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Partners in Stewardship



*Pollinator GLSA with graduate student Carly McGregor
sweep netting, and pan and blue-vane traps to the right.*

Credit: Claire Kremen

Evaluating the Impact of Natural Habitats on Agriculture

Carly McGregor, UBC MSc student

Delta Farmland & Wildlife Trust (DF&WT) has been working with the local farming communities of Delta and Richmond for the last 27 years to increase biodiversity on farmland while enhancing soil health. Biodiversity loss is occurring at unprecedented rates across the globe and appears to be accelerating.¹ At the same time, the costs and challenges of farming in Metro Vancouver continue to increase. As a result, finding solutions that simultaneously address biodiversity loss and support agricultural viability, which is at the core of DF&WT's mission, is only becoming more critical.

I am excited to be a graduate student involved in a new research project being conducted by the DF&WT in partnership with the University of British Columbia (UBC) that will contribute to addressing these critical challenges. UBC researchers Dr. Claire Kremen and Dr. Juli Carrillo are investigating the impacts of DF&WT's stewardship programs on insect populations in Delta. The aim of the project is to examine how grassland set-asides (GLSA) and hedgerows might be supporting beneficial insect communities, and to assess how these habitats are influencing harmful pest communities.

There is evidence that the Hedgerow Stewardship Program supports pollinating insects, but there is growing concern that the fruiting shrubs may also attract pests like the spotted wing drosophila, which is a major pest for berry growers. *Cont. on next page*

IN THIS ISSUE

EVALUATING THE IMPACT OF NATURAL HABITATS ON AGRICULTURE

UBC MSc student- Carly McGregor- discusses a new multi-year research project examining the impact of natural habitats on insect communities and crop yields.

PARTNERS IN STEWARDSHIP

DF&WT's long-term partnership with the University of British Columbia is highlighted.

BCIT ECOLOGICAL RESTORATION SUMMER INTERNSHIP

BCIT intern- Sara Yeomans- discusses her summer internship project that is assessing the impact of cattle grazing on set-asides.



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Graduate student Matthew Tsuruda checking a sticky trap in a hedgerow

Credit: Martina Clausen

Additionally, previous studies with UBC have demonstrated that the GLSA Stewardship Program provides soil benefits and habitat for bird and small mammal species. These restored habitats have the added potential to offer viable nesting and foraging grounds for beneficial insects, such as pollinators and predators of crop pests. In fact, several Delta growers have already been planting forbs in their GLSAs to provide pollinators with better foraging resources than the traditional GLSA mixes offer. However, DF&WT has conducted minimal research on the potential positive and negative impacts of these management practices on insect communities and the impact of these insect communities on commonly grown crops in Delta. Understanding how DF&WT's habitat restoration programs impact both beneficial and detrimental insect communities will enable better management strategies that may be linked to positive outcomes for wildlife, ecosystems and farm profitability.

The UBC research team has recently begun insect sampling in over 25 agricultural fields in Delta and will continue to do so throughout this growing season and the next. Two sampling teams, one collecting pollinating insects and the other collecting pests and their predators, are currently deploying a variety of trapping methods throughout the fields. Insect diversity in various types of field margins including remnant and DF&WT planted hedgerows, GLSAs, and adjacent cropped fields will be evaluated. Next year, a new study will begin to assess the impact of these insect populations on crop yields, on increased

or decreased needs for pesticide applications, and on increased or decreased needs for supplemental pollinators (e.g. honey bee and bumble bee rentals). The research team will also evaluate management success on an individual plant species basis to make recommendations about the best plants to include in the GLSAs and hedgerows. For instance, GLSAs with planted forbs will be evaluated by pollinator-flower visitation rate to find a set of plant species that collectively support the most pollinator species. Plant species identified will then be assessed to include in a new pollinator seed mix for the GLSA Program.

