



2021

Case Study Series

Local Best Management Practices
in Agriculture

Best Management Practices and Alternative Land Use Services in Grey, Bruce, and Huron Counties

SERIES OVERVIEW

This case study series has been developed as a product of an agricultural climate change risk assessment, funded by Bruce Power and completed by the Council of the Great Lakes Region (CGLR) and the Climate Risk Institute (CRI). Providing solution-oriented information and demonstrating the importance of Best Management Practices (BMPs) and Alternative Land Use Services (ALUS) is key for finding and implementing effective solutions to existing and future climate issues. The case studies showcase various BMPs and ALUS projects implemented across Grey, Bruce and Huron counties. Selected case studies range in scale, from regional-level to on-farm applications, highlighting the benefits and outcomes of each project.

BMPs are practical and affordable techniques that can help to conserve agricultural soil and water resources without compromising economic productivity. BMPs can include nutrient management strategies, erosion and runoff control measures and implementing physical barriers and vegetative buffers. ALUS is a unique program that recognizes the important role that farmers play in conservation and stewardship. Through the program, farmers receive incentives to implement conservation measures and restore natural features such as wetlands, native grasses and trees, strengthening ecosystem functions and increasing habitat connectivity. Both BMPs and measures implemented under the ALUS program have co-benefits for soil and water conservation, ecosystem health and farm productivity, while also building climate resilience.



BEST MANAGEMENT PRACTICES

Farmers across Grey, Bruce and Huron counties have successfully implemented BMPs at the farm-level. BMPs have helped farmers reduce soil erosion and nutrient runoff, and protect overall soil and water quality. In addition to environmental benefits, local farmers and organizations have reported several economic benefits of applying BMPs, including increased productivity and lowered operating costs.



ALTERNATIVE LAND USE SERVICES

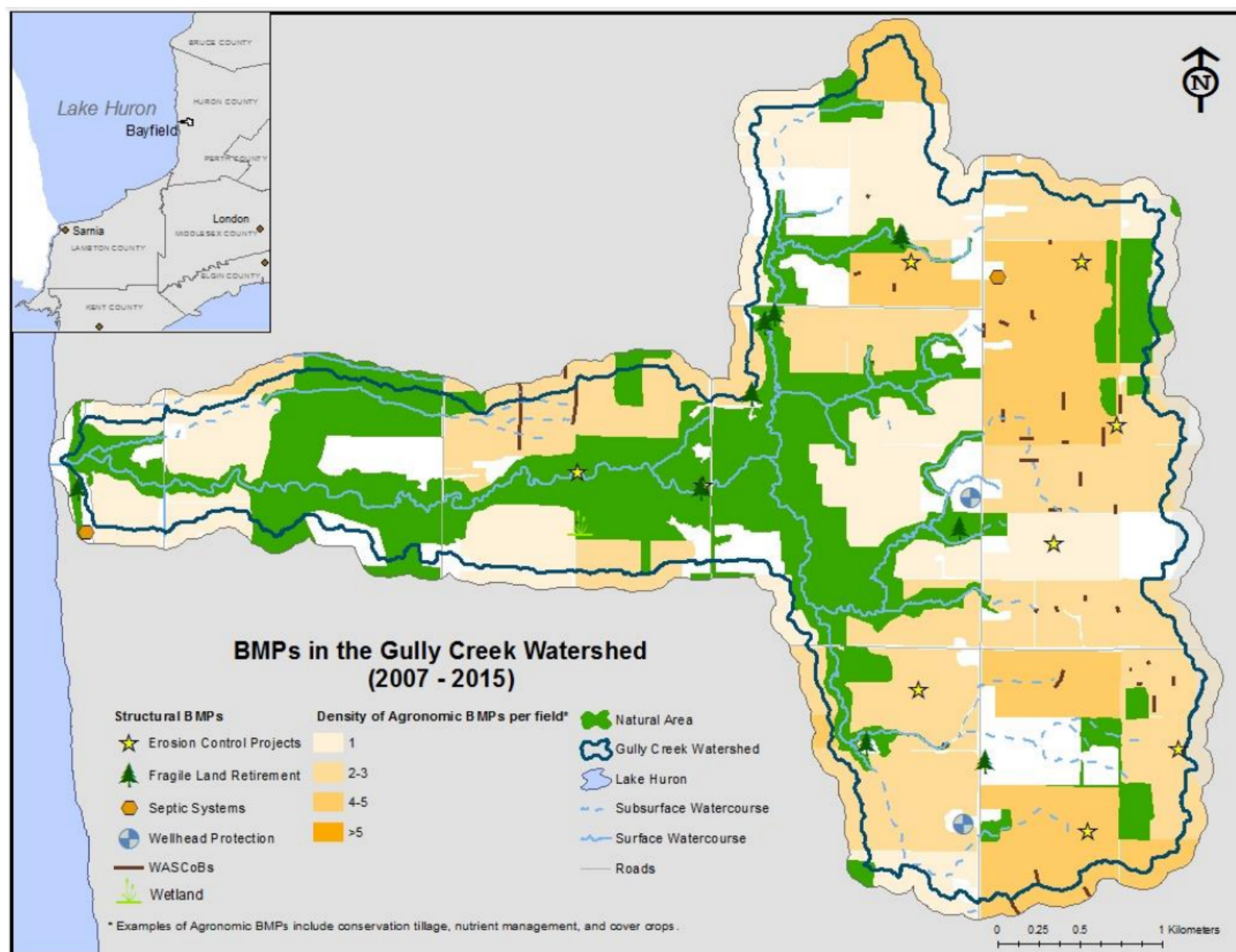
Farmers across Grey and Bruce counties have participated in the ALUS program and reported on the benefits associated with production and ecosystem health. The ALUS Grey-Bruce program aims to support land stewardship by offering incentives to implement projects for enhancing ecosystem and watershed health, while maintaining agricultural productivity.

