USER'S MANUAL

FOR CARBON OFFSET PROJECTS FROM THE AVOIDED CONVERSION OF GRASSLANDS AND SHRUBLANDS TO CROP PRODUCTION

March 2020

American Carbon Registry
at WINROCK INTERNATIONAL

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American Carbon Registry®

WASHINGTON, D.C. OFFICE
c/o Winrock International
2121 Crystal Drive, Suite 500
Arlington, Virginia 22202 USA
ph +1 703 302 6500

CALIFORNIA OFFICE
400 Capitol Mall, Suite 900
Sacramento, California 95814 USA

ACR@winrock.org
americancarbonregistry.org

ABOUT AMERICAN CARBON REGISTRY® (ACR)

A leading carbon offset program founded in 1996 as the first private voluntary GHG registry in the world, ACR operates in the voluntary and regulated carbon markets. ACR has unparalleled experience in the development of environmentally rigorous, science-based offset methodologies as well as operational experience in the oversight of offset project verification, registration, offset issuance and retirement reporting through its online registry system.

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ABOUT THIS MANUAL

This is a user's manual for project developers, project participants and those otherwise interested in the conduct of the Avoided Conversion of Grasslands and Shrublands to Crop Production carbon offset project type with the American Carbon Registry. It is based on v.2.0 of the methodology (October 2019) and the accompanying Errata and Clarification (March 2020).

Documents referenced within:

- Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Avoided Conversion of Grasslands and Shrublands to Crop Production v.2.0 ("the Methodology")
- The American Carbon Registry Standard – Latest version
- The American Carbon Registry Validation and Verification Standard – Latest version
- Project Planning Tool (Excel, available from ACR upon request)
- Risk Tool and Buffer Pool Contributions

This document supports and simplifies information in the methodology but does not replace requirements listed in the methodology or the ACR Standard. Corresponding sections of the methodology are listed. This document is intended to facilitate and catalyze the early stages of project planning especially for developers new to the project type.

Definitions of terms used in this document can be found in the Methodology (**Methodology, Section 8**) and in the ACR Standard. An abridged list of acronyms is included below for easy reference.

ACR	American Carbon Registry
COI	Conflict of Interest
ERTS	Emissions Reductions Tonnes
GHG	Greenhouse Gas
LCA	Land Conservation Agreement
LCC	Land Capability Class
MRV	Monitoring, Reporting and Verification
PDA	Programmatic Development Approach
SOC	Soil Organic Carbon
SSR	Sources, Sinks and Reservoirs
VVB	Validation and Verification Body

PROJECT DEFINITION AND ELIGIBILITY

PROJECT ACTIVITY

The recording of a conservation easement (land conservation agreement, LCA) on a property that includes land parcels of grassland or shrubland that would otherwise be converted for agriculture. (**Methodology, Section 1.1**)

The methodology estimates the GHG emissions avoided by preventing the conversion of grasslands and shrublands to annual crop production. The greatest net GHG benefit from the project activity is anticipated to be the avoided release of soil organic carbon (SOC). This methodology conservatively assumes that avoided conversion results in the maintenance (without increase) of carbon stocks in the pools of soil organic carbon, and above-ground and below-ground biomass remain at steady state throughout the project scenario.

PROJECT ELIGIBILITY

In addition to meeting all requirements in the latest version of the ACR Standard, each field in the project must meet the criteria below. (**Methodology, Section 1.2**)

Table 1: Eligibility Criteria

CRITERIA	CHECK (✓) IF YES
1. All fields to be enrolled avoid the complete conversion to annual Cropland. Avoided conversion to land uses other than Cropland (e.g. development) is not an allowed activity.	☐
2. All fields to be enrolled in the GHG project are in the United States.	
3. All fields to be enrolled in the GHG project are currently grassland or shrubland; fields have been grassland or shrubland[1] for at least 10 years; cropland is the most likely next land use for the fields.	☐
4. No legal prohibition exists to prevent conversion to cropland of all fields to be enrolled in the GHG project.	☐
5. All fields to be enrolled in the GHG project are covered by a qualified Land Conservation Agreement (LCA), e.g. a conservation easement for 40 years (minimum project term).	☐
6. The LCA includes a "sodbuster clause", explicitly prohibiting grassland conversion to another land use	☐
7. The LCA is recorded on the deed for the property	☐
8. Fields are located entirely within counties shown and listed in Figure 3 and Table 3 of Appendix B (this User's Manual) and Figure 2 and Appendix B of the Methodology **(Methodology, Section 3.1.1.2** and **Appendix B**) for unidentified agents of conversion OR written offers to buy or lease the fields specify cropland as highest and best use and reference water rights and infrastructure for irrigation (if required) (**Methodology, Section 3.1.1.2**) for identified agents.	☐
9. At least 50% of the GHG project area is in Land Capability Class (LCC) I-IV and no more than 25% is in Land Capability Class VII and VIII, according to the SSURGO non-irrigated lands database[2].	☐
10. Landowner holds title to carbon and submits to ACR an Statement of Intent to conduct a carbon project in conjunction with the LCA; Statement of Intent is submitted to ACR within ±12 months of the LCA recording date.	☐

[1] As defined in the American Carbon Registry Standard (https://americancarbonregistry.org/carbon-accounting/standards-methodologies/american-carbon-registry-standard)

[2] https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

CRITERIA	CHECK (✓) IF YES
11. Project developer holds title to carbon rights and submits to ACR a copy of the agreement transferring carbon rights ownership from the landowner to the project developer; Agreement is dated and submitted to ACR within ±12 months of the LCA recording date.	☐
12. No fields to be enrolled in the GHG project include organic soils, peatlands, or wetlands and these areas are present, they have been excluded from the project per the **Methodology, Section 2.1.2**.	☐
13. Justification for an irrigated cropland scenario is provided (where needed) and includes demonstration of water access, legal and physical, and discussion of irrigation practices on neighboring or similar properties within the county.	☐
14. IF livestock are present in the project scenario, manure is not managed, stored or dispersed in liquid form.	☐
15. IF livestock are present in the project scenario, they are primarily forage fed and not confined.	☐

