rising sea-levels and increasing erosion coupled with goose herbivory may be causing marsh recession. In the face of climate change, these threats could increase over time and lead to significant loss of habitat and biodiversity.

Coexistence with resident Canada Geese and their use of habitats in the Lower Mainland and FRE has negative impacts to ecological, environmental, economic, and social systems in the region. Studying their demography and ecological impacts to marshes in the FRE will address

the knowledge gap on whether these resident populations are invasive and whether they should be treated as such.

Applied work involving population surveys and ecological sampling for this project are actionable between May 2 and August 12, 2022. Results from population surveys and some analyses (i.e., population estimates, trends, modelling) will be included in the project deliverables. Results and analyses on ecological impacts to sedge marshes are not expected to be finalized until 2023. However, baseline data, methodology, and insights regarding ecological sampling and habitat restoration can be included in final project reporting.

Project scope

This proposed project aims to understand how many resident Canada Geese inhabit the Lower Mainland and FRE, and study their ecological impacts to estuarine marshes. Insights from this work can reveal where conservation or restoration of marsh habitat is required and the rate at which habitat is being lost in response to Canada Geese. The primary activities of the scholar will include surveying Canada Geese in the Lower Mainland, analyzing survey data and other existing datasets, and sampling vegetation plots throughout the FRE.

Objective 1:
Estimate the abundance of resident Canada Geese in the Lower Mainland by surveying the population during their annual moult in late June-early July, following the breeding season. Analysis of wintering population trends and movements will also be analyzed using available data. Field surveys in combination with existing abundance data will allow for an estimate of current population size, historic trends, and modelling of future population growth.

Objective 2:
Collect ecological data at 84 vegetation plots spread across 21 sites the FRE. These plots are part of an ongoing study initiated in 2021. Within each plot, data will be collected on Lyngbye's sedge stem density and height, presence of flowering, and grazing intensity, as well as species richness and dominance, and percent cover of bare ground. Additionally, photographs will be taken of each plot during sampling. Vegetation plots are located in highly dynamic tidal environments where disturbance is common, so maintenance of plots will occur as needed.

Study Area:
Population surveys and analyses (Objective 1) will occur for the entire Lower Mainland of BC. Herbivory (Objective 2) will be studied within the Fraser River Estuary where Lyngbye's sedge dominates marsh edges. This study area comprises marshes along the Fraser River, from the western foreshore of the FRE where Lyngbye's sedge is limited to the higher elevation backshore due to high salinity, to the confluence of the upper and lower arms of the river where salinity is too low for Lyngbye's sedge dominance (East of Annacis Island).

Deliverables

- A final report containing a summary of the work completed
- A final report for the online public-facing Scholars Project Library.

Time Commitment

- This position is for 500 hours of work.
- This project must be completed between May 2 and August 12, 2022
- The scholars are to complete hours between 9 am and 5 pm, Monday to Friday, or during hours and/or days that fit best within ecological and environmental constraints of the project, approximately 34 to 40 hours per week.
- Vegetation sampling will occur around during the weeks of May 15-21 and July 10-16.
- Surveys will occur between June 20-July 10.

Required/preferred Skills and Background

☒ Excellent research and writing skills
☒ Demonstrated interest in sustainability
☒ Familiarity with research methodologies and survey techniques
☒ Statistical analysis
☒ Strong analytical skills
☒ Ability to work independently
☒ Deadline oriented
☒ Project management and organizational skills

Ecocultural Considerations:

We are very interested at the potential of integrating the interests of First Nations into this study and we recognize that ecocultural considerations go hand in hand with of stewardship of the Fraser River Estuary. Ducks Unlimited Canada (DUC) is currently collaborating with Tsawwassen First Nation (TFN) and the Lower Fraser Fisheries Alliance (LFFA) to implement three large, transformative ecological restoration projects throughout the FRE over the next 2.5 years. DUC plans to discuss this project with TFN and LFFA, ask for their input, and discuss how this research project fits within shared stewardship of the FRE and ongoing restoration initiatives. DUC and Tara Martin (UBC Conservation Decisions Lab) have working relationships with additional First Nations in the FRE and we hope to discuss this research project with these Nations, however DUC has been advised that at least one Nation does not wish to be identified in funding applications. DUC is also starting to implement a project restoring tidal marshes throughout the FRE to promote carbon sequestration, for which DUC will information share and identify potential collaboration opportunities with First Nations in the FRE.

Opportunity for collaboration with First Nations in this project could begin as discussions on how cultural and ecological values of Canada Geese and Lyngbye's sedge marshes, and estuary conservation should be considered in each component of this project. Bringing an Indigenous lens to this research could (1) increase our shared understandings of goose population trends,

(2) bring attention to social, cultural, and ecological values impacted by geese in the FRE, and (3) define objectives for future conservation or restoration work. Given that this project is in early stages, now is the best time to integrate ecocultural considerations from Nations in the FRE, and we would certainly appreciate any support from the Collaborative/Sustainability Scholars Program in making these connections.

Collaboration with First Nation in this project could lead to future partnerships to restore marsh ecosystems in the FRE. Ecocultural restoration has been ongoing on Vancouver Island for over the last 3 years in various estuaries impacted resident Canada Geese grazing. Proven methods have used in different successful sedge marsh restoration projects from collaborations between Guardians of the Mid Island Estuary Society (GoMIES) and K'omoks First Nation, as well as with Snuneymuxw First Nation. First Nations take a leading role in this work by preventing goose access with wood fencing around overgrazed marsh, using alder wood acquired with the help from the Fish & Wildlife Compensation Program to effectively restore large areas of habitat. DUC project partner Eric Balke has worked with GoMIES and K'omoks First Nation in recent years on initiatives to address the impacts of resident Canada Goose herbivory on estuarine tidal marshes.

Applications close **midnight Sunday January 30, 2022**
Apply here: Click here to apply
Contact Karen Taylor at sustainability.scholars@ubc.ca if you have questions

Useful Resources

We are holding a special **resume preparation workshop for prospective Scholars** on January 19. Click here for details and to register.
Below are some links to useful resources to help you with your resume and cover letter (there are many more online). Some of these resources also provide information on preparing for your interview.
https://students.ubc.ca/career/career-resources/resumes-cover-letters-curricula-vitae
https://www.grad.ubc.ca/current-students/graduate-pathways-success
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