Case Study #1

Best Management Practices in the Gully Creek Watershed

OVERVIEW

The Gully Creek watershed is located within the jurisdiction of the Ausable Bayfield Conservation Authority (ABCA). The watershed area is 14 square kilometers, dominated by agricultural land-use. With funding and resources from OMAFRA, it has been an area of particular interest for the implementation and monitoring of various BMPs since 2008.



Caption: Implementation of agricultural best management practices in Gully Creek watershed (2007 to 2015)

IMPLEMENTATION

Outreach to landowners in the Gully Creek watershed was initiated in the fall of 2008 and since that time at least 85 agricultural BMPs have been implemented, affecting most properties in the watershed.

Some of the implemented BMPs include:

- Streamside Restoration,
- Riparian Tree Planting,
- Conservation Tillage,
- Cover Crops,
- Precision Agriculture,
- Manure Amendments,
- Nutrient Management.

LOCATION: HURON COUNTY

YEAR: 2008 - PRESENT

PROJECT LEADS: AUSABLE BAYFIELD CONSERVATION AND OMAFRA

CLIMATE RELATED ISSUES: EXTREME WEATHER AND PRECIPITATION; FLOODING; EROSION

TYPE OF PROJECT: BMP

ACTIONS TAKEN: STREAMSIDE RESTORATION; RIPARIAN TREE PLANTING; CONSERVATION TILLAGE; COVER CROP PLANTING; PRECISION AGRICULTURE; MANURE AMENDMENTS; NUTRIENT MANAGEMENT

OUTCOMES AND MONITORING

The implemented BMPs have collectively reduced pollution transport and nutrient loads entering the Gully Creek watershed. The project has increased broader awareness around the importance and associated benefits of BMPs to improve soil and water health, without compromising agricultural productivity.

Research partners from the University of Guelph have developed a Soil and Water Assessment Tool (SWAT) model, which is a hydrologic model that can be used to help determine the collective effect of the BMPs at a watershed scale.

NEXT STEPS

ABCA and partners will continue research and monitoring to showcase the positive impact of BMPs on the watershed.

REFERENCES

- [Evaluating Agricultural BMPs in a Huron County Watershed](#)
- [Ausable Bayfield Conservation Project Webpage](#)
- [Watershed Based BMP Evaluation \(WBBE\) Huron Field-scale BMP Evaluation](#)
- [WBBE Huron Land Use and Land Management](#)

Case Study #2

Garvey-Glenn Watershed Project

OVERVIEW

Garvey-Glenn Creek is a small watershed, draining approximately 3,500 acres of agricultural land into Lake Huron. The objective of the Garvey-Glenn Watershed Project is to research and demonstrate how to best create a watershed that is resilient to the impacts of climate change. This is being done through working with landowners, researching and demonstrating the effectiveness of a variety of BMPs aimed at increasing soil health, improving water quality and building overall watershed resilience.

IMPLEMENTATION

The project has adopted a systematic approach, aiming to avoid and minimize impacts and then control, trap and treat the remaining, unavoidable impacts.

