



**Soil Carbon
Monitoring Network**

Minnesota State Advisory Committee
October 16, 2024

IRA-GHG Quantification Action Area #1

Soil Carbon Monitoring and Research Network with an above-ground perennial biomass component

IRA GHG Investments

Measuring, Monitoring, Reporting and Verification

- \$8.45 bn - Environmental Quality Incentives Program (EQIP)
- \$4.95 bn - Regional Conservation Partnership Program (RCPP)
- \$3.25 bn - Conservation Stewardship Program (CSP)
- \$1.40 bn - Agricultural Conservation Easement Program (ACEP)
- \$1.00 bn - Conservation Technical Assistance (CTA)
- \$0.30 bn - Measure, evaluate, quantify carbon sequestration and GHG emission reductions from conservation investment (CTA - MMRV)

IRA section 21002(a)(2) - Conservation Technical Assistance

- \$300,000,000 to carry out a program to quantify carbon sequestration and carbon dioxide, methane, and nitrous oxide emissions, through which the **Natural Resources Conservation Service** shall collect field-based data to assess the carbon sequestration and reduction in carbon dioxide, methane, and nitrous oxide emissions *outcomes* associated with activities carried out **pursuant to this section** and use the data to monitor and track those carbon sequestration and emissions *trends* through the Greenhouse Gas Inventory and Assessment Program of the Department of Agriculture.

