

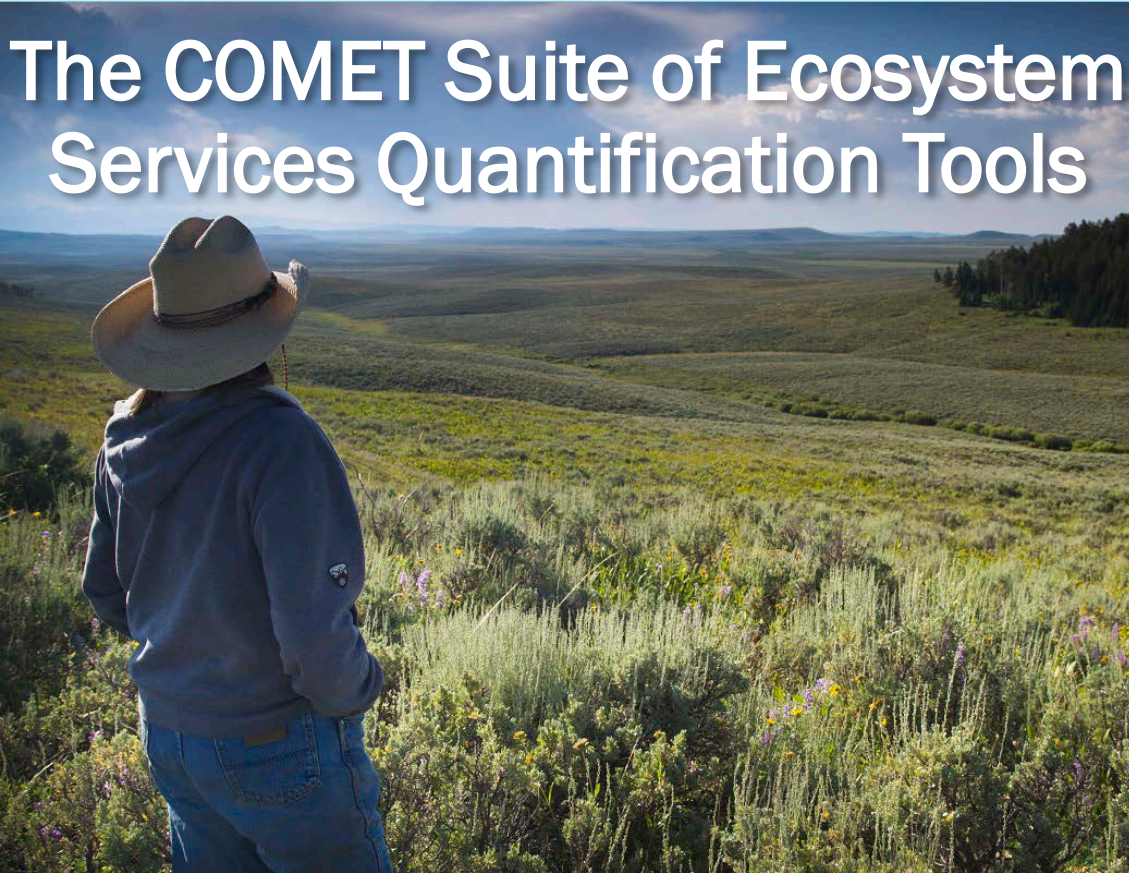


United States Department of Agriculture

# NRCS Webinar

## February 28, 2018

# The COMET Suite of Ecosystem Services Quantification Tools



Natural  
Resources  
Conservation  
Service

[nrcs.usda.gov/](http://nrcs.usda.gov/)

Final

# Introduction



**Kari Cohen** – Director, Conservation Innovations Team

**Adam Chambers** – Co-Leader, Energy and  
Environmental Markets Team



Natural  
Resources  
Conservation  
Service



# Introduction



**Kari Cohen** – Director, Conservation Innovations Team

**Adam Chambers** – Co-Leader, Energy and Environmental Markets Team



Kari



Adam



Natural Resources Conservation Service

[nrcs.usda.gov/](https://nrcs.usda.gov/)



# Overview



- Brief COMET History and NRCS Resource Concerns
- COMET-Farm Overview and Update
  - Recent Updates
  - Uncertainty calculations
  - Help Desk and Technical Support
- COMET-Planner Overview and Update
  - Version 1
  - California
  - The Lower 48 States
- CDSI Integration and Support of NRCS Conservation Planners
- COMET-Water Quality Tool Overview and Vision
- Q&A



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# Brief History of COMET Tools



- Development of COMET-VR initiated with Colorado State University in 1999, released in **2005**
- Launch of COMET-VR 2.0 in **2010**
- Launch of COMET-Farm in **2013**
- USDA “Blue Book” integration in **2015** – *USDA Official Tool*
- Launch of COMET-Planner in **2015** and revised in **2017/18**
- Development of COMET-Water Quality initiated in 2016, planned for **2018**



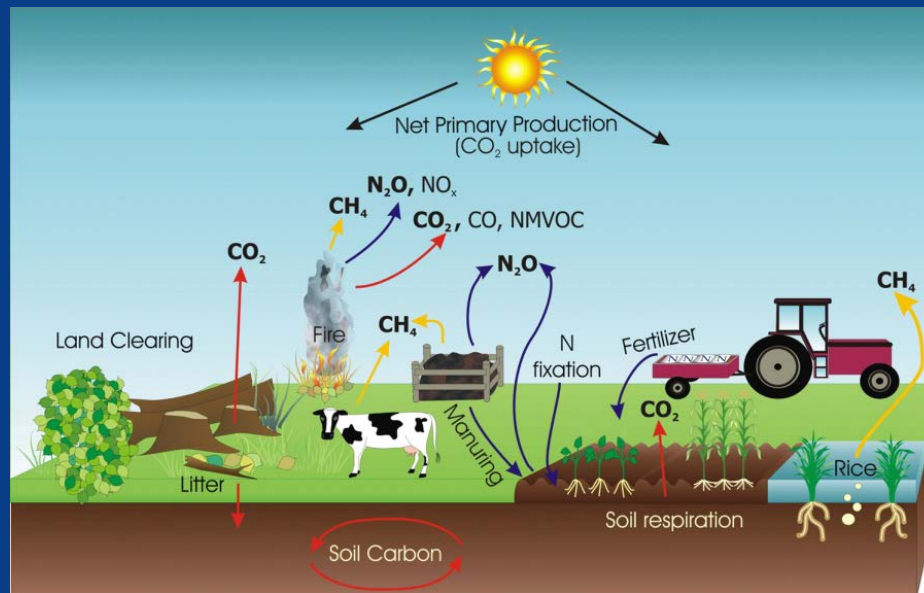
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# NRCS Resource Concerns and COMET Tools

- Air Resource Concern - Greenhouse Gases (GHGs)
- Planning for Soil Carbon Stock Enhancements (i.e. Carbon Farm Planning)
- Voluntary Environmental Market Participation (i.e. GHGs and Carbon Markets)



# Agriculture and the Atmosphere: Three Main Greenhouse Gases(GHG)

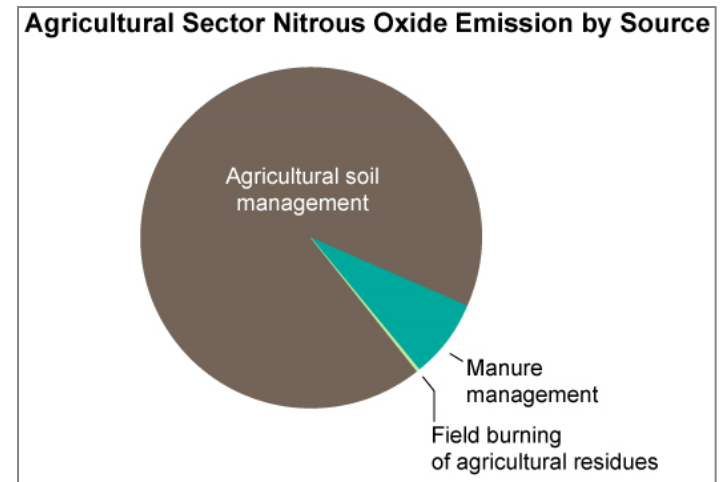
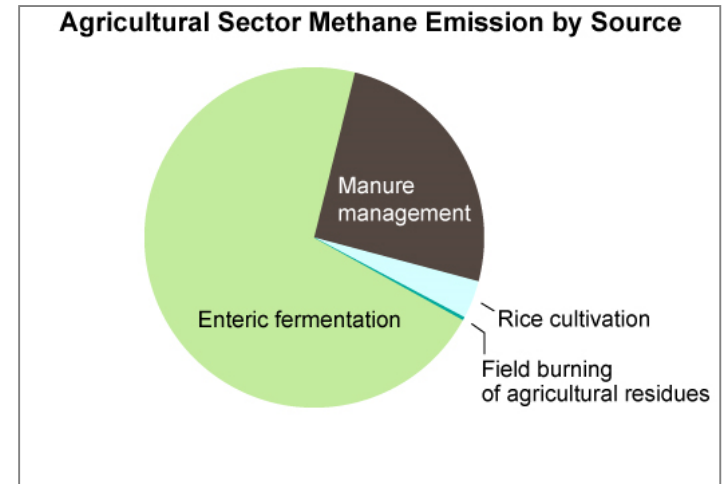
- Carbon dioxide ( $\text{CO}_2$ )
- Nitrous oxide ( $\text{N}_2\text{O}$ )
- Methane ( $\text{CH}_4$ )

\*\*Different than ambient air pollutants  
(i.e. ozone, particulate matter, ammonia etc.)