Maitland Valley Conservation has reported that the following projects have been completed since 2011:

- A total of 2.2 km planted grassed waterways,
- 1.3 km of modified drain clean-outs,
- 15 installed water and sediment control basins,
- 1.1 km of buffered channel,
- 1.5 km of windbreaks,
- 6 acres of block plantings.

The scope of work under this project includes:

- Continued demonstration and monitoring of erosion control structures installed in the Garvey-Glenn watershed.
- Development of nutrients balance sheets for all fields in the watershed to help producers make informed decisions.
- Work with producers to demonstrate practices that improve soil health (i.e., using cover crops and maintaining soil cover year-round).
- Collection of land management and soil health data which will be used as part of a larger initiative to develop watershed Soil Health Report Cards.

REFERENCES

- [Garvey-Glenn Watershed Project](#)
- [Garvey-Glenn Webpage](#)
- [Overview of the Garvey-Glenn Project](#)

LOCATION: HURON COUNTY

YEAR: 2011 - PRESENT

PROJECT LEADS: MAITLAND VALLEY CONSERVATION

CLIMATE RELATED ISSUES: EXTREME WEATHER AND PRECIPITATION; FLOODING; EROSION

TYPE OF PROJECT: BMP

ACTIONS TAKEN: COVER CROP PLANTING, CONSERVATION TILLAGE, GRASSED WATERWAYS, TREE PLANTING, EROSION CONTROL BERMS, CONSTRUCTED WETLANDS, RIPARIAN BUFFER ZONES, NATURALIZED CHANNEL DESIGN



Caption: Garvey-Glenn watershed

OUTCOMES AND MONITORING

Since 2011, Maitland Valley Conservation has been regularly monitoring water quality throughout the Garvey-Glenn watershed. An edge-of-field monitoring station has been installed in the area to collect information on weather, soil moisture, water levels and water quality. This information is relayed back to the project team for documentation and analysis, enabling staff to determine total nutrient loads that pass through each system per event. The data are being used to determine which BMP will have the greatest impact on improving water quality.

NEXT STEPS

Maitland Valley Conservation will continue to monitor water quality throughout the Garvey-Glenn watershed to better understand how various BMPs affect water quality. Additionally, a Garvey-Glenn Watershed Project newsletter is developed and released quarterly, updating recipients on the monitoring progress.