IRA CTA-MMRV

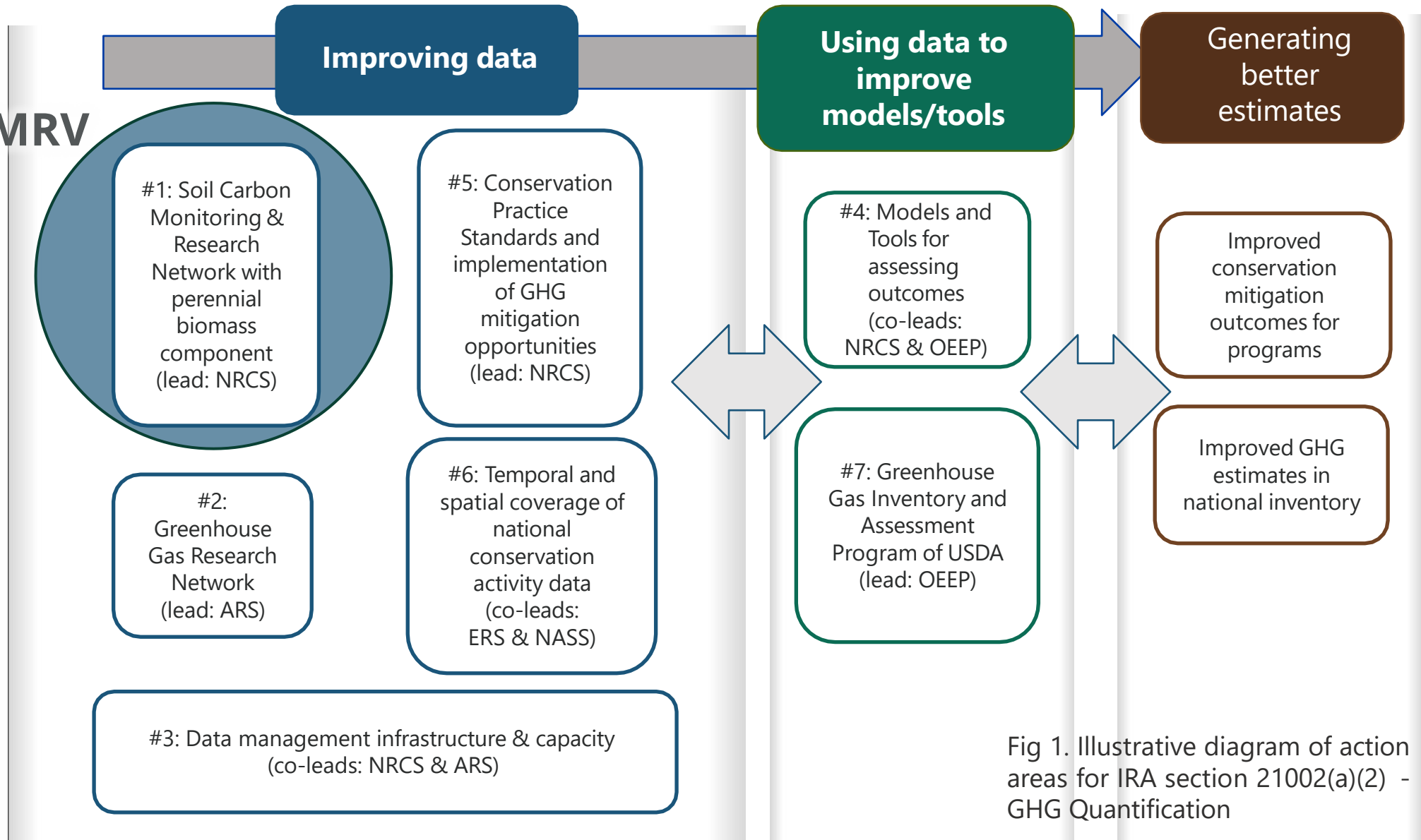


Fig 1. Illustrative diagram of action areas for IRA section 21002(a)(2) - GHG Quantification

Action Area 1 - Soil Carbon Monitoring and Research Network with an above-ground perennial biomass component

Goal

Establish a national soil carbon monitoring and research network with a perennial biomass component (such as agroforestry)

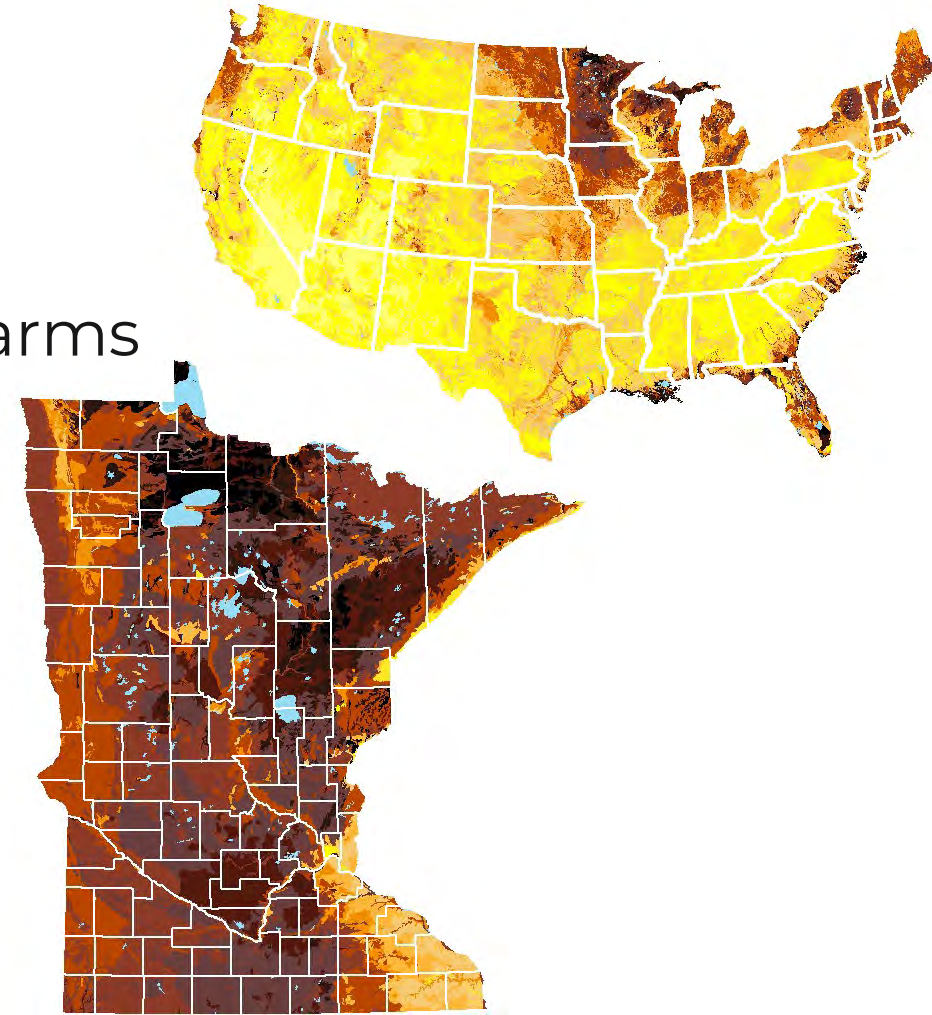
Approach

Network with Two Components:

