Delta Farmland & Wildlife Trust

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Partners in Stewardship

Photo: Mark Macdonald

Working With Nature to Manage Climate Change

Drew Bondar

Unprecedented hot weather struck British Columbia earlier this summer, with dry temperatures resulting in an above-average start to the province's fire season. The uncharacteristically hot weather serves as a stark reminder of the significant impacts of climate change.

Metro Vancouver recently experienced one of its longest streaks with no measurable rain resulting in parched trees that are losing their leaves across the region. Berries in the Fraser Valley and fruit trees in the Okanagan have also experienced extensive damage this season due to the early summer heat wave – resulting in significant crop losses.

Hotter, drier summers and extreme weather events as a result of a changing climate are projected to become more common in the years ahead. Many options are currently being examined to mitigate this trend and its negative impacts. One option that has received international attention is nature-based solutions.

Nature-based solutions are actions that support and leverage healthy-functioning ecosystems to address current societal challenges such as climate change and biodiversity loss. Many nature-based solutions are cost-effective, readily available, and easily scalable. Examples of agricultural nature-based solutions include: planting cover crops and hedgerows, improved nutrient and manure management,

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Dyke on Westham Island separating farmland and foreshore.

Credit: Tyler Garnham

reduced tillage, and incorporating legume crops.

Although nature-based solutions are receiving a lot of attention now, Delta Farmland & Wildlife Trust has been promoting practices that support soil health and biodiversity for almost thirty years. Our Winter Cover Crop Program helps farmers establish vegetative cover on their fields before winter; our Grassland Set-aside Program encourages farmers to plant fields with grasses and broadleaf plants and then let those fields rest for multiple years; and our Hedgerow Program encourages the planting of trees and shrubs along farm field margins. Winter cover crops, grassland set-asides, and hedgerows are three practices that contribute to mitigating climate change through reducing greenhouse gas emissions and trapping carbon in the soil. These practices also support wildlife and increase biodiversity on farmland.

Nature-based solutions show promising results for addressing some of our planet's most-pressing environmental issues. To encourage largescale uptake however, it is important that the costs to implement these solutions do not fall solely on the backs of farmers. Planting a cover crop can cost over $100/acre. Establishing a hedgerow on farmland can cost over $20,000. Grassland set-asides, which temporarily remove farmland from agricultural production, cost even more.

If society is serious about agricultural nature-based solutions then the full costs associated with these practices must be acknowledged. Farmers— who are already dealing with an ever-growing list of challenges— should be financially supported to make these practices economically feasible. By sharing in the costs, farmers will be in a better position to incorporate these practices into their operation resulting in healthier soils and greater resiliency to further impacts of climate change.

Credit: Drew Bondar

Honey bee foraging on Phacelia in a DF&WT set-aside.

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Winter Cover Crop - Credit: Tehlu Singh

Impacts of DF&WT Stewardship Programs on Soil Organic Matter

Drew Bondar

As the impacts of climate change increase in severity, an all hands-on-deck approach is needed to reduce carbon dioxide and other greenhouse gas emissions. Nature-based solutions— one of many approaches that is being promoted— harnesses the power of healthy-functioning ecosystems to withdraw carbon from the atmosphere and trap it in vegetation and soils. This process is known as carbon sequestration. In addition to removing carbon from the air, these solutions also reduce greenhouse gas emissions from the soil.

Three agricultural nature-based solutions that Delta Farmland & Wildlife Trust has been promoting for almost thirty years are: winter cover crops, grassland set-asides, and hedgerows. Each of these practices provide a wide range of benefits to soil health and biodiversity.

With regards to climate change, the question is: "how much of an impact do each of these practices have on sequestering carbon in the soil?"

Jordan Kersey, a Ph.D. fellow at the University of British Columbia, is currently investigating this particular question. Jordan is assessing the impact of winter cover crops, grassland set-asides and hedgerows on soil organic carbon. Soil organic carbon is an indicator of soil quality and is a measure of soil organic matter.

For Jordan's research, sites were selected across Delta, BC based off their historical use of hedgerows, cover crops and set-asides from 1992 to 2016. These sites were compared to fields that did not utilize any of these three practices. Soil sampling was completed in 2018. Research results found that soil organic carbon was 66% and 26% greater in the top 0-15 cm and 15-30 cm of the soil profile of hedgerows compared to sites with no hedgerows. Soil organic carbon was 33% and 45% greater in the top 0-15 cm and 15-30 cm of the soil profile for fields that incorporated cover crops compared to those that did not. For fields that incorporated both winter cover crops and grassland set-asides, soil organic carbon was found to be 60% and 71% greater in the top 0-15 cm and 15-30 cm of the soil profile compared to fields that did not have cover crops and set-asides.