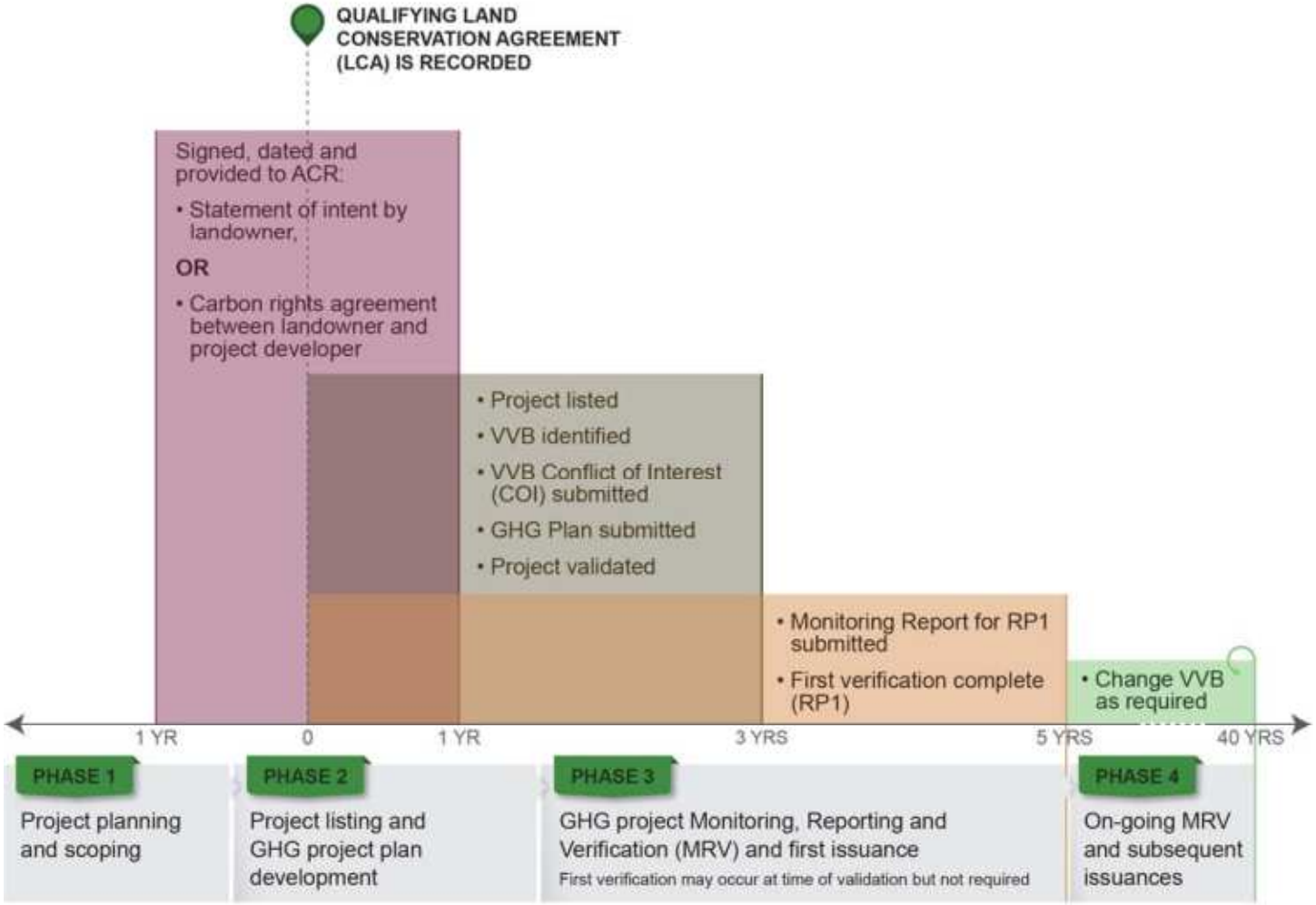
TIMELINE

The basic project timeline for a single property or aggregated project is shown below. The recording of a conservation easement is the defining action in the project timeline. Critical project milestones are shown in relation to this date.

- Phase 1 – Project planning and scoping
- Phase 2 – Project listing and GHG project plan development
- Phase 3 – GHG project Monitoring, Reporting and Verification (MRV) and first issuance
- Phase 4 – On-going MRV and subsequent issuances

The key activities, questions to be answered and important documents to be gathered and/or submitted are listed below for each Phase. The scenario below assumes that the DAYCENT model is used for quantification of the soil organic carbon (SOC) pool, although other methods are allowed as shown in Table 2 (this User's Manual).

Figure 1: Project Timeline



Notes: The exact timing for the beginning of phases 1, 2 and 3 can vary. Validation and Verification for RP1 may (but not required to) occur simultaneously for RP1, i.e. Phase 2 and 3 may fully overlap. Steps in Phase 2 are only required once per crediting period.

PHASE 1: PROJECT PLANNING AND SCOPING

PHASE 1 ACTIONS

- Assess the feasibility of the project
- Understand the project timeline and deadlines
- Review the ACR Standard and the project specific eligibility criteria
- Establish an ACR account
- Connect with a DAYCENT modeling practitioner (if using DAYCENT for SOC pool)
- Engagement with landowners, conservation easement stakeholders, buyers

PHASE 1 PROJECT TRAJECTORY CHECKS

- What properties will be included and what are the dates of easement recording for each (**Methodology, Section 2.3** and if PDA**, ACR Standard, Chapter 6F**)?
- Based on the easement date, what are the dates of other key milestones (**Methodology, Section 8** and **ACR Standard, Chapter 3**)?
- What are the monitoring requirements under the easement (**Methodology, Section 8**)?
- Do all properties meet all eligibility criteria in the methodology (**Methodology, Section 1.2**)?
- Is the project in compliance with the ACR Standard?
- Who will hold title to the carbon offsets (**Methodology, Section 1.2**)?
- Is the project property (ies) located in counties listed in Appendix B of the methodology (**Methodology, Section 3.1.1**)?

- If no, is there evidence to support an unidentified agent of conversion (**Methodology, Section 3.1.1**)?
- What is the baseline cropland management scenario (**Methodology, Section 3.1.2**)?
- Will the project include any optional pools (**Methodology, Section 2.2**)?
- Will DAYCENT be used to quantify the soil carbon pool (**Methodology, Sections 6.1.3** and **6.2.3**)? If no, see Table 2 below (this User's Manual) for quantification options by pool.
- Who will set up the DAYCENT model for the project? What data do they need and what are their costs (**Methodology, Sections 5** and **6**)?
- What are the soil types in the project area (**Methodology, Sections 6.1.3** and **6.2.3**)?
- Does grazing occur in the baseline scenario, project scenario or both (**Methodology, Section 6.1.5** and **6.2.5**)?
- What are the estimated VVB costs, Registry fees, other costs and the timing of costs?
- What is the estimated Risk Deduction and estimated contribution to the buffer pool (**Methodology, Section 6.6.3**)?