- Dispersed sampling plan targeting conservation practices covering a range of soils and systems across private working lands
- Node sampling plan targeting:
 1. research locations
 2. agroforestry and other unique conservation practices

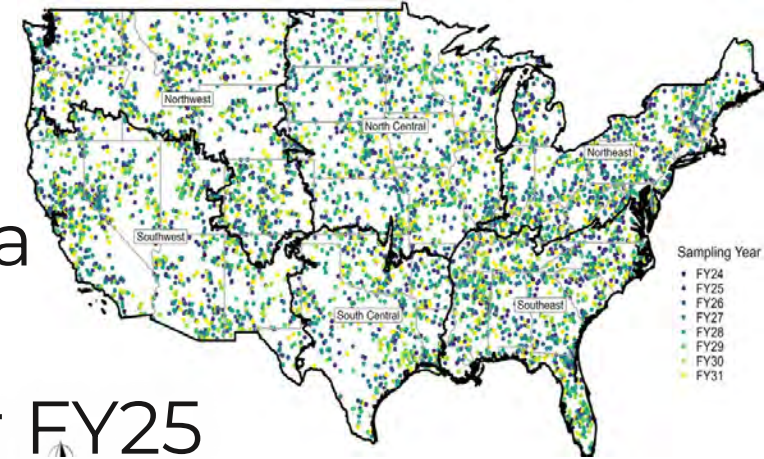
Outcomes

- Improve Data
 - Establish a baseline of soil carbon on farms and ranches to estimate carbon sequestration on working lands
 - Document change over time with a resampling plan
- Use data to improve modeling tools
 - Evaluate management practices
- Generate better estimates
 - Improve conservation outcomes
 - Improve GHG estimates in the National Inventory



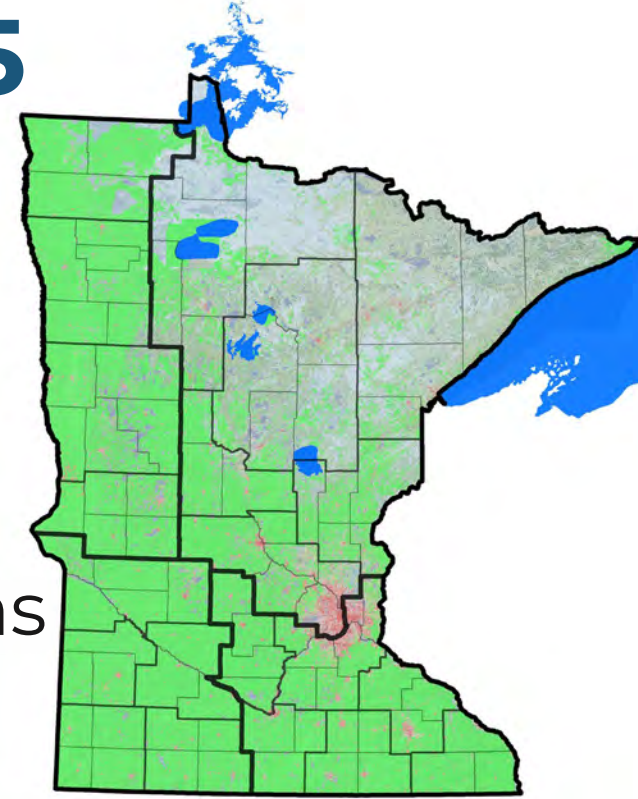
Design Implementation

- Sites are fields/pastures or other units with a consistent land use and management
- Goal of 1500 sites sampled across the US for FY25
 - Opportunity sites – leverage other efforts and willing cooperators
 - 500-850 sites spread proportionally across 7 regions working lands, climates and soils; identified through states, partners and local contacts
 - Existing network sites (i.e. NRI) & prior sampling efforts
 - Nodes – groups of mini-sites based around other networks such as LTAR, university research or demonstration farms