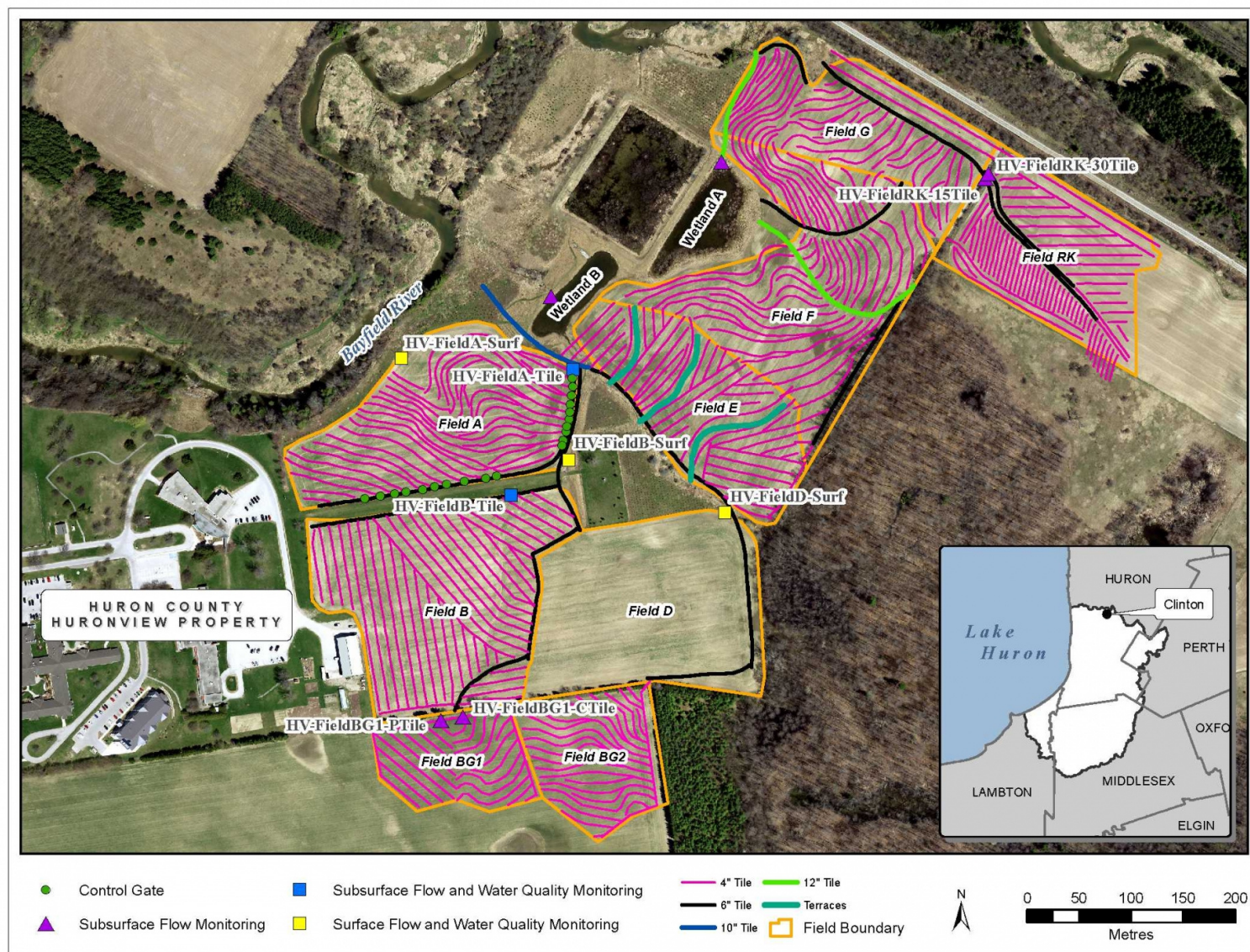
Case Study #3

Innovative Drainage

Demonstration Project

OVERVIEW

Huronview Demo Farm is owned by Huron County, farmed by the Huron County Soil & Crop Improvement Association (HCSCIA) and monitored by the Ausable Bayfield Conservation Authority (ABCA). Originally leased to HCSCIA in 2015 as a demonstration farm to showcase no-till and cover cropped farming practices, in June 2019 it also became the site of side-by-side research comparing contoured/controlled drainage on a slope, a conventional drainage system and an undrained area, along with contoured surface swales to demonstrate erosion control.



Caption: Drainage Map of Huronview Demonstration Farm

IMPLEMENTATION

At the Huronview Demonstration Farm, Huron County, HCSCIA and ABCA have collaborated with the drainage industry to evaluate innovations in tile drainage. An innovative drainage project features wetlands, vegetation strips, contour drainage, control gates, pattern tiling, and terraces that were installed starting in March 2019, culminating in a drainage demonstration day. Crop yields, soil health and water quantity and quality monitoring at the site follows a before, after, control, impact design.

LOCATION: HURON COUNTY

YEAR: 2015 - PRESENT

PROJECT LEADS: HURON COUNTY, HURON COUNTY SOIL & CROP IMPROVEMENT ASSOCIATION; AUSABLE BAYFIELD CONSERVATION

CLIMATE RELATED ISSUES: EXTREME WEATHER AND PRECIPITATION; FLOODING; EROSION

TYPE OF PROJECT: BMP

ACTIONS TAKEN: CONTOUR TILE DRAINAGE, CONTROL GATES, VEGETATION STRIPS, PATTERN TILLING

At Huronview, a 7-acre field (ranging from 3 to 9% slopes) was installed with controlled drainage, and the lateral tiles were laid on contour at a grade of 0.1%. Snaking around the field, each lateral had a control gate installed at the end of it, with 22 gates in total. The gates are adjusted manually to restrict or allow flow.

OUTCOMES AND MONITORING

ABCA is monitoring weather data, soil testing, fertility, flow rates, water levels and water quality. It is too early to determine if the project has improved water quantity and quality. Surface and subsurface water will continue to be measured and analyzed for flow and quality. Based on the first year, the Huronview fields have met the area's yield averages for all selected commodities.

NEXT STEPS

The next steps at Huronview Demonstration Site are to better understand and monitor groundwater so that water quantity can be better measured. Additionally, continued on-site monitoring will allow for the project leads to analyze the results and impacts on water quantity and quality.

REFERENCES

- [Huronview Innovative Drainage Demo 2021 Update](#)
- [Huronview Demo Farm](#)
- [OSCIA – Huronview Demonstration](#)

Case Study #4

Soil Erosion Be Gone

OVERVIEW

Alternative Land Use Services (ALUS) works to maintain ecosystem services on agricultural lands. Project implementation can include wetland restoration and enhancement riparian buffers, shelter-belts, afforestation and native prairie grass restoration. These actions result in improved water and air quality, habitat connectivity, carbon sequestration and build climate resilience. Through the ALUS program, a local Bruce County crop producer has transformed acres of less productive sandy soil into a flourishing arboreal ecosystem.