PHASE 1 DOCUMENTS/FILES/DATA

- Shape files of the LCA boundary, GHG boundary that excludes roads, buildings, wetlands etc. (**Methodology, Section 2.1**)?
- Datasets defining the baseline scenario (**Methodology, Section 3.1.2**)?
- ACR Avoided Conversions of Grasslands and Shrublands Planning Tool (request acr@winrock.org)
- Listing form

Table 2: Quantification Options by Pool

	BASELINE SCENARIO		PROJECT SCENARIO	
ABOVE GROUND BIOMASS (Optional Pool)	$C_{AGB,grass,BL_{p,y}}$ Non-crop, above-ground biomass (grass and shrubs) (6.1.1.1)	Equation 4 (Based on $C_{AGB,PR_{p,y}}$ See Project Scenario) →	$C_{AGB,PR_{p,y}}$ Non-crop, above-ground biomass (grass and shrubs) (6.2.1)	1. Approved models 2. Direct field measurements of $C_{AGBb,y=0}$ or $DM_{b,y=0}$ and CF_b (Equation 21) for each biomass type, b, in a year where growing season precipitation is within 30% of average annual growing season precipitation or averaged over three years 3. Remote sensing of $C_{AGBb,y=0}$ or $DM_{b,y=0}$ and CF_b (Equation 21) for each biomass type, b, in a year where growing season precipitation is within 30% of average annual growing season precipitation or averaged over three years. Remote sensing data should be calibrated to the Project Area with field samples 4. Data as available from government agency or University extension office for $DM_{b,y=0}$ and CF_b

	BASELINE SCENARIO		PROJECT SCENARIO	
	$C_{AGB,crop,BL_{p,y}}$ Crop, above-ground biomass (6.1.1.2)	1. Approved models 2. Field measurements for crop or forage productivity and in the Project Region published in peer re-viewed literature 3. Agricultural statistics for crop or forage productivity and Project Region, including State Agri-cultural Extension Offices 4. Equation 6. Values for the annualized average dry matter ($DM_{BL,p,y}$) and carbon fraction (CF_b) for each crop type Values for $DM_{BL,p,y}$ can be obtained from fixed ratio of crop yield to plant biomass, the Harvest Index ratio, vailable from peer reviewed literature, or government or University extension for crop and region of interest. **DEFAULT VALUES AVAILABLE FOR ($DM_{BL,p,y}$) AND (CF_b).**	Crop, above-ground biomass	Not present in the project scenario

	BASELINE SCENARIO		PROJECT SCENARIO	
BELOW GROUND BIOMASS (Optional Pool)	$C_{BGB,grass,BL_{p,y}}$ Non-crop, below ground biomass (6.1.2.1)	Equation 8 (Based on $C_{BGB,PR_{p,y}}$ See Project Scenario) →	$C_{BGB,PR_{p,y}}$ Non-crop, below-ground biomass (6.2.2)	1. Approved models 2. Equation 22. $C_{AGB,b,y=0}$ and approved root to shoot ratios (R_b). **DEFAULT VALUES AVAILABLE FOR (R_b).**
	$C_{BGB,crop,BL_{p,y}}$ Crop, below-ground biomass (6.1.2.2)	1. Approved models 2. Field measurements for crop or forage productivity and Project Region published in peer re-viewed literature 3. Agricultural statistics for crop or forage productivity and Project Region, including State Agri-cultural Extension Offices 4. Equation 9. $C_{AGB,crop,BL_{p,y}}$ and suitable root-to-shoot ratio for crop and region. Defaults available for (R_b)±.	Crop, below-ground biomass	Not present in the project scenario

	BASELINE SCENARIO		PROJECT SCENARIO	
SOIL CARBON STOCKS (Required)	$C_{SOC,BL_{p,y}}$ Baseline carbon stocks in soil (6.1.3)	1. Approved models. This method assumes emissions from SOC following conversion proceed according to the best fit decay curve to the model SOC and for the time up until when SOC levels in the model are changing by no more than +/-3%, not to exceed 40 years. 2. Direct measurement of SOC according to requirements in ISO 10381-2:2003 Soil quality – sampling – Part 2: Guidance on sampling techniques.31 This method assumes the emissions from SOC following conversion proceed linearly for 20 years (i.e., $D = 20$), at which point a new equilibrium level of SOC is reached in the converted state. A linear EF function may be used per the IPCC GL AFOLU 2006 (adapted from Eq. 2.25, Ch2, p 2.30).	$C_{SOC,y=0}$ Project carbon stocks in soil (6.2.3)	No year-to-year loss of soil carbon in project scenario. Soil carbon in steady state at $y=0$. $C_{SOC,y=0}$ can be determined by same methods as baseline scenario. ←

	BASELINE SCENARIO		PROJECT SCENARIO	
		Requires determination of $EF_{t,y}$ (Equation 11). 3. Direct measurement of SOC according to requirements in ACR Tool for Estimation of Stocks in Carbon Pools and Emissions from Emission Sources.34 This method assumes the emissions from SOC following conversion proceed linearly for 20 years (i.e., $D = 20$), at which point a new equilibrium level of SOC is reached in the converted state. A linear EF function may be used per the IPCC GL AFOLU 2006 (adapted from Eq. 2.25, Ch2, p 2.30). Requires determination of $EF_{t,y}$ (Equation 11).		
FERTI-LIZER APPLICA-TION (Required)	$E_{Fert,BL_{p,y2}}$ Direct emissions of N_2O from fertilizer application in the	1. Approved models 2. Equations 12, 13 and 14 and known masses of fertilizer application and nitrogen content as defined in the baseline cropland management scenario	$E_{PR,N_2O_{p,y}}$ Direct emissions of N_2O from fertilizer	1. Approved models 2. Equations 23, 24 and 25 and known masses of fertilizer application and nitrogen content from activity data in the project scenario. **DEFAULT**

	BASELINE SCENARIO		PROJECT SCENARIO	
	counter factual baseline cropland management scenario (6.1.4)	(**Methodology, Section 3.1.2**). **DEFAULT VALUES AVAILABLE FOR** **(Frac SN) (Frac ON) (EF_N).**	application in project scenario (6.2.4)	**VALUES AVAILABLE FOR** **(Frac SN) (Frac ON) (EF_N).**
GRAZING LIVE-STOCK (Required)	$E_{BL,Livestock_{p,y}}$ Emissions from enteric fermentation (ONLY when winter or stover grazing can legitimately be part of the counterfactual baseline cropland management scenario) **AND** unmanaged manure on grazing lands (ONLY when winter or stover grazing can legitimately	1. Equations 15, 16 and 29. **DEFAULT VALUES AVAILABLE FOR ($EF_{CH4,l}$), ($EF_{N2O,l}$), ($N_{rate,l}$) AND (Y_m).**	$E_{PR,Livestock_{p,y}}$ Emissions from enteric fermentation (ONLY when grazing is present in the project scenario) **AND** unmanaged manure on grazing lands (ONLY when grazing is present in the project scenario) (6.2.5)	1. Equations 27, 28 and 29. **DEFAULT VALUES AVAILABLE FOR ($EF_{CH4,l}$), ($EF_{N2O,l}$), ($N_{rate,l}$) AND (Y_m).**

	BASELINE SCENARIO		PROJECT SCENARIO	
	be part of the counterfactual baseline cropland management scenario) (6.1.5)			
FOSSIL FUEL (Optional)	$E_{FF,BL_{p,y}}$ Emissions from fossil fuel combustion by fuel and vehicle type based on the counterfactual baseline cropland management scenario (6.1.6)	1. Equation 17. **DEFAULT VALUES AVAILABLE FOR (EF_f).**	$E_{FF,PR_{p,y}}$ Emissions from fossil fuel combustion by fuel and vehicle type from activity data (6.2.6)	1. Equation 30. **DEFAULT VALUES AVAILABLE FOR (EF_f).**
LEAKAGE			LE_y	1. Equation 33. **DEFAULT VALUES AVAILABLE FOR ($LE_{M,y}$)**

	BASELINE SCENARIO		PROJECT SCENARIO	
			Market and activity shifting leakage (6.3.2)	
NON-PER-MANENCE			NP_y Risk of reversal of the carbon sequestration in biomass pools (6.6)	1. Equation 35. (BF_y) from ACR Risk Assessment Tool.