# *GHGs Contributed from Agriculture*

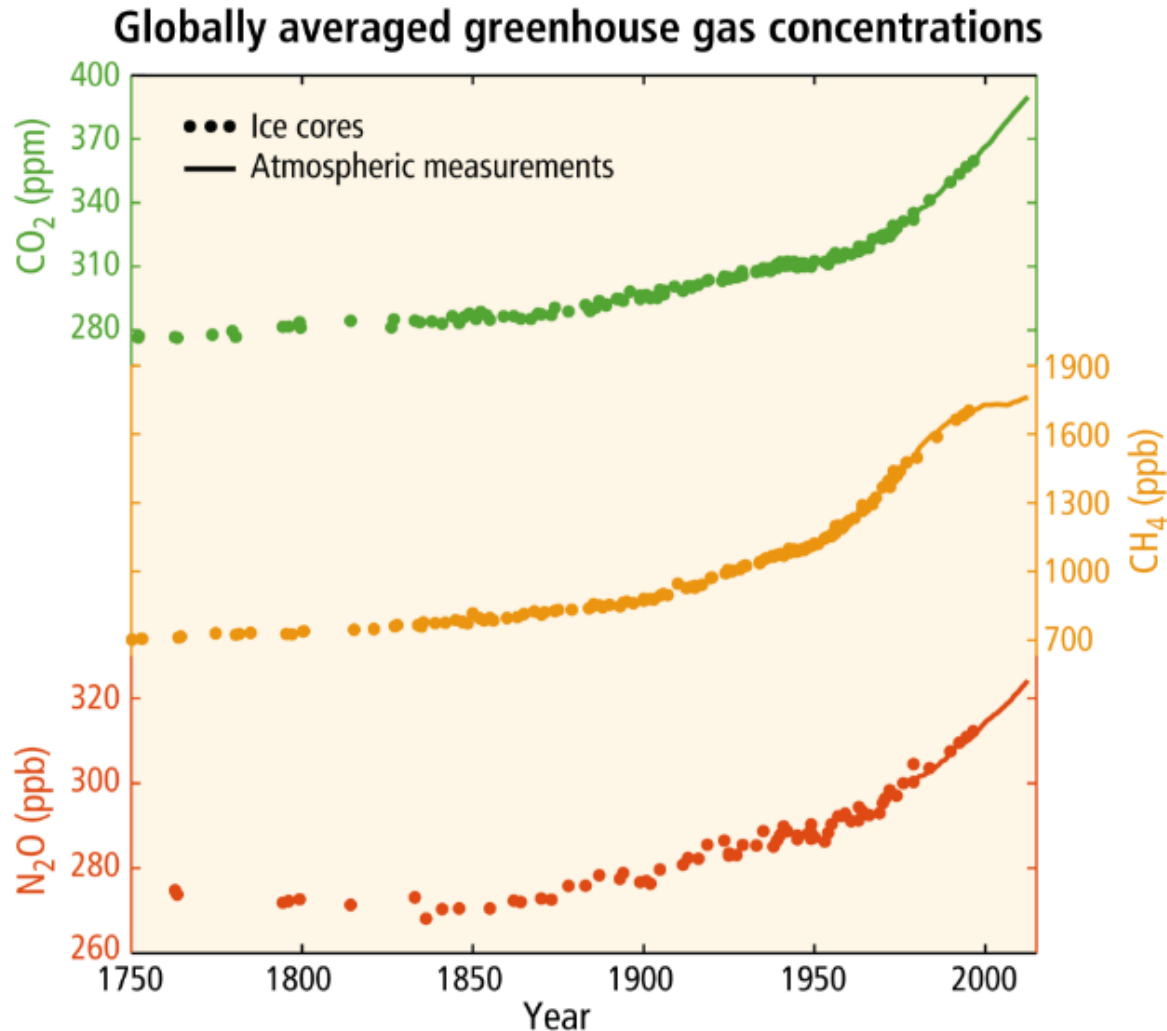
Agricultural sector is responsible for about 6% of total U.S. greenhouse gas emissions.

Among all non-carbon-dioxide emissions, methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) are the primary greenhouse gases emitted by agricultural activities.



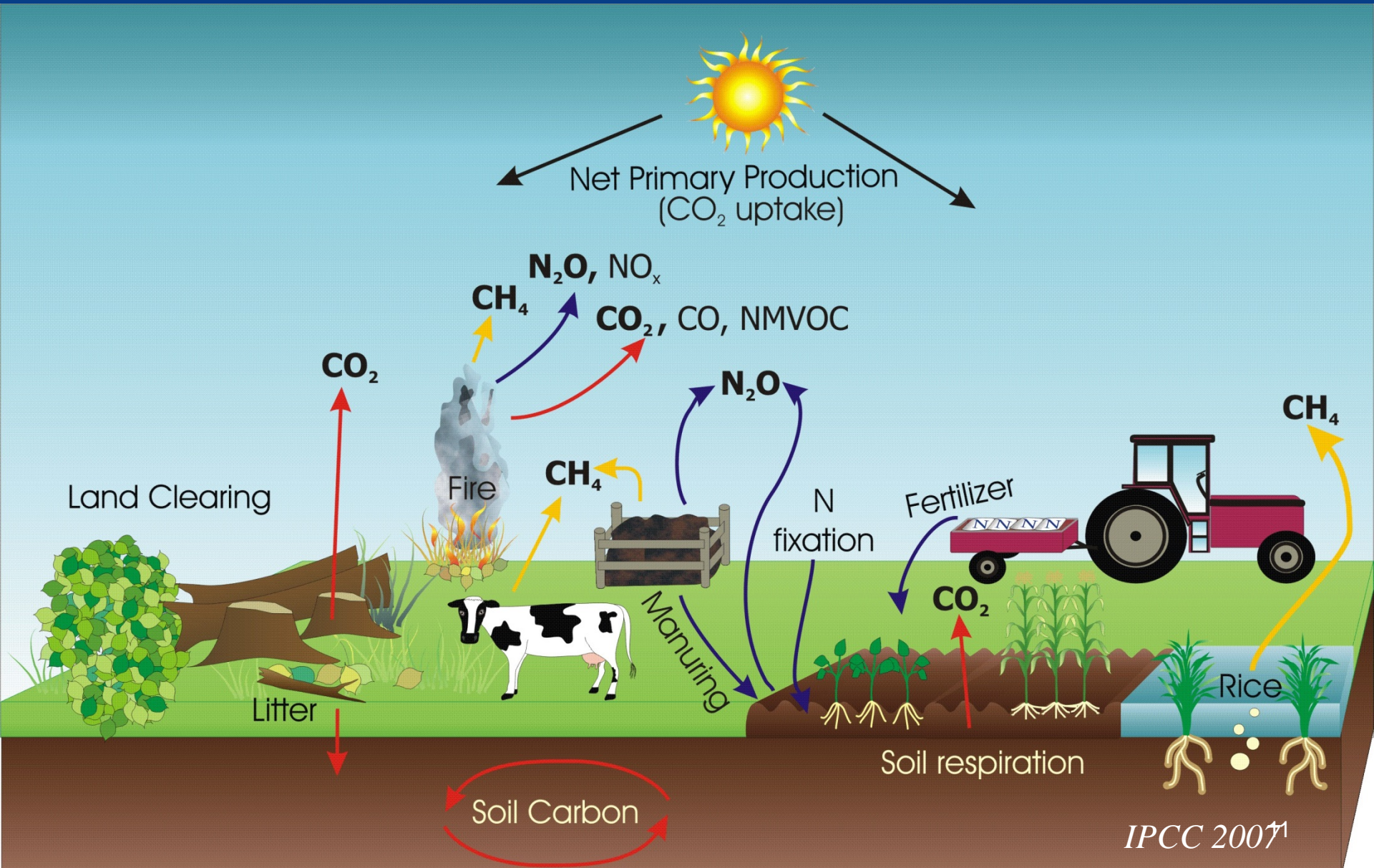
Percentage of GHG Emissions in 2009. EPA, 2011