Caption: Native conifers with a corn crop in the background on Bruce County farmland.

IMPLEMENTATION

After assessing yield maps on over 3,200 acres of land, this local farmer identified the less productive sandy soil areas and worked with the ALUS program to transform the ecosystem. The project main goals were to improve surrounding soil and water quality. The farmer planted native conifers across the identified less productive areas, to increase soil productivity and lessen erosion rates.

LOCATION: BRUCE COUNTY

YEAR: 2017

PROJECT LEADS: LOCAL PRODUCER; ALUS PROGRAM

CLIMATE RELATED ISSUES: WIND; EXTREME RAINFALL; FLOODING

TYPE OF PROJECT: ALUS

ACTIONS TAKEN: TREE PLANTING

OUTCOMES AND MONITORING

The farm has transformed acres of less productive areas of land into a flourishing arboreal ecosystem. Soil erosion has lessened significantly, and overall soil productivity has improved. The project has resulted in several cascading benefits for the farmer and productivity, as well as overall increased ecosystem function and climate resilience.

NEXT STEPS

Based on the benefits of the ALUS tree-planting program, the farmer plans to continue monitoring soil conditions and plant additional trees where possible.

REFERENCES

- [Soil Erosion Be Gone](#)
- [ALUS Resources](#)

Case Study #5

Buffering up the Land

OVERVIEW

The ALUS program supports the implementation of nature-based solutions on agricultural land to sustain productivity and strengthen biodiversity in surrounding ecosystems. At Big Rock Bison, an environmentally minded bison-raising operation in Shallow Lake, grassland across 200-acres has been restored on the family's agricultural operation. The owners joined ALUS in 2017, to contribute to local riparian and habitat conservation. The local Grey County farm has worked to conserve their land by limiting access of their herd to certain areas, allowing increased habitat function and general ecosystem health.



Caption: This local Grey County ALUS project contains 50 mature trees and wild undergrowth.

IMPLEMENTATION

The family-owned production decided to designate and convert 16.5 acres of grazed land to riparian and habitat conservation. They began by fencing off 10 acres of mature bush from their herd, extending a grassland and wetland buffer area that adjoins the forest. By isolating these acres of land from his herd, the land can function as habitat to a broad range of animals, insects and plants.

LOCATION: GREY COUNTY

YEAR: 2017

PROJECT LEADS: LOCAL PRODUCER; ALUS PROGRAM

CLIMATE RELATED ISSUES: WIND; EXTREME RAINFALL; ECOSYSTEM HEALTH

TYPE OF PROJECT: ALUS

ACTIONS TAKEN: WETLAND BUFFER; GRASSLAND BUFFER; TREE PLANTING

OUTCOMES AND MONITORING

The producers almost immediately noticed an increase in wetland and land health, contributing to overall ecosystem function. Grasslands were restored, over grazing was avoided and overall resiliency of the operation increased. The family has observed increased snake, bird, and mammal species on their property, and track more each year.

NEXT STEPS

Currently the producer is exploring other ways to benefit the land, such as introducing a wildflower mix and other native species into the wetlands.

REFERENCES

- [Buffering up the Land](#)
- [ALUS Resources](#)

Case Study #6

Compaction Recovery with Cover Crops

OVERVIEW

Soil compaction can lead to decreased water infiltration and water holding capacity, increased soil erosion, reduced yields and nutrient uptake, increased input costs, and reduced root growth and depth. Increasing knowledge and awareness on the tools available to farmers to both prevent and alleviate compaction is important. This project looks at the role that cover crops can play in compaction recovery. The goal is to understand the impact of cover crops in a rotation on the gradual alleviation of compaction over two years following a compaction event.

IMPLEMENTATION

The project team is monitoring 6 sites with varying tillage practices, compaction methods and cover crop treatment. The objective is to identify how the presence of cover crops impacts compaction and yields.

The project team worked to develop a methodology that would test the objective of determining if cover crops could help to alleviate the effects of soil compaction. Based on this approach, a comparison of a worst-case versus a best-case scenario was implemented to showcase results. Trials were set up with two replicates of a fully compacted area and two that had normal field traffic. Cover crop treatments were then applied to each site, monitored and compared with the sites where no treatment was applied.

Site A



Site B



Caption: Cover crop application between the two sites.