PHASE 2: PROJECT LISTING AND GHG PROJECT PLAN DEVELOPMENT

PHASE 2 ACTIONS

- Create the GHG Plan and Ex-Ante Offset Projection (templates available)
- ACR completes review of the GHG Plan and project is listed
- Record the easement and begin monitoring requirements under the easement
- Engage a Validation and Verification Body (VVB)
- Submit COI for VVB
- Submit Statement of Intent or carbon rights agreement between landowner and project developer

PHASE 2 PROJECT TRAJECTORY CHECKS

- What is the last date that a Statement of Intent or Carbon Rights agreement can be submitted?
- What is the date by which the project must be validated?
- Are values available for all parameters available at validation (Table A.2)?
- Will validation be conducted simultaneously with the first verification? (if yes, see Phase 3)
- Does the verifier require a site visit (**Methodology, Section 8**)?
- Does the project require stratification (**Methodology, Section 4**)?

PHASE 2 DOCUMENTS/FILES/DATA

- Statement of Intent or Carbon Rights Agreement
- VVB COI
- GHG Project Plan (including supporting data files; submitted once per Crediting Period and upon first verification)
- GHG Ex-Ante Offset Projection
- Recorded Easement
- Phase 3 documents – IFverification for Reporting Period 1 will occur together with validation

PHASE 3: GHG PROJECT MRV AND FIRST ISSUANCE

PHASE 3 ACTIONS

- Complete DAYCENT modeling for the SOC pool[3] on project parcels for the first 5 years of the project. Baseline management scenario must be updated at 5-year intervals where needed. Contact ACR for specific DAYCENT modeling guidance.
- Complete quantification of ERTs for project parcels for each year in the reporting period (Figure 2, this User's Manual)
- Complete Verification (and Validation if not already conducted). Validation must be within 36 months of project start date (easement recording) and verification (if separate from validation) must be completed within 60 months of project start date (easement recording).
- Credits are issued by ACR and can be transacted

PHASE 3 PROJECT TRAJECTORY CHECKS

- How many years are included in the first reporting period?
- Have there been any easement violations during the reporting period?
- Has the deadline to complete verification 1 before end of year 5 been met?
- Have all necessary documents been submitted to ACR and retained by VVB and Project Developer?

[3] DAYCENT is one of several allowed quantification approaches for several pools (see Table 2). This Manual describes the scenario where optional pools are excluded and DAYCENT is used to quantify the SOC pool.

- Are there any changes to the GHG Project Plan or lessons learned that need to be incorporated for verification 2?
- Has a buyer been identified for the first issuance of ERTs?

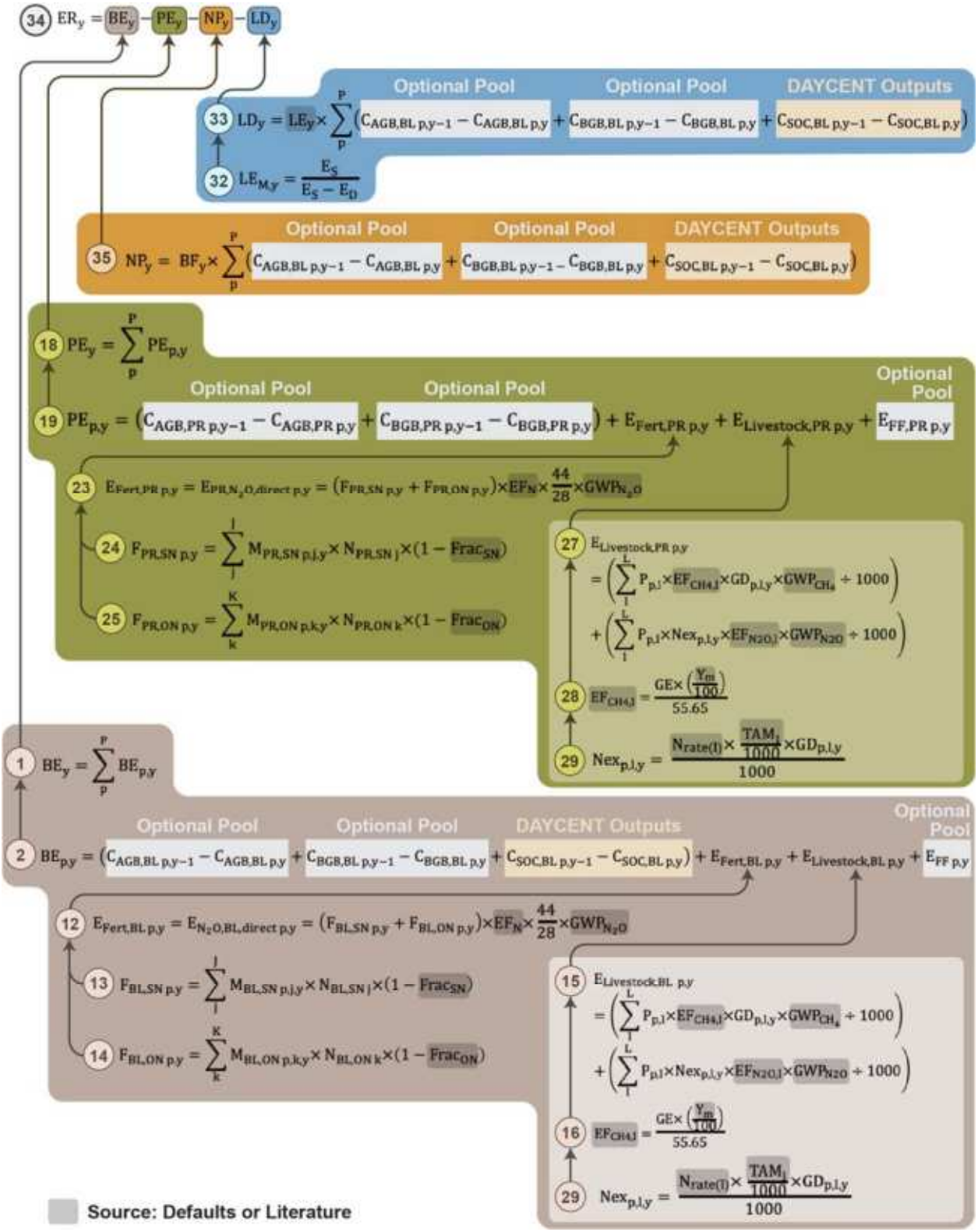
PHASE 3 **DOCUMENTS/FILES/DATA**

- GHG Monitoring Report for Reporting Period 1 and supporting documentation
- Validation Report (once per Crediting Period)
- Validation Statement
- Verification Report for Reporting Period 1
- Verification Statement for Reporting Period 1

Figure 2 on the following page maps all equations (for non-optional pools) listed in **Section 6** of the **Methodology**. Figure 2 starts with equation 34 which ultimately calculates annual ERTs from the sum of the GHG emissions/reductions in the Baseline (BE_y) and Project (PR_y) scenarios, and from Leakage (LE_y) and Non-Permanence (NP_y). Circled numbers (ⓐ) correspond to equation numbers in **Section 6** of the **Methodology**. All terms are defined in Appendix A of the Methodology and included here for easy reference (Appendix A, this User's Manual)[4]. Figure 2 assumes that the DAYCENT model is used to quantify SOC (other approaches are allowed per the **Methodology**, **Sections 6.1.3** and **6.2.3**) and non-optional pools are excluded. Gray squares highlight where default values are available/allowed.