# Greenhouse Gas Concentrations are Increasing in the Atmosphere



\*\*Source: IPCC, AR5, Observed Changes and Their Causes, Figure 1.3

# Agricultural sources and sinks of greenhouse gases

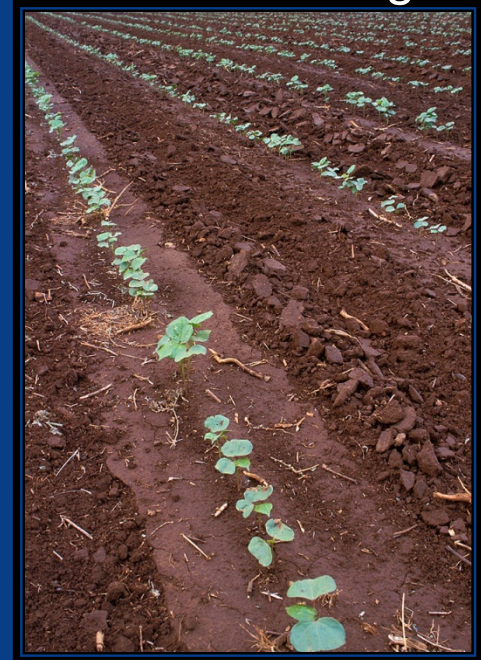


# Agricultural Practices w/o Conservation

Erosion



Intensive tillage



CO<sub>2</sub>



Soil organic matter

Residue removal

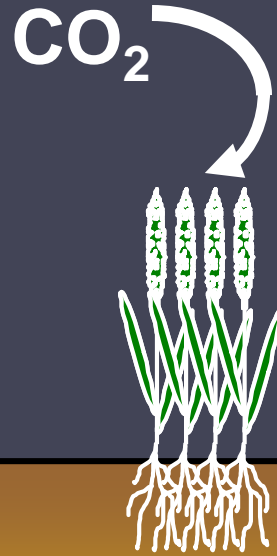


Low Productivity



# Improved Agricultural Practices

Conservation buffers



Soil organic matter

CRP

Conservation tillage



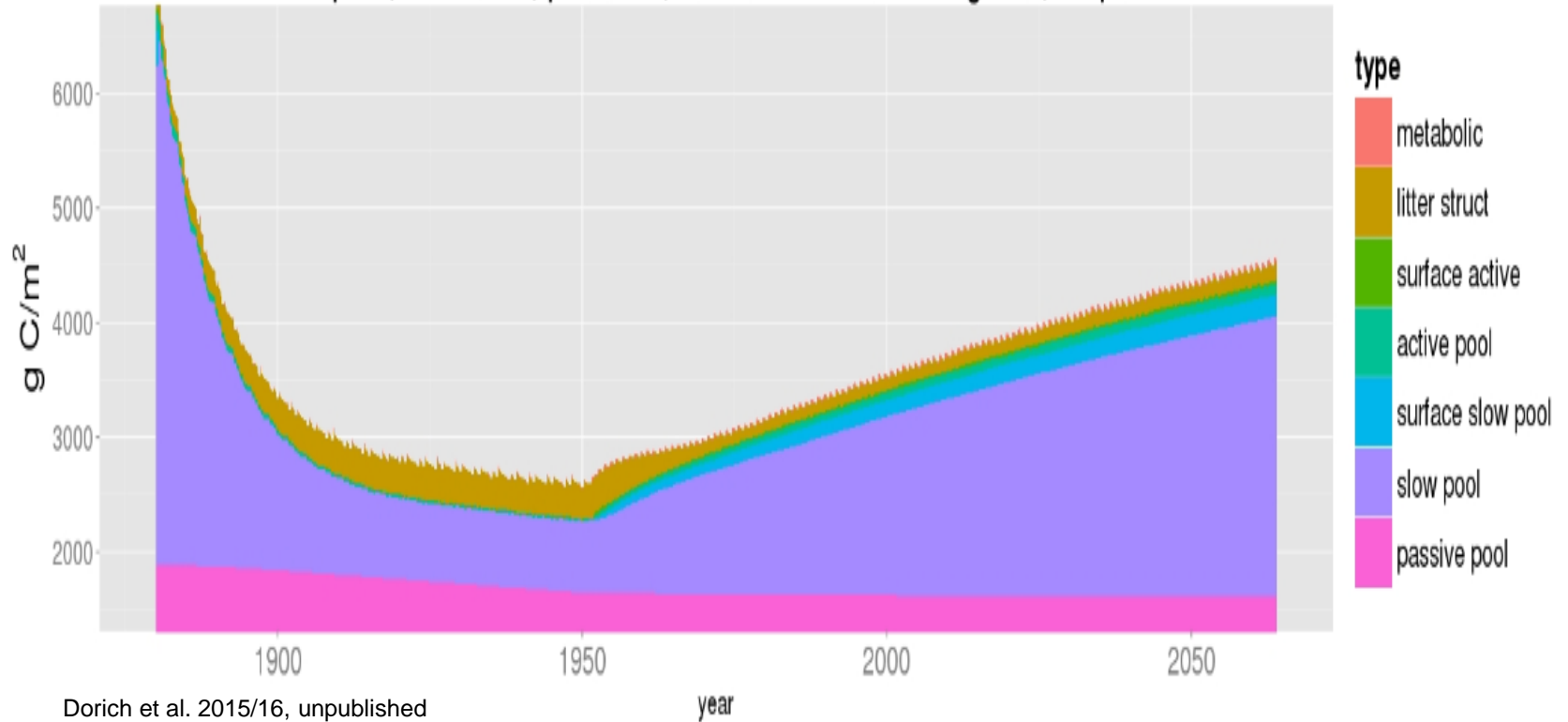
Cover crops



Improved rotations



stemple6, cultivated, potatoes, moderate continuous graze, 50 perc.



# Overview



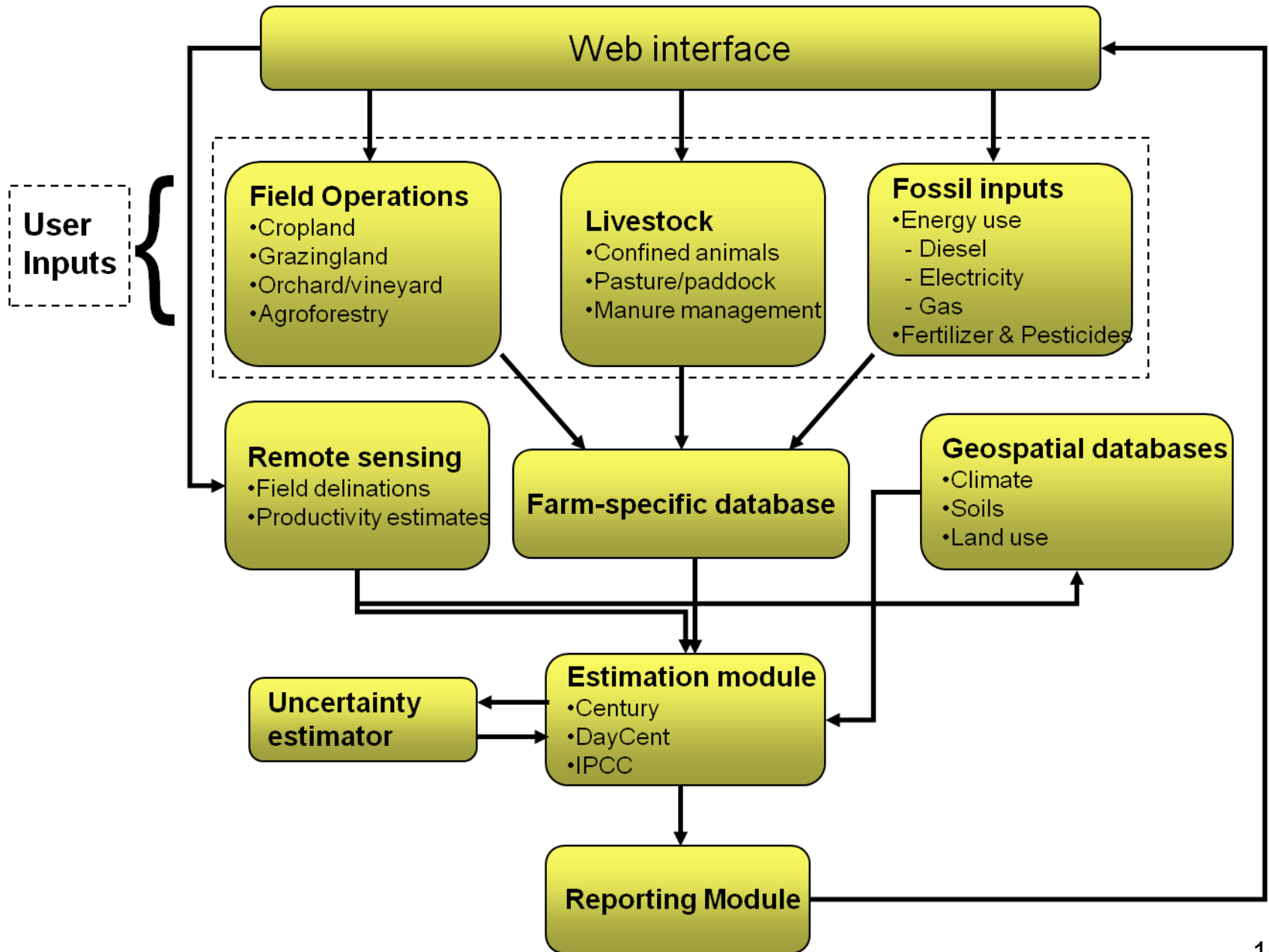
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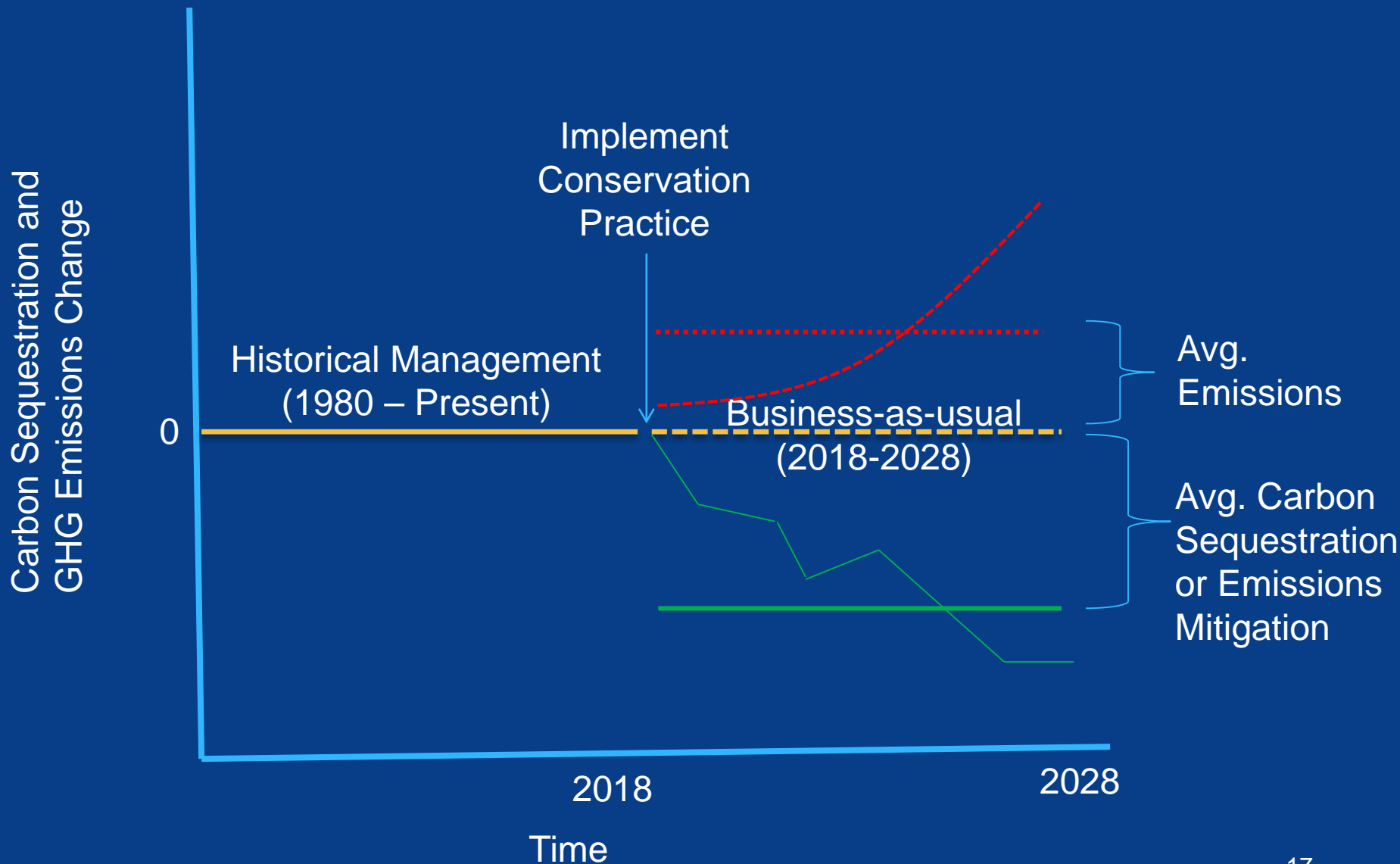
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# COMET's Decision Support and Planning Functionality



