

# Converting Marginal Farmland of Olds College Smart Farm to Perennial Cover

## 2025 Monitoring Field 18 & Steckler

This project report represents the first year of monitoring following the conversion of approximately 11 acres of economically marginal cropland at the Olds College Smart Farm (Field 18 and Steckler) to perennial forage and pollinator habitat. Expanding on the establishment work done in the 2024 season, the 2025 monitoring season focused on evaluating changes in soil health, plant establishment, biomass production, pollinator activity and the economic implications of removing marginal land from annual crop production.

### INTRODUCTION

Starting January 2023 through to April 2024, Olds College Centre for Innovation (OCCI) conducted an extensive project with Farm Credit Canada (FCC), identifying multiple alternative uses for marginal farmland and the associated implications and impacts. The study aimed to determine whether such conversions could improve overall land health while mitigating the high input costs associated with low-yielding farmland.

In 2024 OCCI converted the two marginal sites to different types perennial forages and began in-season monitoring of each site. In 2025, OCCI continued monitoring and measuring the same parameters analyzed in 2024 to support year-to-year comparisons of soil health, vegetation establishment, financial impacts, effects on adjacent cropland and effects on pollinating insects.

### OBJECTIVES

- Continue site assessments and soil analysis on established marginal land and respective control areas to measure longer-term impacts of marginal land conversion.
- Assess the impact of marginal land on adjacent cropland.
- Monitor the climate resilience of converted marginal areas when subjected to notable weather stressors.

### STUDY DETAILS

2025 project season activities spanned from May 1 to October 31 across two previously farmed Olds College sites: Field 18 and the Steckler field, both identified in the 2023 project as economically marginal.

- At Steckler, a 3.6-acre area was established with perennial grasses and legumes in 2024.
- A 7.8-acre area within Field 18 was converted into perennial flowers for pollinator habitat in 2024.
- Control areas, consisting of marginal land left in annual crop production, were chosen for comparable measurements.

Throughout the season, ongoing monitoring included weather data from weather stations, soil sampling, biomass measurements, drone imagery, site observations and plant and pollinator identification.



- Soil samples of the treatment areas and controls were taken at the end of the season in October.
- Drone imagery was collected throughout the season using multispectral, thermal and high-resolution RGB imagery to assess seasonal changes and differences between treatments.
- Weather stations were installed at each site for continuous local measurement monitoring, such as ambient conditions and precipitation.
- Monthly time-domain reflectometer (TDR) measurements were taken at each treatment and control site to measure soil temperature, soil moisture, and soil electrical conductivity. All plant species, weedy or desired, were identified and documented during this time as well.
- Weekly flower assessments were done just at the perennial pollinator habitat sites (Field 18, not Steckler) to assess flower bloom timing and intensity.
- Pollinator sweep-netting was conducted three times during the flowering period and, in 2025, was expanded to include control areas, exclusion land, adjacent cropland and the usual treatment plots at both Field 18 and Steckler.
- A multiyear partial budget was developed to assess the financial impacts of removing the economically marginal land areas from production. A hypothetical scenario was also created to evaluate the potential economic benefits of converting such marginal land into hay bales.
- To measure forage yields of the treatment areas, biomass samples were clipped and dried to calculate yields per acre (lbs/acre).



# Converting Marginal Farmland of Olds College Smart Farm to Perennial Cover

## 2025 Monitoring Field 18 & Steckler

## RESULTS

### Soil Sampling

End-of-season soil sampling in 2025 showed consistent improvement in soil health across all sites. Soil health index scores increased by approximately 8-14% compared to 2024, with Flood Master, Meadow Master and Brine Master scoring highest, suggesting that more diverse forage blends may better support soil functions. Improvements were also observed in control areas, suggesting that overall site conditions were favourable.

### Drone Imagery

Syngenta and Proven Seed blends performed very similarly across the *Field 18 marginal land*, with largely uniform growth and only minor visual and NDVI differences throughout the season. Slight variability observed between plots was minimal and may be influenced more by underlying topography than by treatment effects.

Clear treatment differences were observed at the *Steckler marginal land*, with Brine Master consistently showing fuller, greener growth, higher NDVI value, and a longer growing period than neighbouring treatments. Flood Master established more quickly and showed higher early-season NDVI than Meadow Master, though differences diminished later in the season.



### Weather Monitoring

Multiple major rainfall events occurred during the monitoring period. Despite these events, no flooding was observed within the marginal land or in any adjacent cropland, including locations that had experienced flooding in previous years.

### Plant Establishment

*Field 18 marginal land* was dominated by sweet yellow clover in both forage blends, resulting in a major increase in biomass from 2024 to 2025 and strong suppression of weeds. Control areas were heavily weed-infested, while treated plots showed clear boundaries that limited weed survival and an average biomass increase of 400% per plot. Minor visual differences were observed between blends: Proven Seed appeared denser and dried down sooner, while Syngenta showed slightly higher plant diversity.

At the *Steckler site*, all forage blends showed substantial improvement from 2024 to 2025, with biomass increasingly dominated by desired species and minimal bare ground. Brine Master produced the thickest growth, and Flood Master established quickly with moderate weed presence. Across all blends, dry matter production increased by approximately 406%-494% compared to the previous year.

### Pollinator Sweep-Netting

Sweep-netting was conducted three times during the flowering period across treated plots, control areas, exclusion land and adjacent cropland in both Field 18 and Steckler. Nearly 3,000 pollinator insects were collected in 2025, with substantially higher counts at Steckler than at Field 18. Lower sweep counts at Field 18 compared to 2024 are likely due to extremely dense, tall sweet clover and reduced flower diversity, which limited sweep effectiveness despite frequent visual observations of high pollinator activity.



### Economics

In 2025, marginal land was left unmanaged and generated no direct costs or revenue. Conventional cropping of these marginal areas would have resulted in a net loss at both Field 18 and Steckler, as input costs exceeded expected revenues. When combined with 2024 results, Field 18 showed overall cost savings, while Steckler showed a cumulative loss. In contrast, a hypothetical haying scenario indicated net gains at both sites.

## NEXT STEPS

Continued site assessments and measurements on the same established marginal land and respective control areas for the 2026 and 2027 growing seasons.