[4] Please note that Appendix A of this User's Manual reflects changes described in the Errata and Clarifications issued in March 2020 and shown in the accompanying redline of v.2.0 of the methodology.

Figure 2: Equation Map



PHASE 4: ON-GOING MRV AND SUBSEQUENT ISSUANCES

PHASE 4 ACTIONS

- After year 5, update DAYCENT model to reflect any changes to the baseline cropland management scenario and update evidence substantiating the scenario
- Ensure that annual easement monitoring is being conducted and collect reports
- Report reversals or massive events such as fires, droughts or floods or change in ownership
- Submit for verification at least once every 5 years
- Change VVBs at least once every 5 years or 5 verifications; re-submit COI

PHASE 4 PROJECT TRAJECTORY CHECKS

- How frequently will the project be verified?
- Does verification need to be coordinated with other projects?
- Is easement monitoring occurring as prescribed?
- When will ERTs be transacted and what are the costs?
- Has the sale of ERTS in issuances 2,3,4…n been contracted?

PHASE 4 DOCUMENTS/FILES/DATA

- GHG Monitoring Report for Reporting Period 2,3,4 ……. n and supporting documentation

- Verification Report for Reporting Period 2,3,4 ……. n
- Verification Statement for Reporting Period 2,3,4 ……. n
- Annual Easement monitoring reports
- Data substantiating the hypothetical baseline scenario for the current 5-year period
- VVB COI

OTHER INFORMATION

AGGREGATION AND PROGRAMMATIC DEVELOPMENT APPROACH (PDA) PROJECTS

To achieve scale and consequent economic viability, carbon offset projects of this type will often necessarily be composed of numerous properties under their own LCAs, grouped into a single project with ACR. ACR allows for mutiple fields, facilities or parcels (sites) to be grouped into single projects via two approaches: 1) Aggregation and 2) Programmatic Development Approach (PDA). Aggregated projects shall incude ALL sites in the initial GHG Project Plan. No new sites can be added after validation. The PDA allows for a "rolling enrollment" style system where additional sites can be added over time, with some restrictions. Specific requirements for Aggregated and PDA projects are listed in Chapter 6 of the ACR Standard.

USE OF THE DAYCENT MODEL

The DAYCENT model is one of several available options for quantification of the AGB, BGB and SOC pools (**Methodology, Sections 6.1.1, 6.1.2, 6.1.3** and **6.2.1, 6.2.2, 6.2.3,**). DAY-CENT is the daily time-step version of the CENTURY biogeochemical model (Parton et al., 1994). DAYCENT simulates fluxes of C and N among the atmosphere, vegetation, and soil (Del Grosso et al., 2001a; Parton et al., 1998). Model inputs are: daily maximum/minimum air temperature and precipitation; surface soil texture class; and land cover/use data (e.g., vegetation type, cultivation/planting schedules, amount and timing of nutrient amendments).

Model outputs include: daily N-gas flux (N_2O, NO_x, N_2); CO_2 flux from heterotrophic soil respiration; soil organic C and N; NPP; H2O and NO_3 leaching; and other ecosystem parameters. The ability of DAYCENT to simulate NPP, soil organic carbon, N_2O emissions, and NO_3 leaching has been tested with data from various native and managed systems (Del Grosso

et al., 2001b; 2002; 2005).[5] DAYCENT model experts are available for hire for a fee. ACR can connect interested project developers with a DAYCENT modeling expert. Post-processing instructions for DAYCENT model outputs are available from ACR for registered projects.

[5] https://www2.nrel.colostate.edu/projects/daycent/

APPENDIX A: PARAMETERS

A.1 PARAMETERS DEFINED BY METHODOLOGY EQUATIONS

All parameters in A.1 can also be obtained as outputs from approved biogeochemical models.

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
BE_y	$MTCO_2e$	Baseline emissions in year **y**, all field. **y**=0 at project start date		1
$BE_{p,y}$	$MTCO_2e$	Baseline emissions from participant field **p**, in year **y**		1,2
$C_{AGB,BL_{p,y}}$	$MTCO_2e$	Carbon stock of above-ground biomass for Participant Field **p** in the baseline scenario in year **y**		2,3
$C_{AGB_{b,y=0}}$	$MTCO_2e$	Initial (year **y**=0) carbon stock of above-ground biomass for biomass type **b**		20, 21, 22
$C_{AGB,PR\ p,y}$	$MTCO_2e$	Carbon stock of above-ground biomass for Participant Field **p** in the project scenario in year **y**		4, 19, 20

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$C_{AGB_{grass},BL_{p,y}}$	$MTCO_2e$	Carbon stock of above ground biomass for Participant Field **p** in year **y** in the baseline scenario, as calculated from Section 6.2.1		3,4
$C_{AGB_{crop},BL_{p,y}}$	$MTCO_2e$	Carbon stock of aboveground crop biomass in Participant Field **p** in year **y** in the baseline scenario		3, 5
$C_{AGB_{crop},BL_{b,y}}$	$MTCO_2e$	Carbon stock of aboveground crop biomass in Participant Field **p**, for crop type **b**, in year y in the baseline scenario		5, 6, 9
$C_{BGB,BL_{p,y}}$	$MTCO_2e$	Carbon stock of belowground biomass in Participant Field **p** in year **y** in the baseline scenario		2,7
$C_{BGB_{crop},BL_{p,y}}$	$MTCO_2e$	Carbon stock of belowground crop biomass in Participant Field **p** in year **y** in the baseline scenario		7, 9
$C_{BGB_{grass},BL_{p,y}}$	$MTCO_2e$	Carbon stock of belowground biomass from Participant Field **p** in year **y** in the baseline scenario		7, 8
$C_{BGB,PR_{p,y}}$	$MTCO_2e$	Carbon stock of below-ground biomass for Participant Field **p** in the project scenario in year **y**		8, 19, 22
$C_{SOC,BL_{p,y}}$	$MTCO_2e$	Carbon stock of soil organic carbon for Participant Field **p** in the baseline scenario in year **y**		2,10