# Running COMET-Farm™ on this Property

## We Know:

- Location
- Conservation Plans
- Historical Management, Future Mgmt. Options
- Other Potential Future Management (100 acre option for demonstration purposes)
- [www.comet-farm.com](http://www.comet-farm.com)

USDA Logon - COMET-FARM

https://cometfarm.nrel.colostate.edu/Account/LogOn?ReturnUrl=%2fActivityType

COMET FARM | USDA | NRCS | Colorado State | whole farm and ranch carbon and greenhouse gas accounting and reporting

( Sign in or Register )

Home Tool News Help

Not Registered?... Register

**Sign in...**

Username

Password

Sign In

Forgot Username or Password

**or Continue without Registration...**

Although registering allows you to conveniently store and later retrieve your management information, we realize that not all users feel comfortable with this. You may continue without registering and the information you enter during this session will not be stored permanently on the server. **If you change your mind** at any time during your session, simply **click on the Register link** at the top right of the application and we will store any information previously entered.

Continue Without Registration

# Cropland Module



whole farm and ranch carbon and greenhouse gas accounting and reporting

- Home
- Tool
- News
- Help

Welcome Adam Chambers  
sign out | change password

Step 1  
Activities ▾

## Select a Project

### Existing Projects

- Default
- AdamTest
- Rice Test
- Rangelands

► **Stonelea Farm**  
[ delete ] [ rename ]

Create New Project

## Selected Activities for the Current Project: Stonelea Farm

- All Categories - Full Accounting
- Cropland, Pasture, Range
- Livestock
- Agroforestry
- On-Farm Energy Usage
  - with Actual Fuel Usage
  - without Actual Fuel Usage

Define Activities >>>

### What activities do I select?

Choose the management activities you want to investigate. Click on the help box next to the activity names to learn more about the activities.

### What is a Project?

A project is a set of cropland, livestock, agroforestry and energy management practices that is unique to a single user. A user may have up to five projects at a time.

Zoom to your parcels, then use one of the 'Add Parcel' buttons to define each parcel location. Each parcel must have a unique management history. When finished, click the button to the right.

I am done defining parcels >>

Navigation

- Pan / Zoom
- Find Location

Parcel Management

- Add Parcel by point
- Add Parcel by polygon
- Modify Parcel
- Delete Parcel
- Delete All Parcels
- ESRI Shape File Upload

Soil Info

- View Soil by Click
- Export Soil Information

Help

- What is Parcel by point?
- What is Parcel by polygon?
- How do I? ▾

Soils Aerial Hybrid

Parcel Locations

Where are your parcels located?

No Thanks, I'll Navigate Myself>>
Go to Location>>

Zoom to your parcels, then use one of the 'Add Parcel' buttons to define each parcel location. Each parcel must have a unique management history. When finished, click the button to the right.

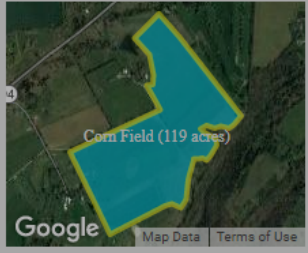
I am done defining parcels >>



Step 1 Activities | Step 2 **Field Management**

Parcel Locations → Historic Management Pre-2000

Select a parcel: **Corn Field**



Legend: Data complete (green), Data incomplete (blue), Selected (yellow)

Parcel Management Summary [Delete Selected Crop]

**Drag and Drop Crop Rotation** NEW!

- 2000 Undefined
- 2001 Undefined
- 2002 Undefined
- 2003 Undefined
- 2004 Undefined
- 2005 Undefined
- 2006 Undefined
- 2007 Undefined
- 2008 Undefined
- 2009 Undefined
- 2010 Undefined

### Create Crop Template

Alfalfa	Barley, Spring	Barley, Fall	Clover	Corn Silage
Corn	Cotton	Dry Field Beans	Fallow	Grass
Grass-Legume	Millet	Oats, Spring	Oats, Fall	Peanut
Potatoes	Rice	Rye, Winter	Sorghum	Sorghum Silage
Soybean	Sugar Beets	Sunflower	Switchgrass	Wheat, Spring
Wheat, Winter				

#### Crop Rotation for Corn Field

Crop	Irri?	Tillage	
Corn	✘	Intensive	✘
Wheat, Winter	✘	Intensive	✘
Soybean	✘	Intensive	✘

Cancel
Create Rotation

Select a parcel: **Corn Field**

**Parcel Management Summary**  
[ Delete Selected Crop ]

**Drag and Drop Crop Rotation** NEW!

- 2000 Corn Winter Wheat
- 2001 Soybean
- 2002 Corn Winter Wheat
- 2003 Soybean
- 2004 Corn Winter Wheat
- 2005 Soybean
- 2006 Corn Winter Wheat
- 2007 Soybean
- 2008 Corn Winter Wheat
- 2009 Soybean
- 2010 Corn Winter Wheat
- 2011 Soybean
- 2012 Corn Winter Wheat
- 2013 Soybean
- 2014 Corn Winter Wheat
- 2015 Soybean
- 2016 Corn Winter Wheat
- 2017 Soybean

Tillage    Manure Application    Liming

Crop and Planting Date    Nitrogen Application    Irrigation    Burning

**For Parcel Corn Field in 2000 what crop did you plant, when did you plant, and when did you harvest?**

What type of crop?:  
 Annual Crop/Hay/Grass     Seasonal Cover Crop     Orchard/Vineyard Crop