LOCATION: BRUCE COUNTY

YEAR: 2018- 2021

PROJECT LEADS: OMAFRA, BRUCE SOIL AND CROP IMPROVEMENT ASSOCIATION AND SAUGEEN VALLEY CONSERVATION

CLIMATE RELATED ISSUES: EXTREME PRECIPITATION; FLOODING; EROSION

TYPE OF PROJECT: BMP

ACTIONS TAKEN: COVER CROPS, NO-TILL SYSTEMS

OUTCOMES AND MONITORING

It is known that organic matter and aggregate stability are important soil qualities for preventing compaction, but there is scarcity of data to support how much the BMPs can assist with recovery. The project team observed less visible compaction in long-term no-till and cover crop plots. Due to challenges associated with measuring compaction (i.e., wet soil conditions), the quantifiable impact that cover crops alone had on soil compaction was undetermined. However, the study was able to draw conclusions that no-till systems are found to increase resilience to soil compaction. The project team anticipates a slower long-term compaction recovery rate in plots without cover crops than in plots with cover crops.

NEXT STEPS

The project team will be communicating the results and progress of this project and will host a compaction reaction field day in 2021. It is suggested that the project is repeated to increase knowledge on the influence tillage systems and cover crops have on soil compaction recovery overtime.

REFERENCES

- [Compaction Recovery with Cover Crops](#)
- [Compaction Recovery with Cover Crops Project Presentation](#)

Case Study #7

The Value of Keeping Topsoil in Place

OVERVIEW

The diversity of soils and climate conditions in Ontario allows farmers to grow a wide range of crops and support different types of agriculture. To varying degrees, farmers face common challenges related to drainage, soil organic matter and fertility, and deal with conditions unique to their farm's topography and geographic location. A local farmer in Bruce County has implemented several BMPs to address the issues with soil health and conservation in the region,



Caption: Example of using clover for cover crop.

IMPLEMENTATION

This Bruce County row crop producer has grown corn, soybeans and wheat in a three-crop rotation since the early 2000s. Movement of topsoil and general soil health has always been a concern and resulted in added input costs over the years. BMPs were implemented and monitored on the local site to measure impacts on topsoil movement and fertility.

Specific BMPs included:

- Rotation - Moved from a corn-soy rotation to a four-crop rotation including corn, soy, wheat and cover crops.
- Cover crops - Applied after wheat and included a mix of oats, cereal rye and clover.
- No-till/Strip-till - Started no-till and strip-tilling in 2008.
- Altered nutrient use - Applies biosolids to cover crops, which carries over to corn and soybean crops.

LOCATION: BRUCE COUNTY

YEAR: 2020

PROJECT LEADS: LOCAL PRODUCER; FARM & FOOD CARE ONTARIO

CLIMATE RELATED ISSUES: WIND; EXTREME RAINFALL

TYPE OF PROJECT: BMP

ACTIONS TAKEN: NO-TILL/STRIP-TILL, COVER CROPS, NUTRIENT APPLICATION, CROP ROTATION

OUTCOMES AND MONITORING

The BMP that has resulted in the greatest benefits at this point in the project, is the transition to a no-till system. This transition has kept soil in place and improved overall water infiltration. The change has led to the farmer being able to plant earlier, lessen weeds and herbicide costs, and increase general soil quality. It is predicted that soil compaction will continue to decline as no-till practices and other BMPs are continuously implemented.

NEXT STEPS

Based on observed benefits and lowered costs, the local producer plans to continue applying and monitoring the identified BMPs.

REFERENCES

- [The Value of Keeping Topsoil in Place](#)
- [Farm and Food Care Ontario Soil Health Resources](#)