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$F_{BL/PR,ON_{p,y}}$	MT-N	Mass of organic N amendments applied to Participant Field p in the baseline/project scenario in year y adjusted for volatilization as NH_3 and NO_X		12, 14, 23, 25
$F_{BL/PR,SN_{p,y}}$	MT-N	Mass of synthetic fertilizer nitrogen applied to Participant Field p in the baseline/project scenario in year y adjusted for volatilization as NH_3 and NO_X		12, 13, 23, 24
$E_{Fert,BL/PR_{p,y}} = E_{BL/PR,N_2Odirect_{p,y}}$	$MTCO_2e$	Total N_2O emissions due to application of synthetic and organic fertilizer from Participant Field p in the baseline/project scenario in year y.		2, 12, 19, 23
$E_{(BL/PR),FF_{p,y}}$	$MTCO_2e$	Emissions due to the use of fossil fuels in agricultural management in the baseline/project scenario on Participant Field p in year y		2, 17, 19, 30
$EF_{t,y}$	d.u.	Emission factor for the fraction of soil organic carbon pool remaining t years since conversion to Cropland in year y		10, 11
$Nex_{l,p,y}$	kg N $(animal)^{-1}$ $(yr.)^{-1}$	Annual average N excretion per head of livestock type l, Participant Field p in year y		15, 27, 29

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$E_{Livestock,BL/PR_{p,y}}$	$MTCO_2e$	CH_4 emission from livestock enteric fermentation and N_2O emissions from deposited, un-managed livestock waste on Participant Field **p** in year **y**		2, 15, 19, 27
PE_y	$MTCO_2e$	Total project emissions in year **y**		18
$PE_{p,y}$	$MTCO_2e$	Total project emissions from participant field **p** in year **y**		18, 19
LE_y	(0.0 -0.1)	Leakage factor in year **y**		31
LD_y	$MTCO_2e$	Leakage deduction in year **y**		33

A.2 PARAMETERS AVAILABLE AT VALIDATION

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
A_b	ha	Area of biomass/crop type **b**	Project Proponent	6, 21
$A_{p,i}$	ha	Area of Participant Field in soil strata **i**	Project Proponent	10

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$C_{AGB_{b,y=0}}$	$MTCO_2e$	Initial (year **y**=0) carbon stock of aboveground biomass for Participant Field **p**	Approved models, direct measurements, remote sensing, data published in scientific literature	20, 21, 22
$C_{SOC_{i,y=0}}$	$MTCO_2e\ (ha)^{-1}$	Total initial (year **y**=0) soil organic carbon stock in soil strata **i**, fixed for project duration	Approved models, direct measurements, data published in scientific literature. Default values from IPCC 2006 AFOLU GL, Table 2.3.	10
CF_b	MT C (MT dry matter)$^{-1}$	Carbon fraction of dry matter for biomass type **b**	Data published in scientific literature Default values from IPCC 2006 AFOLU GL, Table 11.2.	6, 21
D	years	Transition period for soil organic carbon, time period for transition between equilibrium SOC values, default value of 20	Approved models, direct measurements, data published in scientific literature. Default value of 20 years (IPCC 2006 AFOLU GL, Ch. 2.3.2.2).	11
$DM_{b,y=0}$	MT/ha	Average, annual, dry matter for biomass type **b** at project initiation (year **y**=0)	Approved models, direct measurements, published data.	21
$e^{(-0.77\times(y-t))}$	d.u.	The decay function for aboveground biomass following conversion	Kochsiek et al. 2009	4

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$e^{(-1.41\times(y-t))}$	d.u.	The decay function for below-ground biomass following conversion	Silver and Miya 2001	8
EF_f	$MTCO_2e$ (liter of fuel)$^{-1}$	Emission factor for the type of fossil fuel combusted in vehicle or equipment	For gasoline EF CO_2e = 8.89 kg CO_2e/gallon. For diesel EF CO_2e = 10.16 kg CO_2e/gallon. Source: EIA[6]	17, 30
EF_{CH_4l}	kg-CH_4 head^{-1} grazing day^{-1}	Enteric CH_4 emission factor for livestock type l	Default values from IPCC 2006 AFOLU GL, Table 10.11 (Cattle, N. America, values are annualized)	15, 16, 27, 28
EF_N	MT-N_2O-N (MT-N input)$^{-1}$	Emission Factor for emission from N inputs	0.0254 (2.54%) of applied synthetic fertilizer N and 0.02 (2%) of applied organic fertilizer N (Davidson, 2009)	12, 23
$EF_{N_2O,l}$	MT-N_2O-N (MT-N input)$^{-1}$	Emission Factor for emission from manure inputs	Data published in scientific literature. Default values from IPCC 2006 AFOLU GL, Table 11.1.	15, 27
$FC_{p,y}$	d.u.	Proportion of Participant Field p that has been converted to Cropland in the	Project Proponent	10

[6] https://www.eia.gov/environment/emissions/co2_vol_mass.php

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
		baseline scenario for year **y**, d.u.		
$FC_{p,t,y}$	d.u.	The cumulative proportion of Participant Field **p** that has been converted to Cropland in year **t**, time of conversion, as of year **y** in the baseline scenario, determined based on rates and extents of conversion	Project Proponent	4, 8
$Frac_{ON}$	kg N volatilized (kg of N applied or deposited)$^{-1}$	Fraction of organic **N** applied to soils that volatilizes as NH_3 and NO_x	Default value of 0.20. IPCC 2006 AFOLU GL, Table 11.3.	14, 25
$Frac_{SN}$	kg N volatilized (kg of N applied or deposited)$^{-1}$	Fraction of synthetic **N** applied to soils that volatilizes as NH_3 and NO_x	Default value of 0.10. IPCC 2006 AFOLU GL, Table 11.3.	13, 24
GWP_{CH_4}	$MTCO_2e$	Global warming potential for CH_4	See ACR Standard	15, 27
GWP_{N_2O}	$MTCO_2e$	Global warming potential for N_2O	See ACR Standard	12, 15, 23, 27

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
Y_m	d.u.	Methane conversion factor, per cent of gross energy in feed converted to methane	Default values: 6.5% (Cattle or Buffalo grazing); 4.5% (Lambs < 1 year); 6.5% (Mature Sheep). IPCC 2006 AFOLU GL, Tables 10.2 and 10.3.	16, 28
P	d.u.	Total number of participant fields, p	Project Proponent	
t	years	Time since conversion of Grassland to Cropland in the baseline scenario	Project Proponent	
R_b	d.u.	Root carbon-to-shoot carbon ratio of (crop) biomass type b; default value 4.2 for temperate grassland, 4.5 for cool temperate grassland and 1.8 for shrubland	Data published in scientific literature (grass and crops) including Craine et al. 2005, Mokany et al 2006. Default values from IPCC 2006 AFOLU GL, Table 6.1.	9, 22
$\frac{44}{12}$		Ratio of molar mass of CO_2 to C	NA	6, 21
$\frac{44}{28}$		Ratio of molar mass of N_2O to N	NA	12, 23
$LE_{M,y}$	(0.0 - 1.0)	Market leakage in year y; (0-1.0)	Default value 0.2 or calculated according to Equation 32. See section 6.3.1.	31, 32