Crop: **Corn**

Planting Date: **05/04/2000**

**Harvest Table** + Add New Harvest

Harvest Date	Grain / Fruit / Tuber?	Yield (bu/ac)	Straw / Stover / Hay / Residue Removal (%)	Delete
10/01/2000	<input checked="" type="checkbox"/>	139	0	X

**Grazing Table** + Add New

Start Dates	End Dates	Rest Period (days)	Utilization
<b>No data to display</b>			

**Tillage Table** + Add New Tillage Application Practice

Date Applied	Tillage Type	Delete
5/3/2018	Intensive Tillage	X

Parcel Management Summary  
[ Create Selected Crop ]

**Drag and Drop Crop Rotation** NEW!

- 2018 Corn Winter Wheat
- 2019 Soybean
- 2020 Corn Winter Wheat
- 2021 Soybean
- 2022 Corn Winter Wheat
- 2023 Soybean
- 2024 Corn Winter Wheat
- 2025 Soybean
- 2026 Corn Winter Wheat
- 2027 Soybean

Intensive Tillage dropdown menu:  
 Intensive Tillage  
 Reduced Tillage  
 Mulch Tillage  
 Ridge Tillage  
 Strip Tillage  
 No Tillage  
 Growing Season Cultivation  
 Mow

<< Back    Next >>    Skip Ahead >>



Select a parcel: **Corn Field**

**Parcel Management Summary**  
[ Delete Selected Crop ]

**Drag and Drop Crop Rotation** NEW!

- 2000 Corn Winter Wheat
- 2001 Soybean
- 2002 Corn Winter Wheat
- 2003 Soybean
- 2004 Corn Winter Wheat
- 2005 Soybean
- 2006 Corn Winter Wheat
- 2007 Soybean
- 2008 Corn Winter Wheat
- 2009 Soybean
- 2010 Corn Winter Wheat
- 2011 Soybean
- 2012 Corn Winter Wheat
- 2013 Soybean
- 2014 Corn Winter Wheat
- 2015 Soybean
- 2016 Corn Winter Wheat
- 2017 Soybean

**For parcel Corn Field (selected at left) what was its historic management?**

Pre-1980 Management: **Upland Non-Irrigated (Pre 1980s)**

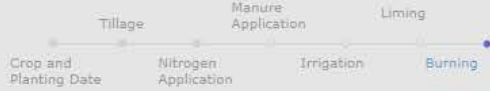
Was this parcel enrolled in Conservation Reserve Program(CRP) at anytime before 2000?  
 No     Yes

1980-2000 Management: **Non-Irrigated: Annual Crops in Rotation**

1980-2000 Tillage: **Intensive Tillage**

<< Back    Next >>

Select a parcel: Corn Field



For Parcel Corn Field in 2000 did you burn crop residue (not including orchards and vineyards)?

No burning

Copy Crop?

Management for parcel Corn Field for 2000 is complete.

If you would like to copy the management details to other parcels and/or years, select those parcel-years and click the Copy button.

Crop-Year to be copied

Crop-Year has data

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Corn Field	select ✓	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>	select <input checked="" type="checkbox"/>	select <input type="checkbox"/>

No, thanks>>

Copy & Continue >>

- 2000 Corn
- 2001 Soybean
- 2002 Corn
- 2003 Soybean
- 2004 Corn
- 2005 Soybean
- 2006 Corn Winter Wheat
- 2007 Soybean
- 2008 Corn Winter Wheat
- 2009 Soybean
- 2010 Corn Winter Wheat
- 2011 Soybean
- 2012 Corn Winter Wheat
- 2013 Soybean
- 2014 Corn Winter Wheat
- 2015 Soybean



**Current Step**  
**Select Animal Types**

### Select Animal Types

- Cattle**
  - Beef-Heifer Replacements
  - Beef-Mature Cows/Cow-Calf
  - Bulls
  - Dairy-Dry Cows
  - Feedlot Cattle
  - Beef-Heifer Stockers
  - Beef-Steer Stockers
  - Dairy-Heifer Replacements
  - Dairy-Lactating Cows
- Poultry**
  - Broilers
  - Laying Hens
  - Turkeys
  - Ducks
  - Pullets
- Sheep**
  - Feeder Sheep
  - Flock Sheep
- Swine**
  - Gestating Sows
  - Lactating Sows
  - Grow-Finish Pigs
  - Weaning Pigs
- Other**
  - American Bison
  - Goats

<< Back

Save & Continue >>



2. Choose the types of feed consumed for your **Beef-Mature Cows/Cow-Calf** for the month/months in your **Default Herd**.

Feed Stuff <sup>?</sup>	Category <sup>?</sup>	Your Selections <sup>?</sup>
Search <input type="text"/>		
<ul style="list-style-type: none"> <li>Crambe Meal</li> <li>Cranberry</li> <li>Crawfish Waste</li> <li>Distillers Grains</li> <li>Elephant Grass</li> <li>Fat, Animal</li> <li>Feather Meal</li> <li>Fescue</li> <li>Fish Meal</li> <li>Flax Seed</li> <li>Garbage</li> <li>Glycerol</li> <li>Grain</li> <li>Grape</li> <li>Grass</li> </ul>	<ul style="list-style-type: none"> <li>KY 31 Fresh</li> <li>KY 31 Hay Early Bloom</li> <li>KY 31 Hay Mature</li> <li>Red Straw</li> </ul>	<ul style="list-style-type: none"> <li>Fescue</li> <li>KY 31 Hay Mature</li> </ul>
	<input type="button" value="Add &gt;&gt;"/>	<input type="button" value="Confirm Selections"/>
	<input type="button" value="Remove &lt;&lt;"/>	

3. Enter the percentage of each fe

Total % of Diet

Step 1 Activities    Step 2 Field Management    Step 3 **Animal Agriculture**    Step 4 Report

Property Location → Animal Types → **Animal Characteristics**

**Current Step**

**Enter Animal Details**

Current Category Selection

- Beef-Mature Cows/Cow-Calf

---

Current Herd Selection

- Default Herd

**Scenarios**

**Scenario List** [ new ] [ delete ]

- Baseline

Animal Details    Pregnancy and Milk Production    Feeding Situation    **Manure System Details**

Number of Herds    Weight    Types of Feed    Manure System Types    Manure Details

**Enter Animal Characteristics - Beef-Mature Cows/Cow-Calf**

Based on your selections in the previous manure system type panel you do not have to define anything on this panel. Please proceed to the next panel.

NAME: Adam Chambers  
PROJECT: COMET Example  
Version: Ver. 2.0, build 3.2.6583.20928 (09-Jan-2018)

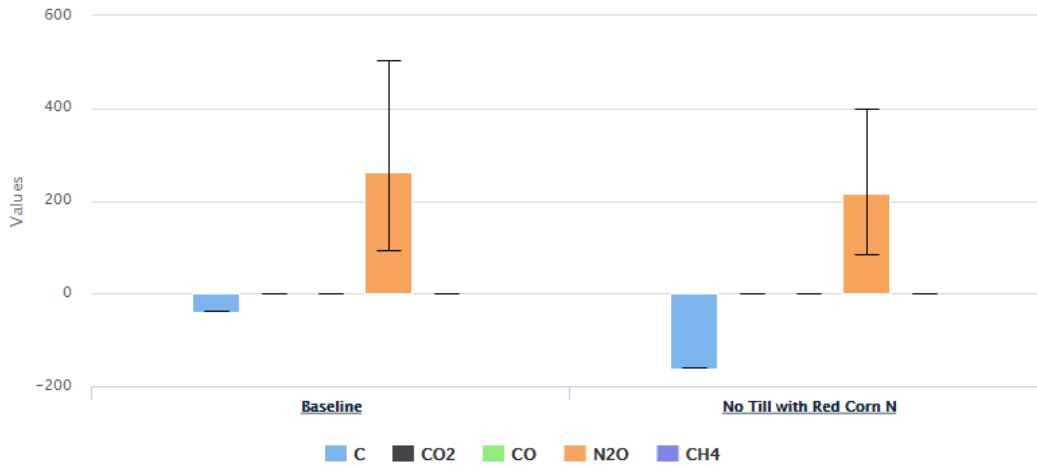
JOBID: 3054\_22132\_107941  
TIME: 1/23/2018 5:19:49 PM

Source	Baseline Emissions		No Till with Red Corn N			
	Emissions	+/-	Emissions	+/-	Change	+/-
<b>☏ Corn Field (120 acres - Rye, Soybean, Winter Wheat, Corn)</b>						
C (tonnes CO <sub>2</sub> equiv./yr.)	-39.2	NR <sup>†</sup>	-161.9	NR <sup>†</sup>	-122.7	NR <sup>†</sup>
CO <sub>2</sub> (tonnes/yr.)	0.0	+0/-0	0.0	+0/-0	0.0	+0/-0
CO (tonnes CO <sub>2</sub> equiv./yr.)	0.0	+0/-0	0.0	+0/-0	0.0	+0/-0
N <sub>2</sub> O (tonnes CO <sub>2</sub> equiv./yr.)	262.5	+241.1/-169.4	215.7	+181/-132.1	-46.8	+45.4/-73.2
CH <sub>4</sub> (tonnes CO <sub>2</sub> equiv./yr.)	0.0	+0/-0	0.0	+0/-0	0.0	+0/-0
<b>Total</b>	<b>223.4</b>	<b>NR<sup>†</sup></b>	<b>53.9</b>	<b>NR<sup>†</sup></b>	<b>-169.5</b>	<b>NR<sup>†</sup></b>
<b>Total (all parcels)</b>	<b>223.4</b>	<b>NR<sup>†</sup></b>	<b>53.9</b>	<b>NR<sup>†</sup></b>	<b>-169.5</b>	<b>NR<sup>†</sup></b>

<sup>†</sup>Uncertainty of the soil carbon and woody biomass carbon stock change model estimate is not available at this time, but is in development.