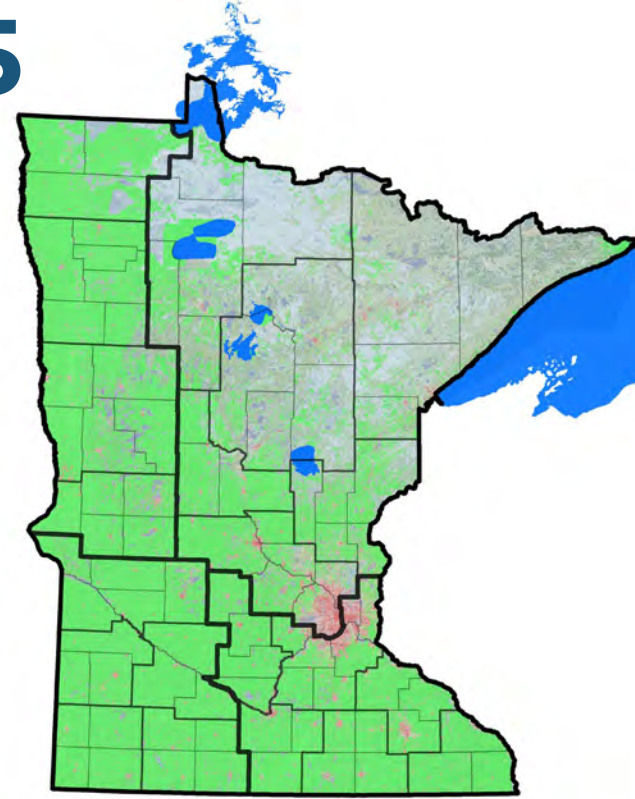
Minnesota Implementation - 2025

- 20+ opportunity sites to sample in FY25
- Target land use proportionate to working private lands (USDA)
- Target common CSAF practices
- Highlight High Functioning Soil Health Systems
 - > 10 years in management system
 - Well documented land use history
- Prioritize HU & Tribal
- **Leverage Partnerships**



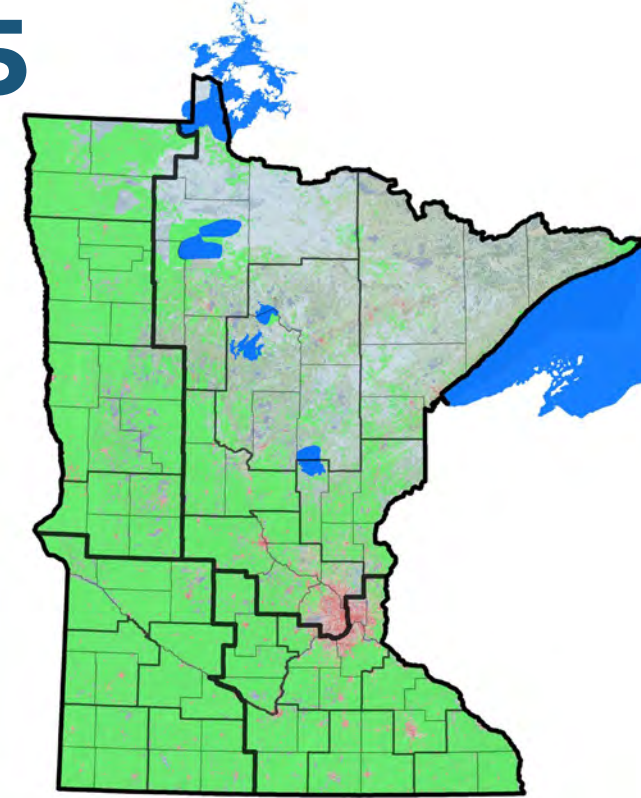
Minnesota Implementation - 2025

- MN Working Lands (USDA customers)
 - 70% Cropland
 - 10% Grasslands, Hay & Pasture
 - 10% Wetlands
 - 6% Forest
 - 4% Other
- Easements
 - Conservation Reserve Program
 - Agricultural Conservation Easement Program
 - ALE/WRE
 - Others



Minnesota Implementation - 2025

- Most Common Applied Practices in MN*:
 - Cropland
 - Nutrient Management
 - Conservation Crop Rotation
 - Cover Crop
 - Conservation Cover
 - Residue and Tillage Management, No Till
 - Forest
 - Tree/Shrub Establishment
 - Woody Residue Treatment
 - Pasture/Range
 - Prescribed Grazing
 - Pasture & Hay Planting