Case Study #8

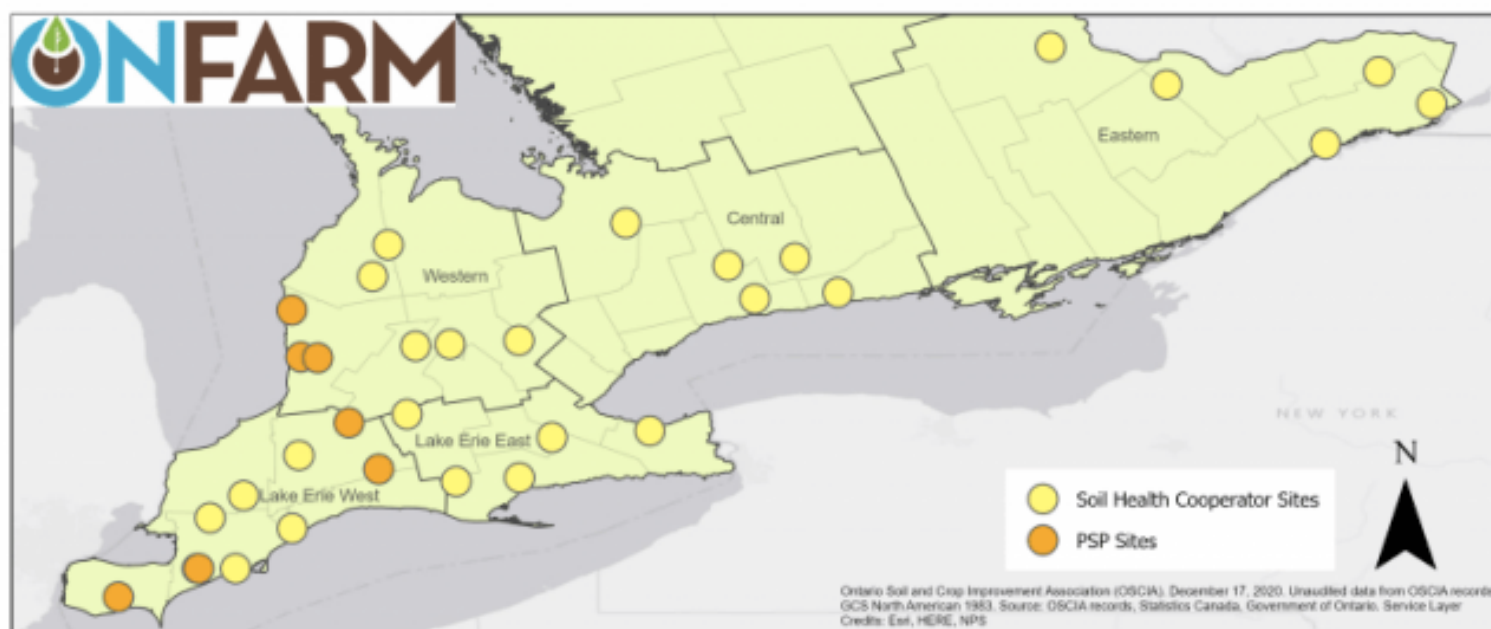
Regional Soil Health Trial Sites

OVERVIEW

The On-Farm Applied Research and Monitoring (ONFARM) program was launched in 2019, by Ontario Soil and Crop Improvement Association (OSCIA) and Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), with funding support from the Canadian Agricultural Partnership. The program supports soil health and water quality research on farms across Ontario. Local farmers across Bruce and Grey counties have participated in the program by implementing BMPs on-farm and reporting on soil health goals overtime.

IMPLEMENTATION

The ONFARM program includes 25 individual sites across the province, for implementing and monitoring BMPs on soil health and agronomic indicators over three full field seasons. Local sites in Bruce and Grey counties have implemented no-till and strip-till management practices and adopted cover crop application. Trial sites across the counties have similar goals including improving soil health and nutrient cycling, minimizing wind and water erosion, improving soil fertility, and reducing compaction.



Caption: Map of Participating Trial Sites

LOCATION: BRUCE AND GREY COUNTIES

YEAR: 2020 - PRESENT

PROJECT LEADS: ONTARIO SOIL AND CROP IMPROVEMENT ASSOCIATION (OSCIA) AND OMAFRA

CLIMATE RELATED ISSUES: EXTREME WEATHER AND PRECIPITATION; FLOODING; EROSION

TYPE OF PROJECT: BMP

ACTIONS TAKEN: COVER CROPS, CONSERVATION TILLAGE, ORGANIC AMENDMENT

OUTCOMES AND MONITORING

The ONFARM program supports efforts of monitoring water quality and quantity and soil health for each of the selected sites. Supported activities include monitoring the impact of different BMPs across a variety of soil management practices and commodity types. Results from the ONFARM program are used for information sharing with local farmers to increase the uptake of BMPs.

NEXT STEPS

Local project sites in Grey and Bruce counties will continue to monitor their on-farm application for the remaining duration of the project. Specifically, producers will continue to measure and monitor improvements in soil health and fertility and report on findings. Local participants intend to continue the application of BMPs beyond the project based on the preliminary benefits observed.