Parcel Name:

### Total GHG Emissions (metric tons CO<sub>2</sub>-eq per year)



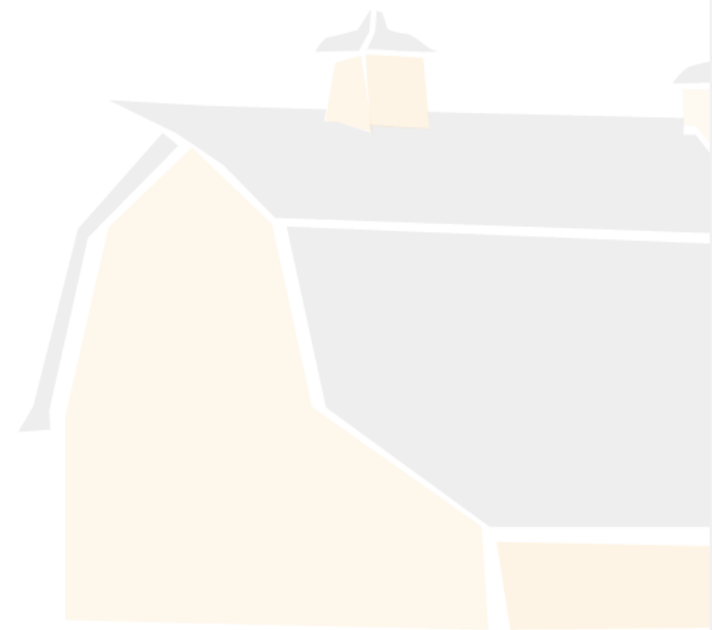
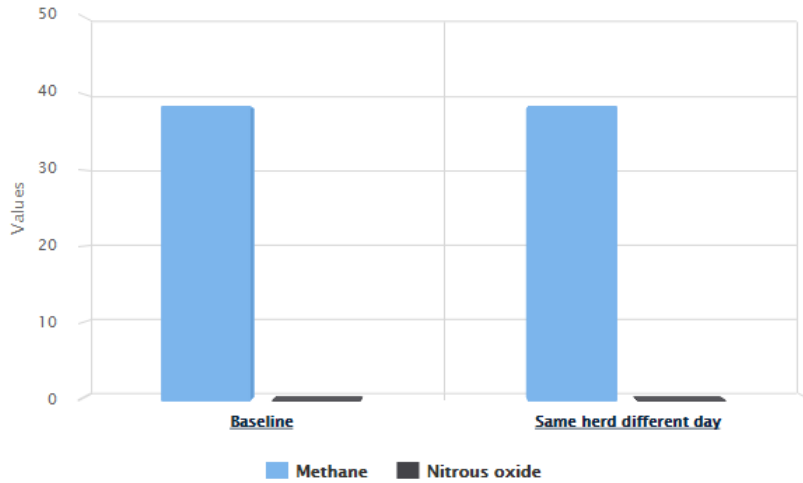
	A	B	C	D	E	F
1	Corn Field (119.958 acres)					
2	Category	Subcategory	Scenario	Baseline	No Till with Red Corn N	
3	C			-78.3706	-323.712	
4		Soil		-39.1853	-161.856	
5		Biomass Burning		0	0	
6		Dead		0	0	
7		Woody Biomass		0	0	
8						
9	CO <sub>2</sub>			0	0	
10		Liming		0	0	
11		Urea Fertilization		0	0	
12		Drained Organic Soil		0	0	
13						
14	CO			0	0	
15		Biomass Burning		0	0	
16						
17	N <sub>2</sub> O			262.536	215.741	
18		Soil		262.536	215.741	
19		Wetland Rice Cult.		0	0	
20		Biomass Burning		0	0	
21		Drained Organic Soil		0	0	
22						
23	CH <sub>4</sub>			0	0	
24		Wetland Rice Cult.		0	0	
25		Biomass Burning		0	0	
26	Total			223.3507	53.88499451	
27						



†Uncertainty of the soil carbon and woody biomass carbon stock change model is not available at this time, but is in development.

Animal Type:

### Total GHG Emissions (metric tons CO<sub>2</sub>-eq per year)



†Uncertainty of the soil carbon and woody biomass carbon stock change model estimate is not available at this time, but is in development.

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## Evaluate potential carbon sequestration and greenhouse gas reductions from adopting NRCS conservation practices

[Click to View Introduction Video](#)

NRCS Conservation Practices included in COMET-Planner are only those that have been identified as having greenhouse gas mitigation and/or carbon sequestration benefits on farms and ranches. This list of conservation practices is based on the qualitative greenhouse benefits ranking of practices prepared by NRCS.

Project Name:

State:

County:



- NRCS
- Name
- + Crop
- + Crop
- + Crop
- + Graz
- + Rest

### Introduction to COMET-Planner

**COMET-PLANNER** NRCS USDA Colorado State University  
Carbon and greenhouse gas evaluation for NRCS conservation practice planning

Evaluate potential carbon sequestration and greenhouse gas reductions from adopting NRCS conservation practices

NRCS Conservation Practices included in COMET-Planner are only those that have been identified as having greenhouse gas mitigation and/or carbon sequestration benefits on farms and ranches. This list of conservation practices is based on the qualitative greenhouse benefits ranking of practices prepared by NRCS.

Project Name: Brown's Farm

State: CA

County: Sutter

**NRCS Conservation Practices - Select Your Practice(s)**

- Name CP# (Conservation Practice Standard Number)
- Cropland Management
- Cropland to Herbaceous Cover (10 Items)
- Cropland to Woody Cover (7 Items)
- Grazing Lands (3 Items)
- Restoration of Disturbed Lands (5 Items)

Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions\*

NRCS Conservation Practices  
(Click Practice Name for Documentation)

Enter Acreage	(CO <sub>2</sub> )	(N <sub>2</sub> O)	(CH <sub>4</sub> )	Equivalent
Total	0.00	0.00	0.00	0.00



## Evaluate potential carbon sequestration and greenhouse gas reductions from adopting NRCS conservation practices

[Click to View Introduction Video](#)

NRCS Conservation Practices included in COMET-Planner are only those that have been identified as having greenhouse gas mitigation and/or carbon sequestration benefits on farms and ranches. This list of conservation practices is [based on the qualitative greenhouse benefits ranking of practices prepared by NRCS.](#)

Project Name:

Stonelea Farm

State:

KY

County:

Oldham



NRCS Conservation Practices - Select Your Practice(s)	
Name CPS (Conservation Practice Standard Number)	
- Cropland Management (9 Items)	
Conventional Tillage to No Till (CPS 329)	
Conventional Tillage to Reduced Tillage (CPS 345)	
Nutrient Management - Improved Nitrogen Fertilizer Management (CPS 590)	
Nutrient Management - Replacing Nitrogen Fertilizer with Soil Amendments (CPS 590)	
Conservation Crop Rotation (CPS 328)	

Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions<sup>1</sup>  
(tonnes CO<sub>2</sub> equivalent per year)

NRCS Conservation Practices (Click Practice Name for Documentation)	Enter Acreage	Carbon Dioxide (CO <sub>2</sub> )	Nitrous Oxide (N <sub>2</sub> O)	Methane (CH <sub>4</sub> )	Total CO <sub>2</sub> -Equivalent
Conventional Tillage to No Till (CPS 329) [ delete ]	120 ac	50	-13	0	37
Nutrient Management - Improved Nitrogen Fertilizer Management (CPS 590) [ delete ]	120 ac	N.E. <sup>2</sup>	13	N.E. <sup>2</sup>	13

**Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions<sup>1</sup>**  
(tonnes CO<sub>2</sub> equivalent per year)

		Enter Acreage	Carbon Dioxide (CO <sub>2</sub> )	Nitrous Oxide (N <sub>2</sub> O)	Methane (CH <sub>4</sub> )	Total CO <sub>2</sub> -Equivalent
<b>NRCS Conservation Practices</b> (Click Practice Name for Documentation)						
Conventional Tillage to No Till (CPS 329)		120 ac	50	-13	0	37
		[ delete ]				
Nutrient Management - Improved Nitrogen Fertilizer Management (CPS 590)		120 ac	N.E. <sup>2</sup>	13	N.E. <sup>2</sup>	13
		[ delete ]				
		<b>Total</b>	<b>50</b>	<b>0</b>	<b>0</b>	<b>50</b>

<sup>1</sup>Negative values indicate a loss of carbon or increased emissions of greenhouse gases

<sup>2</sup>Values were not estimated due to limited data on reductions of greenhouse gas emissions from this practice

[Download and Print COMET-Planner Results](#)

**How are your carbon sequestration and greenhouse gas emission reduction estimates calculated?**

Emission reduction coefficients were derived from recent meta-analyses and reviews. Coefficients were generalized at the national-scale and differentiated by dry and humid climate zones. Emissions estimates represent field emissions only, including those associated with soils and woody biomass as appropriate, and do not include off-site emissions, such as those from transportation, manufacturing, processing, etc. More information on quantification methods can be found in the [COMET-Planner Report](#).