A.3 PARAMETERS MONITORED

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
B		Total number of crop/biomass types b		
$DM_{BL,b,y}$	MT dry matter $(ha)^{-1}$	Annualized average dry matter in the baseline for crop type b in year y	Data published in scientific literature. Harvest Index applied to crop yield guides for the Project Region where the Harvest Index is ratio of economic product dry mass to plant aboveground dry mass. Default value of 0.5 MT C (ha)-1 for annual crops following one year after conversion, Source: IPCC AFOLU GL, Table 5.9.	6
$FSOC_{LU}$	d.u.	Fraction of soil organic carbon pool remaining after transition period, accounting for land use factors	Approved models, direct measurements, data published in scientific literature. Default values from IPCC 2006 AFOLU, GL Table 5.5.	11
$FSOC_{MG}$	d.u.	Fraction of soil organic carbon pool remaining after transition period, accounting for management factors	Approved models, direct measurements, data published in scientific literature. Default values from IPCC 2006 AFOLU, GL Table 5.5.	11
$FSOC_{IN}$	d.u.	Fraction of soil organic carbon pool remaining after	Approved models, direct measurements, data published in scientific literature. Default	11

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
		transition period, accounting for input of organic matter	values from IPCC 2006 AFOLU, GL Table 5.5.	
$FF_{BL/PR_{p,v,j,y}}$	liters	Volume of fossil fuel consumed in the baseline/project scenario on Participant Field **p** in vehicle/equipment type **v** with fuel type **j** during year **y**	Expert opinion or extension/agency report (baseline) or producer report (project) that contains vehicle/equipment hours and fuel needed per unit of use.	17, 30
$GD_{p,l,y}$	days	Grazing days per livestock type **l** on Participant Field **p** in year **y**	University extension, producer, or other production report containing average grazing days per livestock type **l** in the project region.	15, 27, 29
GE	MJ head^{-1} day^{-1}	Gross energy intake	Data published in scientific literature, government reports, or expert opinion.	16, 28
$M_{BL/PR,SN_{p,j,y}}$	MT	Mass of synthetic fertilizer type **j** applied to Participant Field **p** in year **y**	County-level producer surveys conducted by a government agricultural agency(ies) or university extension offices, or the expert opinion of an university extension personnel working in the region and systems of interest, personnel of a governmental agriculture agency field office (e.g., USDA's RMA, FSA,	13, 24

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
			NRCS) with jurisdiction in the Project Region, or Cropland management plans approved by a lending agency.	
$M_{BL/PR,ON_{p,k,y}}$	MT	Mass of organic **N** amendment type **k** applied to Participant Field **p** in year **y**	County-level producer surveys conducted by a government agricultural agency(ies) or university extension offices, or the expert opinion of an university extension personnel working in the region and systems of interest, personnel of a governmental agriculture agency field office (e.g., USDA's RMA, FSA, NRCS) with jurisdiction in the Project Region, or Cropland management plans approved by a lending agency.	14, 25
$N_{BL/PR,ON_k}$	MT-N (MT input)$^{-1}$	Nitrogen content of organic **N** amendment type **k**	Product label or product specifications if commercially produced. Data published in scientific literature. Defaults available from IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories, Chapter 4, Background Paper, N_2O: Direct Emissions from Agricultural Soils[7].	14, 25

[7] https://www.ipcc-nggip.iges.or.jp/public/gp/bgp/4_5_N2O_Agricultural_Soils.pdf

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
$N_{BL/PR,SN_j}$	MT-N (MT input)$^{-1}$	Nitrogen content of synthetic fertilizer type j	Product label or product manufacturer specifications	13, 24
N_{rate_l}	kg N (1,000 kg animal mass)$^{-1}$ day^{-1}	N excretion rate	Default values from IPCC 2006 AFOLU, GL Table 10.19.	29
$P_{p,l}$	number of head	Population of livestock type l	Where the Project Proponent can demonstrate that any positive change in enteric methane would be de minimus then it is not required that livestock populations must be monitored at the level of the Participant Field. This could be done by identifying the maximum stocking rate observed in the Project Region and calculating the difference in enteric methane emission between the baseline and maximum stocking rate.	15, 27
TAM_l	kg animal^{-1}	Typical animal mass for livestock category l	Literature, government reports, or expert opinion.	29
L		Total number of livestock types in project scenario	Project Proponent	15, 27
J		Total number of synthetic N inputs, j	Project Proponent	13, 24

PARAMETER	UNIT	DESCRIPTION	SOURCE	USED IN EQ.
K		Total number of organic N amendments, k	Project Proponent	14, 25
V		Total number of vehicles, v	Project Proponent	17, 30
F		Total number of fossil fuels, f	Project Proponent	17, 30