This project will address many concerns local growers have about hedgerows and GLSA. The resulting evidence may assist farmers with decisions about using these techniques in their farming operations. In addition to providing local evidence, the findings of this study will contribute to global discussions about how to mitigate biodiversity loss and feed the world sustainably, and how to reconcile agricultural land use with wildlife protection.

Funding for this project has been provided by the Governments of Canada and British Columbia through the Canadian Agricultural Partnership, a federal-provincial-territorial initiative. The program is delivered by the Investment Agriculture Foundation of BC.

References

1 - United Nations. 2019. *UN Report: Nature's Dangerous Decline 'Unprecedented'; Species Extinction Rates 'Accelerating'*. Accessed at <https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/>

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UBC truck with samples from the five-year GLSA research project

Partners in Stewardship

Drew Bondar, Maja Krzic and Sean Smukler

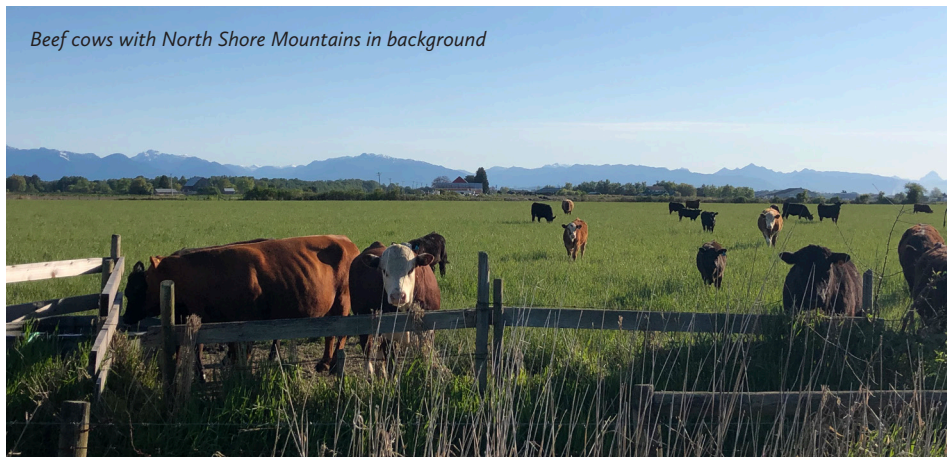
Delta Farmland & Wildlife Trust's (DF&WT) ongoing success is due in large part to the close partnerships the organization has developed over the years. Most importantly, DF&WT depends on over 40 farmers and land owners annually in the cities of Delta and Richmond to implement our stewardship programs. Without the support of the local farming community our success would have come to an end long ago. It is through the support and hard work of farmers that has resulted in the establishment and maintenance of over 13,100 acres of grassland set-asides, 82,000 acres of winter cover crops and 10 km of hedgerows. In addition to our close partnership with local farmers, DF&WT has worked extensively with multiple post-secondary institutions to continually evaluate our stewardship programs.

One of those institutions is the University of British Columbia's (UBC) Faculty of Land and Food Systems, which DF&WT has been working with since our establishment in 1993. Researchers from the UBC — Dr. Art Bomke and Dr. Wayne Temple — were instrumental in developing a seed mix for the Grassland Set-aside (GLSA) Stewardship Program that is still in use 25 years later. In the early 2000s, Dr. Bomke and Dr. Temple conducted further evaluations on various management practices of grassland set-asides as well as winter cover crops. In 2012, researchers' Dr. Sean Smukler and Dr. Maja Krzic led a project that assessed the impact of hedgerows on various environmental functions, including greenhouse gas mitigation, plant biodiversity and hydrology. In the spring of 2020, DF&WT began another project building off of earlier studies completed in partnership with UBC. Dr. Claire Kremen and Dr. Juli Carrillo will be leading a multi-year evaluation of the impact of GLSA and hedgerows on insect abundance and diversity, which includes an assessment of the effect of pollinator-mix GLSA on blueberry yields.