Each emission reduction is calculated using the following equation:

$$\text{Emission reduction} = \text{Area (acres)} * \text{Emission Reduction Coefficient (ERC)}$$

**Emission Reduction Coefficients (ERC)**  
(tonnes CO<sub>2</sub> equivalent per acre per year)

**Greenhouse Gases**

Carbon Dioxide (CO <sub>2</sub> )	Nitrous Oxide (N <sub>2</sub> O)	Methane (CH <sub>4</sub> )
-----------------------------------	----------------------------------	----------------------------

**NRCS Conservation Practices**

Conventional Tillage to No Till (CPS 329)      0.42      -0.11      0.00

Nutrient Management - Improved Nitrogen Fertilizer Management (CPS 590)      N.E.<sup>2</sup>      0.11      N.E.<sup>2</sup>

# Comparing the Results:

## COMET-Farm:

169.5 tons CO<sub>2</sub>e for 120 acres OR 1.41 tons CO<sub>2</sub>e per acre

NAME: Adam Chambers      JOBID: 3054\_22132\_107941      USDA United States Department of Agriculture      Colorado State University  
 PROJECT: COMET Example      TIME: 1/23/2018 5:19:49 PM      Natural Resources Conservation Service      DayCent Portal      Data Off ramp  
 Version: Ver. 2.0, build 3.2.6583.20928 (09-Jan-2018)      Show uncertainty as percentage

Source	Baseline Emissions			No Till with Red Corn N			
	Emissions	+/-	Emissions	+/-	Change	+/-	
<b>☑ Corn Field (120 acres - Rye, Soybean, Winter Wheat, Corn)</b>							
C (tonnes CO <sub>2</sub> equiv./yr.)	-39.2	NR <sup>†</sup>	-161.9	NR <sup>†</sup>	-122.7	NR <sup>†</sup>	
CO <sub>2</sub> (tonnes/yr.)	0.0	+0/-0	0.0	+0/-0	0.0	+0/-0	
CO (tonnes CO <sub>2</sub> equiv./yr.)	0.0	+0/-0	0.0	+0/-0	0.0	+0/-0	
N <sub>2</sub> O (tonnes CO <sub>2</sub> equiv./yr.)	262.5	+241.1/-169.4	215.7	+181/-132.1	-46.8	+45.4/-73.2	
CH <sub>4</sub> (tonnes CO <sub>2</sub> equiv./yr.)	0.0	+0/-0	0.0	+0/-0	0.0	+0/-0	
<b>Total</b>	<b>223.4</b>	<b>NR<sup>†</sup></b>	<b>53.9</b>	<b>NR<sup>†</sup></b>	<b>-169.5</b>	<b>NR<sup>†</sup></b>	

## COMET-Planner:

50 tons CO<sub>2</sub>e for 120 acres OR 0.42 tons CO<sub>2</sub>e per acre

Approximate Carbon Sequestration and Greenhouse Gas Emission Reductions<sup>1</sup>  
 (tonnes CO<sub>2</sub> equivalent per year)

Enter Acreage	Carbon Dioxide (CO <sub>2</sub> )	Nitrous Oxide (N <sub>2</sub> O)	Methane (CH <sub>4</sub> )	Total CO <sub>2</sub> -Equivalent	
<b>NRCS Conservation Practices</b> (Click Practice Name for Documentation)					
Conventional Tillage to No Till (CPS 329) [delete]	120 ac	50	-13	0	37
Nutrient Management - Improved Nitrogen Fertilizer Management (CPS 590) [delete]	120 ac	NE <sup>2</sup>	13	NE <sup>2</sup>	13
<b>Total</b>	<b>50</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>50</b>

# Overview



- Brief COMET History and NRCS Resource Concerns
- COMET-Farm Overview and Update
  - Recent Updates
  - Uncertainty calculations
  - Help Desk and Technical Support
- COMET-Planner Overview and Update
  - Version 1
  - California
  - The Lower 48 States
- **CDSI Integration and Support of NRCS Conservation Planners**
- COMET-Water Quality Tool Overview and Vision
- Q&A



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# COMET Water Quality Tool



## Overview

**In Partnership with Colorado State University, we are building a quantification tool that integrates COMET-Farm with the water quality modeling capabilities of NTT.**

**The integrated tool will only require conservation planners and NRCS conservation partners to enter field-specific data one time and evaluate carbon sequestration, GHG emissions, and water quality.**

**Imagine a tool that integrates:**

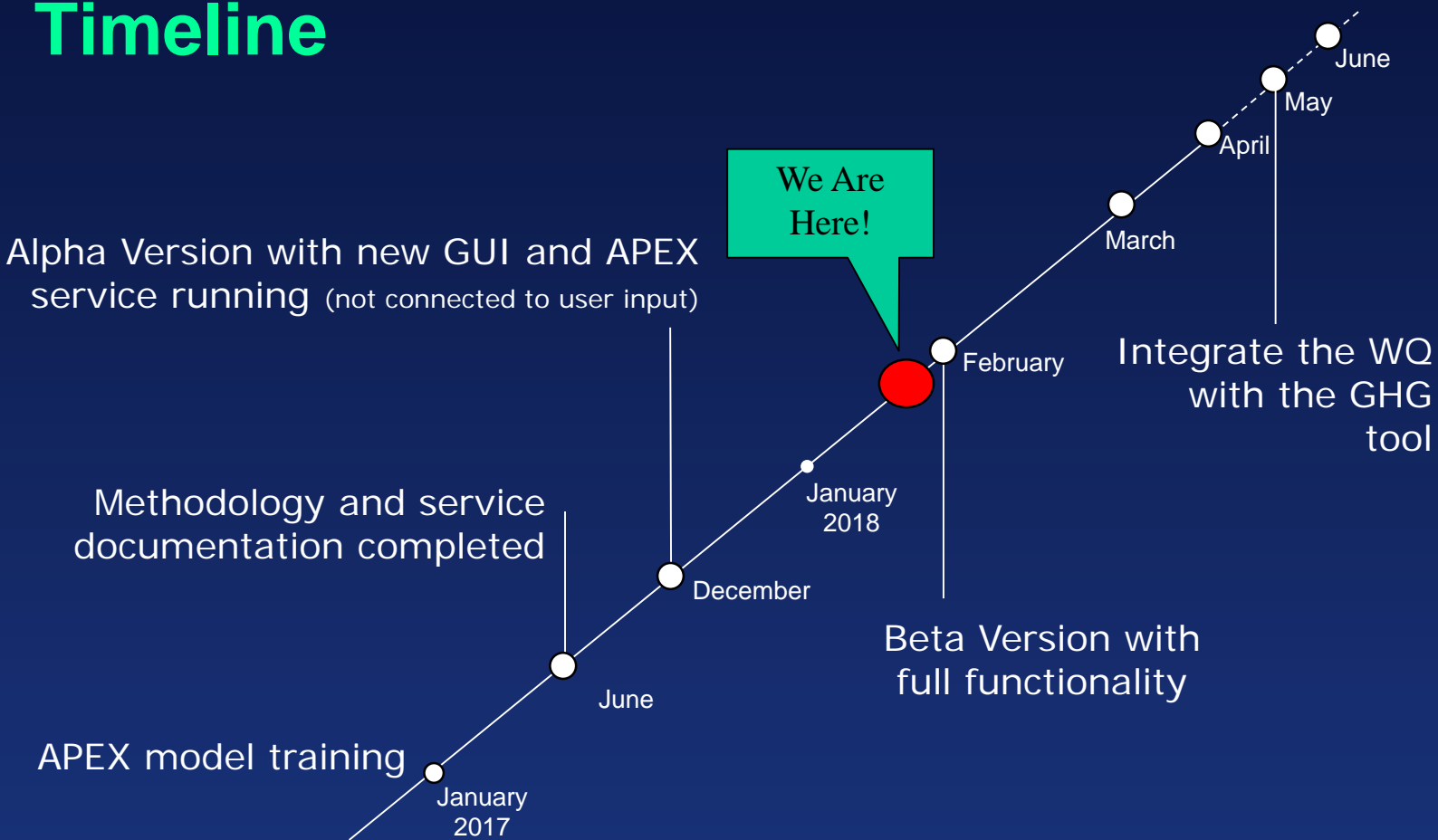
- **soil organic matter (carbon cycles) with**
- **nitrogen cycles with**
- **runoff and leaching evaluation capabilities**



Natural  
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Conservation  
Service



# COMET-WQ Timeline





# COMET Water Quality Tool

# COMET



United States Department of Agriculture  
Natural Resources Conservation Service



Welcome yao/zhang  
[sign out](#) | [change password](#)



Whole Farm  
Conservation Management  
System

[HOME](#) [TOOL](#) [INFO](#) [HELP](#)

Step 1  
**Activities** ▾

## Select a Project [ Create Demo Project ] Existing Projects

Project 1

- ▶ **test**  
[ delete ] [ rename ]
- test2

Create New Project

## Selected Activities for the Current Project:

test

- Water Quality
- All Categories - Full Accounting
  - Cropland, Pasture, Range
- Green House Gas Emissions
  - All Categories - Full Accounting
  - Cropland, Pasture, Range
  - Animal Agriculture
  - Agroforestry
  - Forestry



Define Activities >>

### What activities do I select?

Choose the management activities you want to investigate. Click on the help box next to the activity names to learn more about the activities.