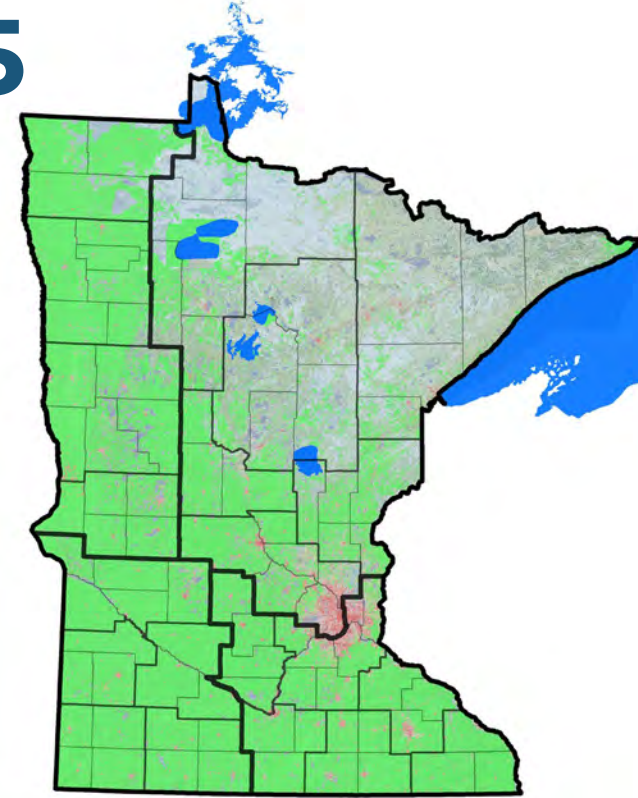


*CSAF associated conservation practices applied acreage/instance in MN through 2022

Minnesota Implementation - 2025

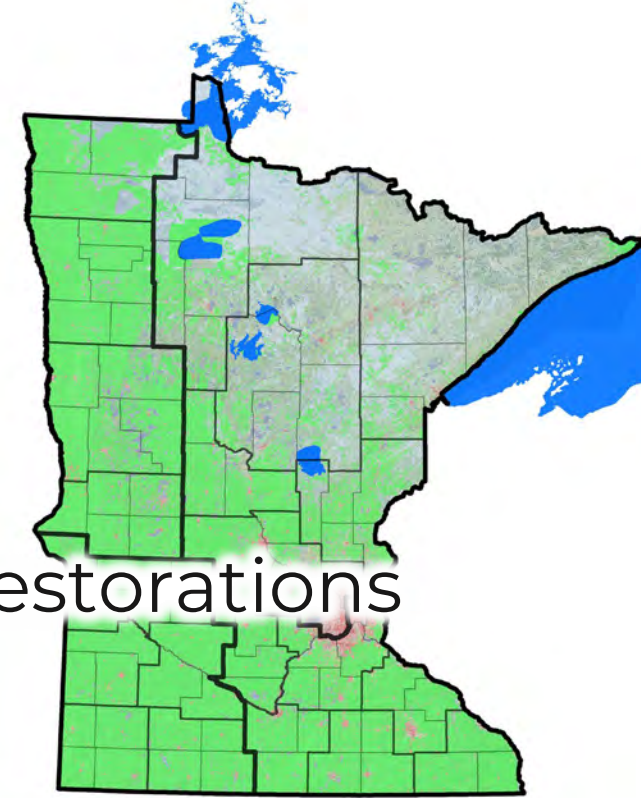
- Most Common USDA Easements:
 - Conservation Reserve Program*
 - Wetland Restoration
 - Filter Strip
 - State Acres for Wildlife Enhancement (SAFE)
 - Agricultural Conservation Easement Program
 - Wetland Reserve Easement
 - Agricultural Land Easements
 - Partner Easements

*Active acreage/instance in MN through 2023



Minnesota-NRCS Goal - 2025

- Identify 15 – 30 Sites on Cropping System
 - Soil Health Management
- Identify 3 – 5 Sites in Perennial Forage System
 - Managed Grazing
- Identify Up to 4 Sites in Wetland Easements/Restorations
- Identify Up to 3 Sites in Grassland Easements
- Sites must be identified by December 2024