REFERENCES

- [On-Farm Applied Research and Monitoring](#)
- [ONFARM Cooperator Profile](#)
- [Soil Health BMP Trial Site #11](#)
- [Soil Health BMP Trial Site #15](#)

Case Study #9

Cover Crop Trial Project

OVERVIEW

The Huron Clean Water Project provides financial and technical assistance to Huron County residents to improve and protect water quality in the County. This cover crop demonstration research project promoted the initiative by observing the effect of different cover cropping strategies for corn. Variables include population size, the effect of different cover crop mixes, and cover crop seeding rate. Ausable Bayfield Conservation is working with the participating landowner and with agricultural industry partners to monitor and report on the outcomes of the project.



Caption: Crop cover innovation project along Lake Huron's southeast shore.

IMPLEMENTATION

Cover crops were planted on six 1-acre plots into 60-inch double cornrows of 700 feet length. Each of the six plots has different plant populations and the cover crop mix is tailored to benefit either the current corn crop or the subsequent soybean crop with varying cover crop seeding rates and a common fertility program for all strips. Strips accommodate three passes of eight row planters and four passes of a 15-foot drill. The 60-inch corn twin rows are planted by the two-pass, every-other-row method, offset by seven inches. Cover crop mixes are drilled into the corn at the 'V4' stage. The project uses GPS to locate strip boundaries for future reference. The damage to corn is minimized, when planting the cover crop, by splitting twin rows with drill-seed openers.

LOCATION: HURON COUNTY

YEAR: 2020

PROJECT LEADS: AUSABLE BAYFIELD CONSERVATION; HURON COUNTY; THE HEALTHY LAKE HURON - CLEAN WATER, CLEAN BEACHES PARTNERSHIP

CLIMATE RELATED ISSUES: WIND; EXTREME RAINFALL

TYPE OF PROJECT: BMP

ACTIONS TAKEN: COVER CROPS; NO-TILL SYSTEMS

OUTCOMES AND MONITORING

Indicators are being measured for the corn yield cover crop biomass soil health and the soybean yield in the following crop. Early results show prompted root biomass, increased soil health and less soil erosion.

NEXT STEPS

Within the Huron Clean Water Project, a cover crop incentive program has been developed to promote establishment of cover crops by local farmers. The incentive applies to cover crop applications with three or more species to reduce erosion and protect local water quality. Specifically, landowners in the area are eligible for a up to \$45 per acre, up to 100 acres, for planting cover crops (dependent on number of species planted). Trial research like this project is important for demonstrating the associated benefits of cover crops and other BMPs to local farmers.

REFERENCES

- [Cover Crop Innovations in Huron County](#)
- [Cover Crop Innovations in Huron County Video](#)
- [Cover Crops in Sixty Inch Corn Video](#)
- [Annual Cover Crops Workshop Video](#)

Case Study #10

Pollinator Strip at

Huronview

Demonstration Farm

OVERVIEW

Enhancing habitat for pollinators around agricultural land can result in improvements to pollinator health, ecosystem function and improve crop yields (particularly in pollinator-dependent crops). BMPs like pollinator strips, that retain native flowers and plants, will contribute to improving pollinator habitats. This demonstration project was implemented at Huronview Demonstration Farm to showcase how pollinator strips and grassed buffers can limit wind and water erosion and provide habitat for local pollinators.

IMPLEMENTATION

Native grasses and flowers that blossom throughout the growing season were planted on a strip of land along the edge of the demonstration property.



Caption: Huronview Demonstration Farm Aerial

LOCATION: HURON COUNTY

YEAR: 2020

PROJECT LEADS: HURON COUNTY SOIL AND CROP IMPROVEMENT ASSOCIATION; AUSABLE BAYFIELD CONSERVATION; HURON COUNTY

CLIMATE RELATED ISSUES: WIND; EXTREME RAINFALL; FLOODING
TYPE OF PROJECT: BMP

ACTIONS TAKEN: POLLINATOR STRIPS; GRASSED BUFFERS

OUTCOMES AND MONITORING

The implemented buffer area directs water to appropriate outlets and limits soil erosion and nutrient loss. The incorporation of native plant species that are pollinator-friendly have increased the benefits associated with the buffer strip by providing additional habitat for pollinators. The increased pollinator habitat is likely to benefit pollinator dependent crops in the long-term.

NEXT STEPS

Monitoring efforts will continue on the Huronview Demonstration Farm to record the benefits and any lessons learned. Local farms in the area have started participating in projects with pollinator strips and cover crops to attract pollinators and enhance their habitats.

REFERENCES

- [Huronview Demonstration Farm](#)
- [Pollinator Strip at Huronview Demonstration Farm Video](#)
- [Cover Crops and Pollinators Video](#)