### What is a Project?

A project is a set of cropland, livestock, forestry, agroforestry and energy management practices that are unique to a single user. A user may have up to five hundred project time.

### What is a Demo Project?

Create a project that has existing data already. This is designed to help you navigate through COMET-Farm.



United States Department of Agriculture

# COMET



United States Department of Agriculture  
Natural Resources Conservation Service



Welcome yao/zhang  
Current Project: test3  
[Sign out](#) | [change password](#)

Whole Farm Conservation Management System



[HOME](#) [TOOL](#) [INFO](#) [HELP](#)

Step 1  
**Activities**

Step 2  
**Field Management** ▼

Step 3  
**Report**

**Parcel Locations** →

**Field Drainage** →

**Historic Management** →  
Pre-2000

**Current & Future Management**  
Crop Rotation Management

- Connect Parcel
- Clear Connection
- Add Outlet
- Clear Outlet





Create Crop Template

Alfalfa 	Barley, Spring 	Barley, Fall 	Clover 	Corn Silage 
Corn 	Cotton 	Dry Field Beans 	Fallow 	Grass 
Grass-Legume 	Millet 	Oats, Spring 	Oats, Fall 	Peanut 
Potatoes 	Rice 	Rye, Winter 	Sorghum 	Sorghum Silage 
Soybean 	Sugar Beets 	Sunflower 	Switchgrass 	Tomatoes 
Wheat, Spring 	Wheat, Winter 			

Crop Rotation for F3

Crop	Irri?	Tillage
Drag and drop crops here		

Cancel Create Rotation

Step 7 Step 8



Select a parcel: F3 ▼



Current Management

Baseline Future Management Scenarios: ▼ [New] [Delete Selected]

Drag and Drop Crop Rotation

- 2000 Corn Silage
- 2001 Corn Silage
- 2002 Corn Silage
- 44
- 2003 Corn Silage

- Step 1 Crop and Planting Date
- Step 2 Tillage
- Step 3 Synthetic Fertilizer
- Step 4 Organic Fertilizer
- Step 5 Irrigation
- Step 6 Liming
- Step 7 Burning
- Step 8 Structure & Soil

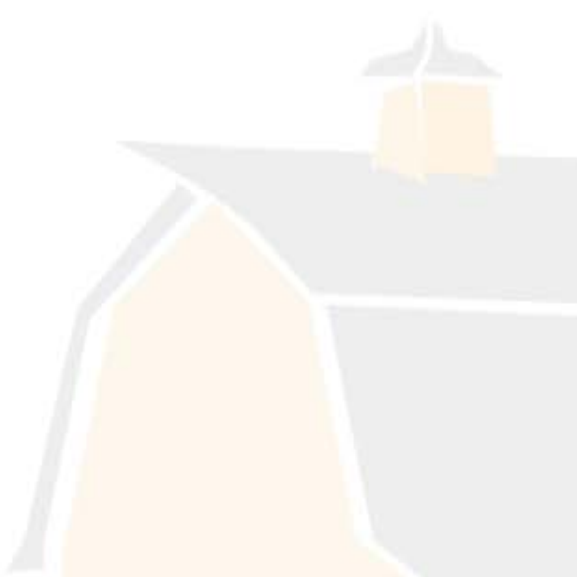
### Structural Conservation Features for Parcel F3

- Filter Strip
- Grass Waterway
- Riparian Forest Buffer
- Terrace
- Contour
- Tile Drainage

### Phosphorous from Soil Test

Concentration PPM

Date





**NAME:** Mark Easter    **RUNID:** 1592\_16609\_92187  
**PROJECT:** Swanton Cont Corn Test    **TIME:** 11/18/2016 3:19:40 PM

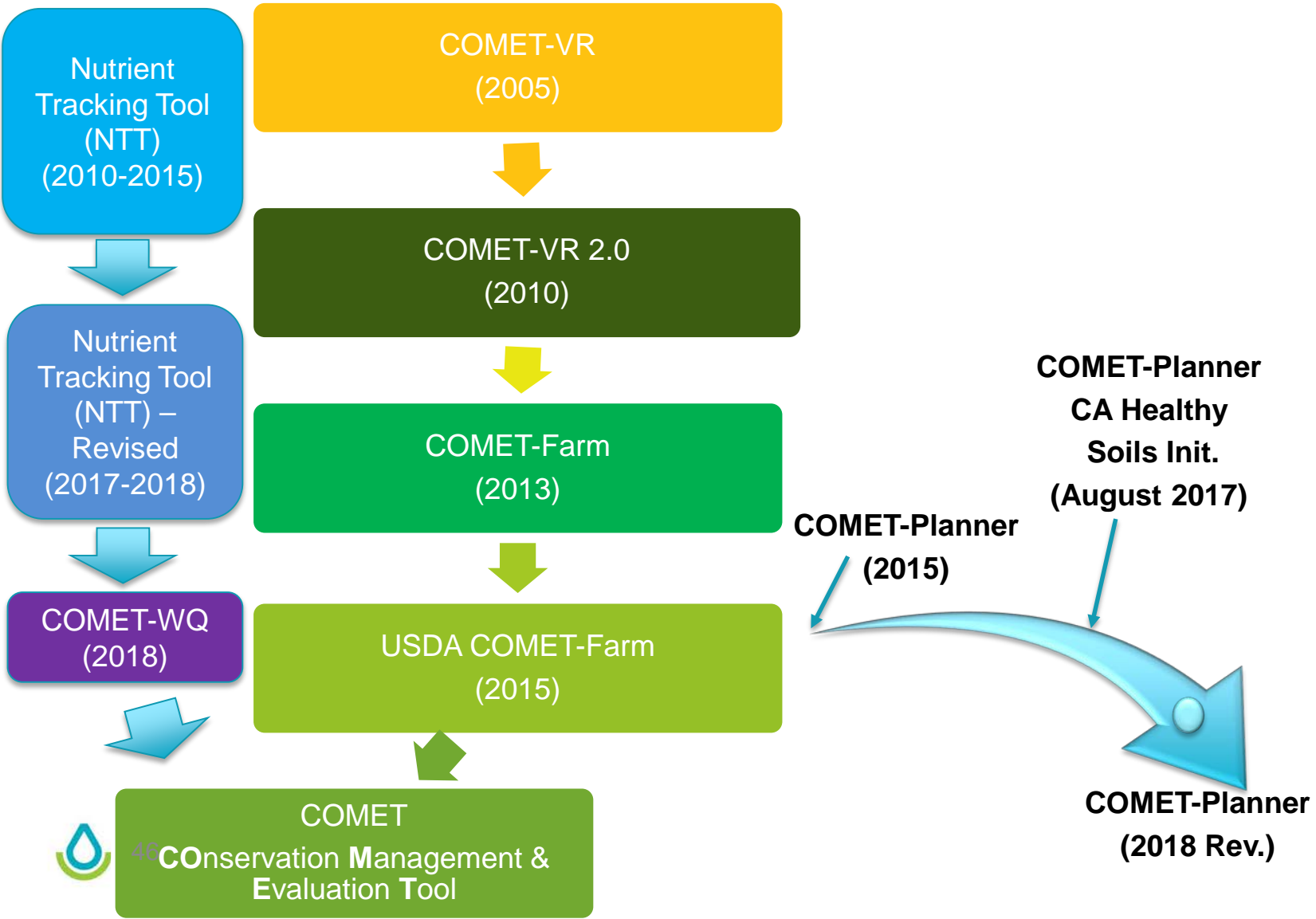


Report type ▼    DayCent Portal  
 Data Offramp

Source	Baseline Emissions	No Tillage	
		Emissions	Change
<b>F1 (100 acres - Corn Silage, Sorghum)</b>			
C (tonnes CO <sub>2</sub> equiv./yr.)	-34.9	-37.9	-3.0
CO <sub>2</sub> (tonnes/yr.)	7.2	7.2	0.0
CO (tonnes CO <sub>2</sub> equiv./yr.)	0.0	0.0	0.0
N <sub>2</sub> O (tonnes CO <sub>2</sub> equiv./yr.)	152.1	151.4	-0.6
CH <sub>4</sub> (tonnes CO <sub>2</sub> equiv./yr.)	0.0	0.0	0.0
<b>Total</b>	<b>124.4</b>	<b>120.8</b>	<b>-3.6</b>
<b>Total (all parcels)</b>	<b>124.4</b>	<b>120.8</b>	<b>-3.6</b>

**SAMPLE for Demonstration Purposes Only**

# The COMET Toolbox Vision



Natural Resources Conservation Service

[nrcs.usda.gov/](http://nrcs.usda.gov/)

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