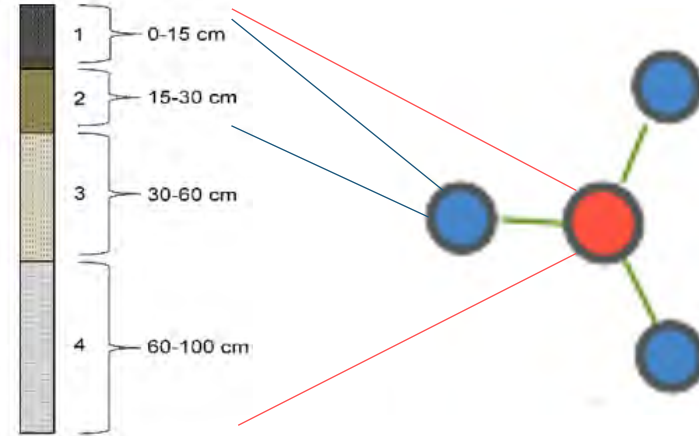
Site Sample Design

- 10-acre unit stratified
- Detail Management Information
 - Producer Interviews
 - Local Knowledge & Data
- 6 sampling clusters with central and satellite points
- Soil samples to a depth of 100cm
- Soil Layers/Samples - laboratory analysis
 - Soil Organic Carbon (Dry Combustion)
 - Bulk Density
 - pH
 - Mid Infrared Spectroscopy (Soil Property Predictions)
 - Particulate Organic Matter (POM)



Site Sample Design

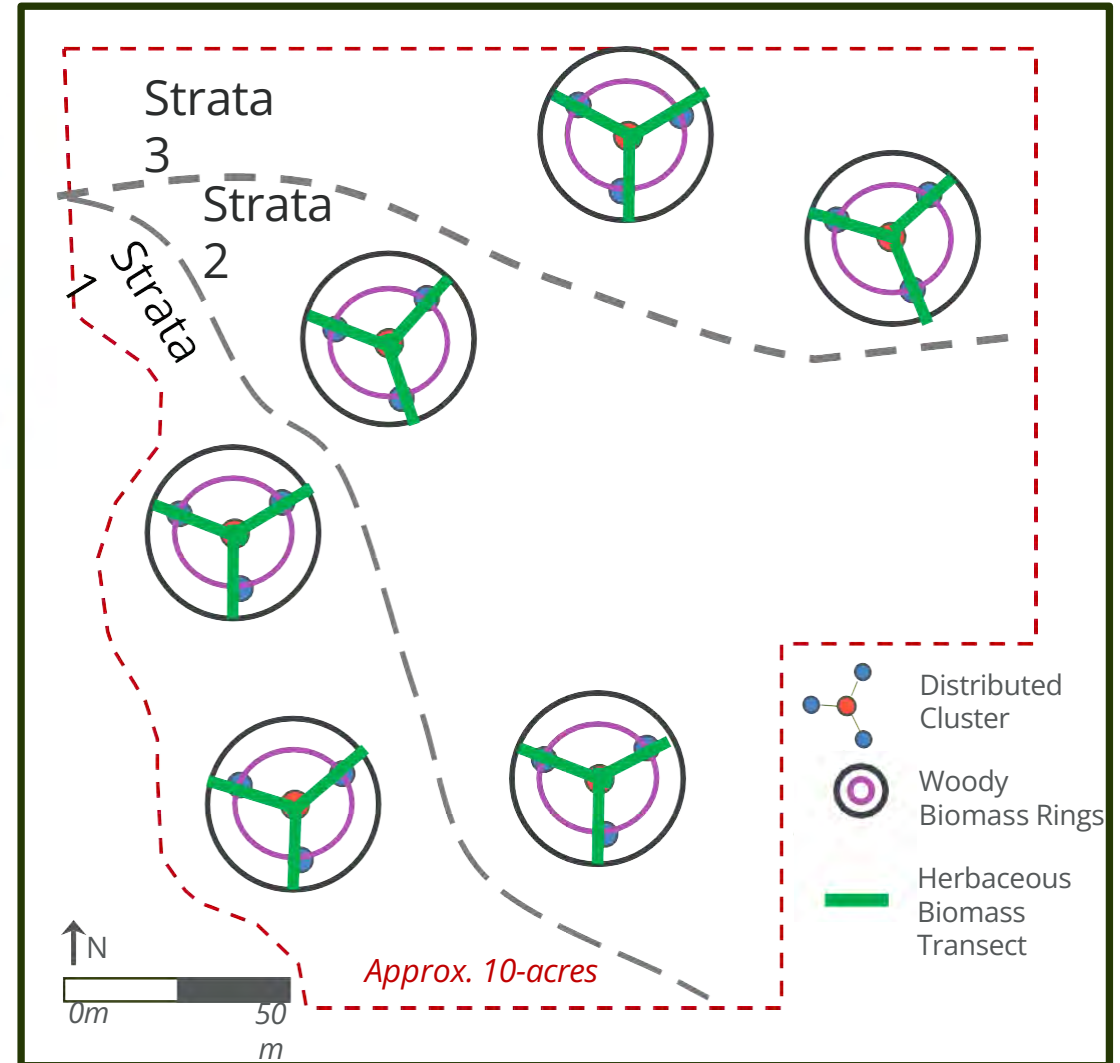
- **Soil sampling:**



- **Plant sampling:**

- Woody biomass survey of all trees (10m) and shrubs (5m) within designated area
- Herbaceous biomass transect records all plant, rock, bare soil observations along 150ft transect at 0.91m (3ft) intervals