More recently, DF&WT wrapped up a five-year research project that evaluated the effects of GLSA on soil quality, and the effects on soil nutrient availability and crop yields following set-aside incorporation. One PhD, five MSc, and over 30 undergraduate students participated in the project. Dr. Krzic and Dr. Smukler led the investigation. Both have worked with DF&WT for many years and continue to support the organization through their expertise and guidance. "It is often difficult for university researchers to get to know farmers, understand their challenges so that they can do the research that is most helpful and then get the information to them effectively. Partnerships with organizations like the DF&WT are critical for facilitating this relationship and ensuring the impact of research," says Dr. Smukler. Dr. Krzic pointed out that the on-going collaboration with the DF&WT has provided valuable practical experience to several UBC graduate students, spanning from her graduate work back in the early 1990s to current projects. Copies of final research reports can be found on DF&WT's website at <https://deltafarmland.ca/library>.

In addition to our partnership with the local farming community and UBC, these research projects would not be possible without funding from the Governments of Canada and British Columbia delivered by the Investment Agriculture Foundation. This was the main source of funding for Drs. Bomke and Temple's study in the early 2000s, the hedgerow project in 2012, the five-year research project on GLSA and the latest project assessing the impact of hedgerows and GLSA on insect communities contributing over \$450,000 in cash support.

As challenges facing local farmers continue to increase, it is important that solutions developed to support wildlife on farmland also support agricultural viability. Partnerships with academic institutions, such as UBC, ensure DF&WT stewardship programs provide clear agronomic benefits in addition to the provision of wildlife habitat. Land management practices that improve the profitability of local farm operations while also increasing biodiversity on farmland is critical for ensuring continued participation by local farmers.



Beef cows with North Shore Mountains in background

Credit: Sara Yeomans

BCIT Ecological Restoration Summer Internship

Sara Yeomans, BCIT ER student

Since 2015, DF&WT has partnered with the British Columbia Institute of Technology to offer a summer internship to students in the Ecological Restoration BSc Program. This partnership provides students the opportunity to gain valuable fieldwork and project management experience, and allows DF&WT to study the effects of their stewardship programs on wildlife. Previous internships included studies on the effect of hedgerows on native songbirds and the effect of grass margins on insect communities.

The project this summer is to study the effect of cattle grazing on small mammal and raptor populations in grassland set-asides (GLSA). Historically, cattle grazing has not been permitted on set-asides. However, as the area of agricultural land continues to decline in the Fraser River delta growers are finding it more difficult to incorporate GLSA into their crop rotation. This is resulting in a decline in acres enrolled in the program annually. In order to continue to promote this sustainable practice, DF&WT is interested in identifying additional management options that support the use of GLSA.

Beginning in spring 2019, light livestock grazing was permitted on a few GLSA. Livestock grazing can change the vegetation structure and composition of a field, which can in turn affect small mammals and their predators. Specifically, grazing can change the density and height of vegetation, which can result in less cover for voles and can increase predation rates.

To study the effect of grazing on GLSA, we are conducting small mammal trapping, raptor surveys, and vegetation surveys in four fields in Delta, BC. We are comparing two fields that have been lightly grazed for approximately one year with two fields with no history of grazing. Our goal is to identify whether GLSA fields that have been grazed negatively impact small mammal and raptor abundance. Results from the study will assist in determining whether allowing livestock grazing of GLSA may become a viable option to continue to encourage growers to participate in the program.

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Wildlife Tidbits

With John Hatfield

A phenomenon that you may have come across while hiking your favourite trails in late summer or fall is a large shrub “decorated” with all types and sizes of mushrooms. Don’t be too surprised! These mushrooms did not grow here. They were placed there by squirrels to dry out and be eaten later. This is probably a welcome change in diet from fir and pine seeds. I’ll bet other squirrels, in addition to the ones who put them there, help themselves to these mushrooms too!

THANK YOU TO OUR 2019 STEWARDSHIP PROGRAM SUPPORTERS!



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