



Combatting climate change with conservation agriculture practices in Michigan

Mitch Hunter, PhD
Research Director
June 20, 2021



About AFT

Saving the Land that Sustains Us.



ACCELERATE

Regenerative Agriculture



PROTECT & PROMOTE

Farmland

Compact growth

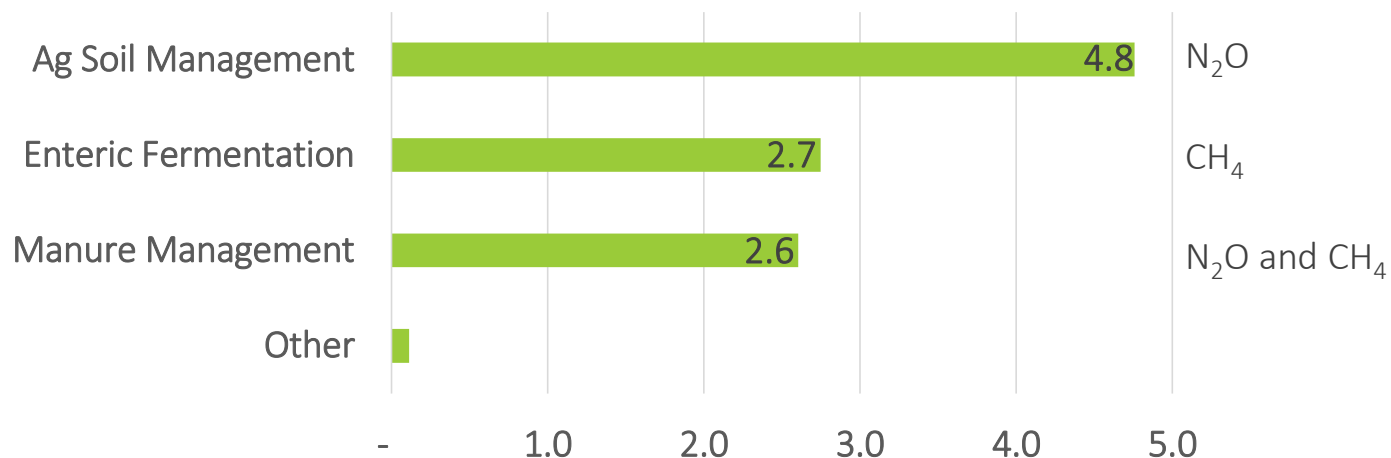


EXPAND

Smart Solar Siting

Overview of GHG Emissions from Michigan Agriculture

2018 Emissions (MMTCO₂ Eq.)



** Does not account for long-term declines in soil carbon stocks OR for the benefits of conservation practices already adopted. **

Total emissions of 11.7 MMTCO₂eq per year as of 2018
6.8% of total state emissions

Source: World Resources Institute, Climate Watch program
<https://www.wri.org/data/climate-watch-historical-emissions-data-countries-us-states-unfccc>