Example Site Design (Subject to Change)



Opportunity Site Sample Plan - 2025

- Q4 FY24 – Q1 FY25
 - Finalize Laboratory Procedures/Field Protocols
 - Conduct Regional Sampling Training
 - Enter Opportunity Sites into Portal
- Q2 FY25
 - Opportunity Site Cultural Resource Clearance
 - Publish Procedures & Protocols
 - Deploy data storage solutions
 - Sample opportunity sites
 - Establish network sites:
 - Nodes: Long Term Research Sites
 - National Inventory Network Sites
- Potential resample cropland after 5 yrs

Soil Carbon Monitoring Network Site Proposal Form

The Soil Carbon Monitoring Network (SCMN) has been asked to accelerate sample collection in FY25. For this reason, state POCs are being asked to work with staff and partners to identify potential 'opportunity sites' for sampling. Opportunity sites are not selected to represent a statistical plan, but are sites that leverage existing relationships and convenience to gain as much soil organic carbon and management information as possible as soon as possible (opportunities). After potential sites are identified, SCMN regional coordinators will assist with prioritizing and tracking sites for clearance, management information gathering, and sample collection. The goal is to identify and select opportunity sites that represent the typical climate, soils, and crop and grazing management systems of your state and the country at large.

Use this form to submit proposed opportunity sites for SCMN sampling. Sites will be evaluated on a rolling basis and regional coordinators will work with you on site clearance and access to begin sampling as soon as possible.

1. Enter Information

Preliminary Site Name (required)

Enter a preliminary site name to identify the site

Land Use Class (required)

Select...

Select the most appropriate land use class

Land Use

Enter notes on land use; crop rotation; management:

CRP

☐ Yes

☐ No



Additional Considerations

- Personally Identifiable Information
 - Will follow data privacy rules
 - Aggregation and obscuring of location may afford public data access, but only at regional scales
- Building Technical Capacity
 - Field
 - Laboratory
 - Partnerships
- CEMA 221 Soil Organic Carbon Stock Monitoring
 - Citizen Science - Soil Carbon Stock Monitoring Network Strategy



CONSERVATION EVALUATION AND MONITORING ACTIVITY

Soil Organic Carbon Stock Monitoring CEMA 221

DEFINITION

- This activity outlines the tools and protocols to measure soil organic carbon stocks.
- Used to estimate carbon stocks and track trends when data are aggregated across many producers. Soil organic carbon storage should be measured before and after the implementation of a conservation practice, system, or activity. Evaluation and monitoring of change usually requires several years (e.g., >5 years).

APPLICABLE LAND USES

All land uses where there is a change in management or vegetation.

REQUIREMENTS

Qualified Individual Requirements

Participants should know the following Qualified Individual (QI) Requirements to ensure that the person they hire is reputable, competent, and meets their needs and objectives.

A QI for this CEMA must meet one of the following:

- Individuals who hold current applicable credentials, such as: Certified Crop Advisor (CCA), Certified Professional Agronomist (CPAg) through the American Society of Agronomy or a Certified Professional Soil Scientist (CPSS) through the Soil Science Society of America.
- Individuals recognized through the NRCS Registry as a Technical Service Providers (TSP) certified for one of the following: Conservation Practice Standard (CPS) Nutrient Management (Code 590) or Soil Health Management Design and Implementation Activity (162).
- Individuals who hold a Bachelor of Science degree or higher in agricultural or soil science with at least 2 years of experience collecting soil for laboratory analysis.

Individuals under the supervision of a QI are allowed to collect soil samples for this CEMA.

General Requirements

- 1) This CEMA includes the performance of work and documentation of the tasks, results, interpretations, and other activities described herein by a QI.
- 2) Prior to initiation of the CEMA, the QI shall arrange a pre-work conference to ensure all parties understand the participant's objectives, required deliverables, purpose and requirements for

Resources

- Inflation Reduction Act GHG Quantification Webinar Series:



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