Jordan's research results clearly highlight the benefits that cover crops, set-asides and hedgerows can have on soil organic matter and its subsequent benefit to mitigating climate change. Soils with higher organic matter are also better able to retain water for the drier summer months and improve nutrient cycling resulting in a reduction in the amount of fertilizer needed. Nitrous oxide, a greenhouse gas 300x more potent than carbon dioxide, is a byproduct of nitrogen fertilizers as they breakdown in the soil. Soils with higher organic matter that are able to reduce the quantity of fertilizer needed could potentially result in lower nitrous oxide emissions.

As we continue to deal with the impacts of climate change, finding solutions that are readily available and easy to incorporate into current agricultural practices is essential. Cover crops, grassland set-asides and hedgerows are all practices that DF&WT has been promoting and helping farmers with the costs to implement for many years. As we learn more about these practices, the benefits from an agronomic and environmental perspective only continue to grow.

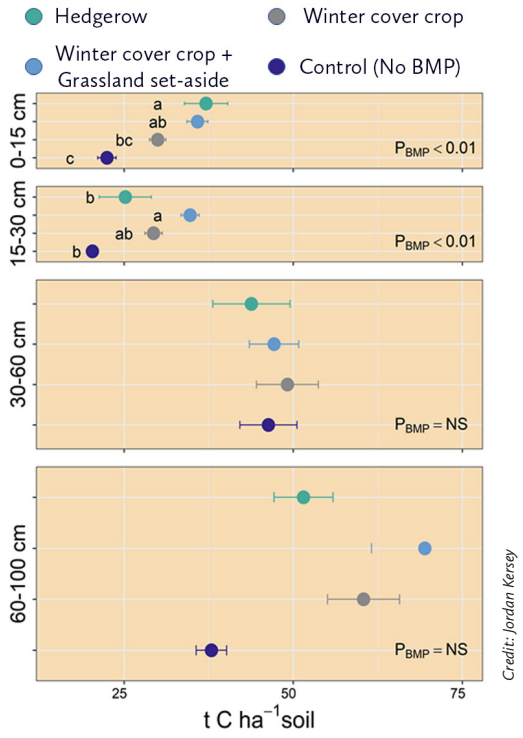

Figure: Soil organic carbon (t C ha^{-1}) at various soil depths (0 to 100cm) for sites that incorporated either hedgerows, winter cover crops, grassland set-asides, or no best management practices (BMP)

Snow Geese grazing a barley cover crop field

Credit: Drew Bondar

Increasing Waterfowl Grazing of Winter Cover Crops

Drew Bondar

The Fraser River estuary supports hundreds of thousands of waterfowl every winter during their annual migration. In the past, most waterfowl would stopover in the Fraser estuary before continuing their migration southwards. A recent report completed by Birds Canada and Pacific Wildlife Foundation, however, has found that many species of waterfowl are now making the Fraser estuary their final winter destination.[1] The report also found that the population of many waterfowl species have fared well since previous surveys completed in the 1980s, which is a positive conservation story but is also posing significant challenges for local farmers.

Winter cover crops are one tool that DF&WT has promoted for 28 years to support waterfowl on farmland and improve soil health. Although cover crops have assisted with mitigating the impacts of waterfowl on agricultural land, current conditions are resulting in greater pressure on farmland. The population of some species of waterfowl, such as Snow Geese, has increased significantly over the last four decades. During this same period there has also been a substantial reduction in soil-based farmland, which has resulted in much more concentrated waterfowl grazing on the farmland remaining.

Recent vegetation surveys of fields planted with a winter cover crop in Delta and Richmond have found that 60% of cover crop fields are grazed right to the soil surface by spring. This is in stark contrast to surveys conducted in 1999/2000 where only a quarter of cover crop fields were grazed to the soil surface by the end of the winter season— which is roughly a 130% increase.

Cover crops provide a wide range of benefits to agriculture and the environment. In addition to supporting waterfowl, they also improve soil fertility, reduce nutrient leaching into waterways and contribute to trapping carbon in the soil which assists in mitigating climate change.

With the increase in waterfowl grazing, planting cover crops is becoming costlier for local farmers. It is important that these rising costs be recognized through cost-share rates that reflect the increasingly challenging conditions local farmers are facing.

1 - Butler, R.W., D.W. Bradley and J. Casey. 2021. The status, ecology and conservation of internationally important bird populations on the Fraser River Delta, British Columbia, Canada. British Columbia Birds 32: 1-52

Delta Farmland & Wildlife Trust

Wildlife Tidbits

With the late John Hatfield

Common loons can be a nuisance to fly fishermen on lakes. I've had the experience myself of catching a rainbow trout and suddenly thinking "I've just caught the largest trout ever," only to realize that a loon has grabbed ahold of it. Very seldom will a loon let go. It hangs on until either the line breaks or the trout breaks off from the hook, ending up an easy meal for the loon. If I want to release a trout, I'll splash the water with an oar or my hand to distract the loon and then throw the trout in the opposite direction.

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