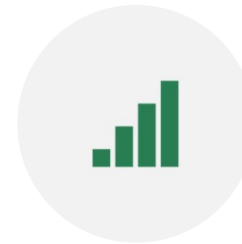
Approach



CaRPE Tool

Carbon Reduction
Potential Evaluation

Couples COMET-Planner &
AgCensus Data



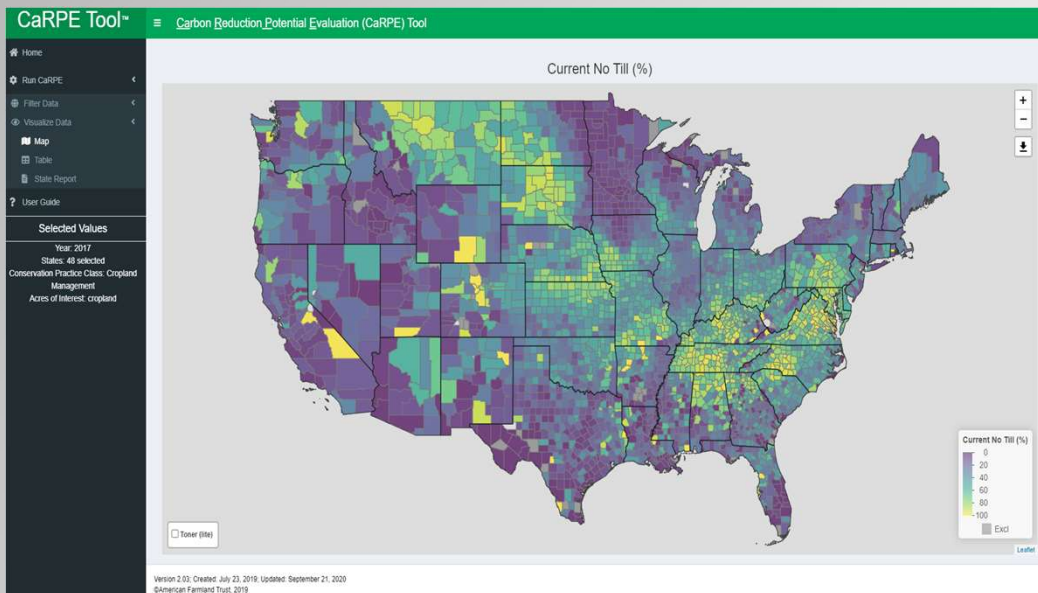
Visualize & Quantify

Emission reduction
potential from key
conservation practices



Summary Reports

Custom tables and
figures by state



Report Authors



**Jennifer Moore,
PhD**



**Daniel Manter,
PhD**



**Tabitha Brown,
PhD**



**Shelby C.
McClelland, PhD**



**Mitch Hunter,
PhD**

Practices Evaluated

Management Focus	NRCS Conservation Practice Standard (CPS) Number and Practice Name	Relative GHG Benefit	COMET Application
Soil Health	328 Conservation Crop Rotation	Dark Green	Decrease fallow or add perennial crops to rotation
	329 Residue and Tillage Management, No Till & Strip Till		Intensive or reduced tillage conversion to no-till or strip till
	340 Cover Crop		Add legume cover with 50% fertilizer N reduction
	340 Cover Crop	Light Green	Add non-legume cover with 25% fertilizer N reduction
	345 Residue and Tillage Management, Reduced Till		Intensive tillage conversion to reduced till
	484 Mulching		Add high carbon organic matter to croplands (e.g., straw or crop residues)
	585 Strip cropping		Add perennial cover in strips
Nitrogen Management	590 Nutrient Management	Light Green	Reduce synthetic N application rate by 15% over 5 years by adding organic N source (e.g., manure or compost)
Grazing and Pasture	381 Silvopasture		Add trees/shrubs on grazed grasslands
	528 Prescribed Grazing		Replace extensive pasture management (60% forage removal or more) with intensively managed grazing (40% forage removal)
	550 Range Planting	Seeding forages to improve rangeland condition	



Soil Health

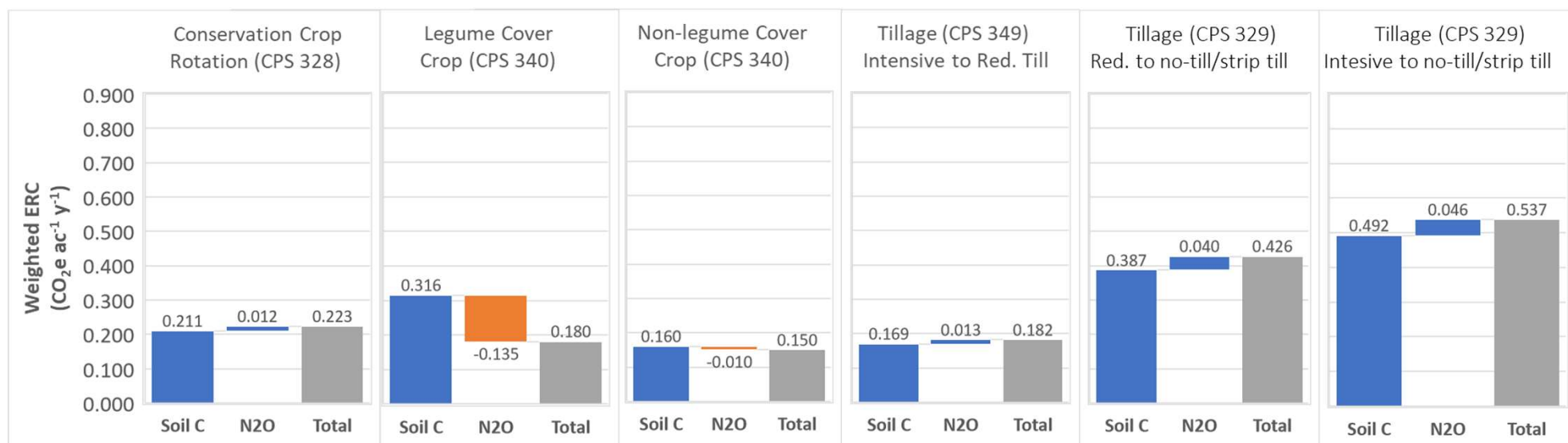


Nitrogen Management



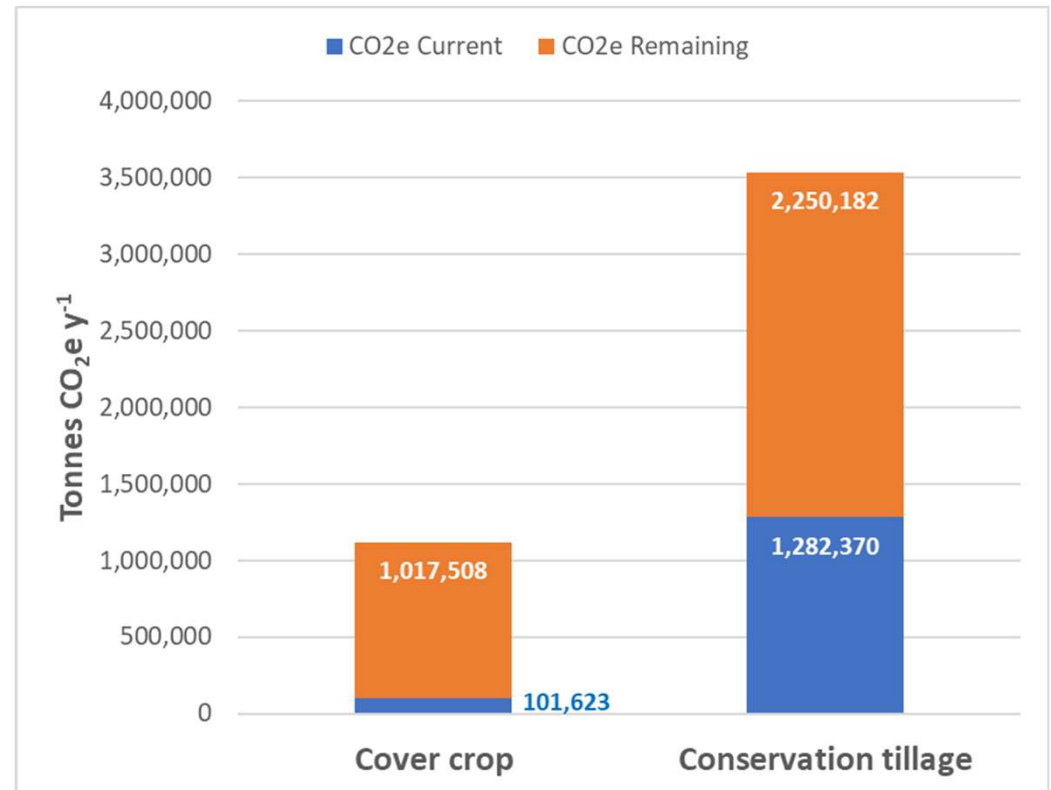
Grazing & Pasture

Average Weighted CO₂e Reduction Coefficients: Michigan



Theoretical Reduction Potential

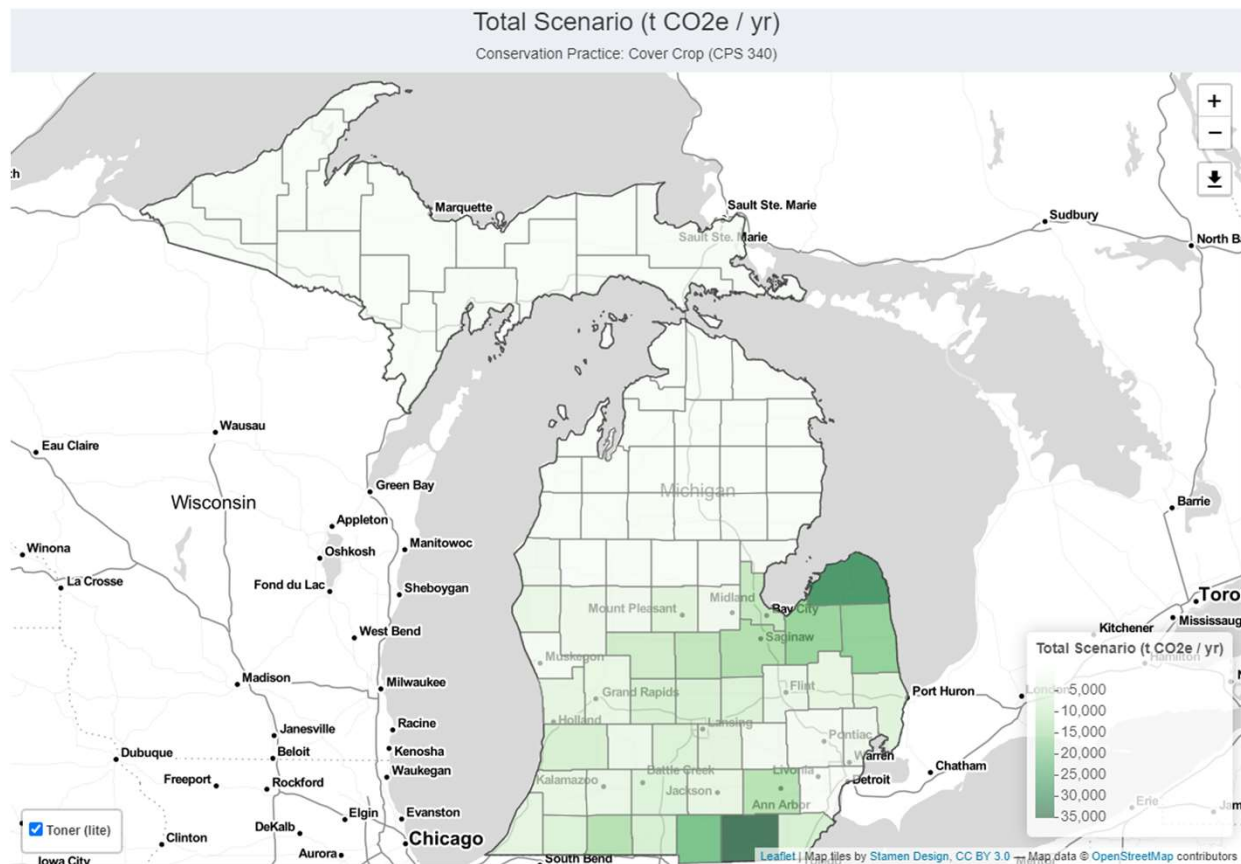
CO₂e Reduction from Cover Crops and Tillage in Michigan.



Sum = 4.6 M tonnes CO₂e reduction per year
39% of MI agriculture's total emissions

100% Cover Crop Rotation Adoption in Michigan

Note: Online CaRPE tool allows user to hover over counties, name and value is indicated for more detailed exploration.





Source: www.americanlandbroker.com

Scenario Example – Row Crops

3 practices implemented

- Roughly 5.5 M acres of row crops in 2017
- On these 5.5 M acres:
 - **Cover crops** were implemented on 25% of the acres (assumed 25% of these acres adopted a legume cover and 75% adopted a nonlegume cover);
 - **Conservation crop rotation** was implemented on 20% of the acres;
 - **No-till** was adopted on 50% of the acres (assumed half of the acres converted from intensive till and half from reduced till).

Scenario Example

Michigan row crop acres and percent adoption of 3 conservation practices with estimated CO₂e reduction potential resulting from state-wide implementation.

Practice	Scenario acres	% of Selected Acres	CO ₂ e (tonnes y ⁻¹)
Cover crop ¹	1,384,110	25	225,708
Conservation crop rotation	1,107,288	20	246,562
No-till	2,768,220	50	1,354,923
Top 3 Practices	5,259,617	N/A	1,827,193

¹ 25% legume/75% non-legume

Note: Reductions provided by current adoption are included in total.

Near-term practices on row crop acres alone can mitigate 15% of ag emissions.

Michigan can harness this GHG reduction potential **TODAY** by working with farmers to promote voluntary adoption of these practices.



Closing Thoughts


Conservation practices are a key tool in the climate toolbox and the CaRPE Tool can support state efforts to prioritize efforts.

It is also critical to address nutrient management, enteric fermentation, and manure management.


Most agricultural climate solutions provide numerous co-benefits for the environment and farming communities.


Thank You



Mitch Hunter, PhD 

Research Director

mhunter@farmland.org 

www.farmland.org 

<https://carpe.shinyapps.io/CarpeTool/> 