APPENDIX B: COUNTIES FOR UNIDENTIFIED AGENTS OF CONVERSION

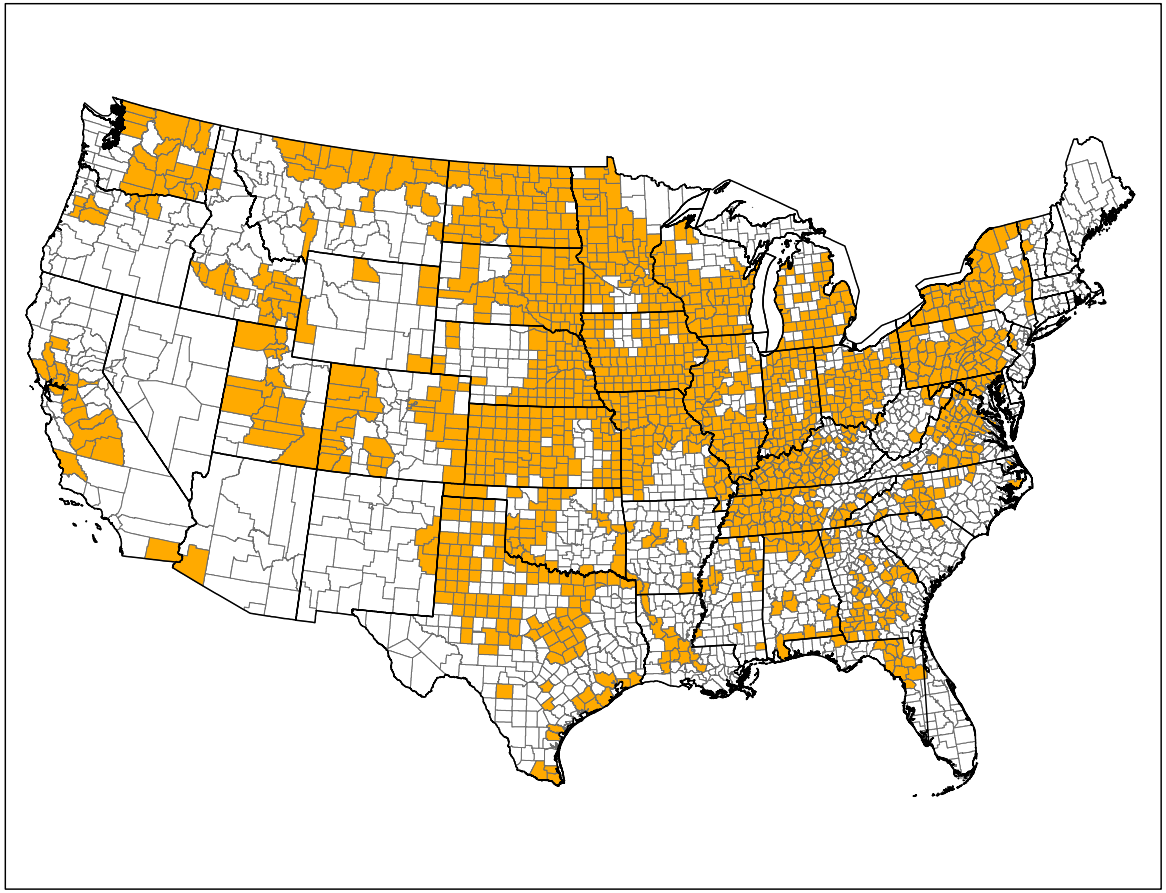


Figure 3: County Map for Unidentified Agents of Conversion

Project fields/parcels located in the counties highlighted in orange have a baseline scenario of cropland for unidentified agents of conversion and surpass the practice-based performance standard for demonstrating additionality. Project fields/parcels in white counties must determine the baseline land-use scenario and demonstrate additionality according to **Sections 3.1.1.2** and **3.2.2.2** of the **Methodology**, respectively.

Table 3: County List for Unidentified Agents of Conversion

STATE	COUNTY
AL	Baldwin County
	Barbour County
	Bullock County
	Calhoun County
	Cherokee County
	Colbert County
	Covington County
	Cullman County
	Dallas County
	DeKalb County
	Escambia County
	Etowah County
	Franklin County
	Geneva County
	Henry County
	Houston County
	Jackson County
	Lauderdale County
	Lawrence County
	Limestone County
	Macon County
	Madison County
	Marengo County
	Marshall County
	Morgan County
	Perry County
	Talladega County
AR	Ashley County
	Chicot County
	Conway County
	Crawford County
	Drew County
	Jackson County
	Lafayette County
	Little River County
	Lonoke County
	Miller County
	Perry County
	Pope County
	Yell County
AZ	Yuma County
CA	Amador County
	Contra Costa County
	Fresno County
	Glenn County
	Imperial County
	Kings County
	Lake County
	Madera County
	Merced County
	Napa County
	Sacramento County
	San Joaquin County
	San Luis Obispo County
	Solano County
	Sonoma County
	Stanislaus County
	Tulare County
	Yolo County
CO	Adams County
	Alamosa County
	Arapahoe County
	Baca County
	Cheyenne County
	Conejos County
	Delta County
	Denver County
	Dolores County
	Eagle County
	Elbert County
	Garfield County
	Kiowa County
	Kit Carson County
	La Plata County
	Lincoln County
	Logan County
	Mesa County
	Moffat County
	Montezuma County
	Montrose County
	Morgan County
	Phillips County
	Pitkin County
	Prowers County
	Rio Blanco County
	Rio Grande County
	Routt County
	Saguache County
	San Miguel County
	Washington County
FL	Alachua County
	Citrus County
	Columbia County
	Dixie County
	Gilchrist County
	Hamilton County
	Jackson County
	Lafayette County
	Levy County
	Madison County
	Marion County
	Suwannee County
GA	Appling County
	Atkinson County
	Bacon County
	Baker County
	Bartow County
	Berrien County

STATE	COUNTY
	Bleckley County
	Brooks County
	Burke County
	Calhoun County
	Chattooga County
	Coffee County
	Colquitt County
	Crawford County
	Crisp County
	Decatur County
	Dodge County
	Dougherty County
	Early County
	Floyd County
	Gordon County
	Hart County
	Houston County
	Irwin County
	Jeff Davis County
	Jefferson County
	Jenkins County
	Johnson County
	Lamar County
	Lanier County
	Lee County
	Macon County
	Miller County
	Mitchell County
	Monroe County
	Montgomery County
	Morgan County
	Murray County
	Peach County
	Pierce County
	Polk County
	Putnam County
	Richmond County
	Screven County
	Seminole County
	Spalding County
	Sumter County
	Taylor County
	Telfair County
	Terrell County
	Thomas County
	Toombs County
	Treutlen County
	Walker County
	Walton County
	Warren County
	Washington County
	Wheeler County
	White County
	Worth County
IA	Adair County
	Adams County
	Allamakee County
	Appanoose County
	Audubon County
	Benton County
	Black Hawk County
	Butler County
	Carroll County
	Cass County
	Cedar County
	Cherokee County
	Chickasaw County
	Clarke County
	Clay County
	Clayton County
	Clinton County
	Crawford County
	Dallas County
	Davis County
	Decatur County
	Delaware County
	Des Moines County
	Dickinson County
	Dubuque County
	Emmet County
	Fayette County
	Floyd County
	Franklin County
	Fremont County
	Greene County
	Grundy County
	Guthrie County
	Hancock County
	Hardin County
	Harrison County
	Henry County
	Howard County
	Ida County
	Iowa County
	Jackson County
	Jasper County
	Jefferson County
	Johnson County
	Jones County
	Keokuk County
	Lee County
	Linn County
	Louisa County
	Lucas County
	Lyon County
	Madison County
	Mahaska County
	Marion County
	Marshall County
	Mills County
	Mitchell County
	Monona County
	Monroe County
	Montgomery County

STATE	COUNTY
	Muscatine County
	O'Brien County
	Osceola County
	Page County
	Plymouth County
	Polk County
	Pottawattamie County
	Poweshiek County
	Ringgold County
	Sac County
	Shelby County
	Sioux County
	Story County
	Tama County
	Taylor County
	Union County
	Van Buren County
	Wapello County
	Warren County
	Washington County
	Wayne County
	Winnebago County
	Winneshiek County
	Woodbury County
	Wright County
ID	Ada County
	Bannock County
	Bear Lake County
	Bingham County
	Bonneville County
	Butte County
	Camas County
	Canyon County
	Caribou County
	Elmore County
	Gooding County
	Jefferson County
	Latah County

STATE	COUNTY
	Lincoln County
	Madison County
	Oneida County
	Power County
IL	Adams County
	Alexander County
	Bond County
	Boone County
	Brown County
	Bureau County
	Calhoun County
	Carroll County
	Cass County
	Christian County
	Clay County
	Clinton County
	Coles County
	Crawford County
	Cumberland County
	DeKalb County
	Douglas County
	Edgar County
	Edwards County
	Effingham County
	Fayette County
	Ford County
	Franklin County
	Fulton County
	Gallatin County
	Greene County
	Hamilton County
	Hancock County
	Hardin County
	Henderson County
	Henry County
	Jackson County
	Jasper County
	Jefferson County

STATE	COUNTY
	Jersey County
	Jo Daviess County
	Johnson County
	Kane County
	Kankakee County
	Kendall County
	Knox County
	Lawrence County
	Lee County
	Livingston County
	Macoupin County
	Madison County
	Marion County
	Marshall County
	Mason County
	Massac County
	McDonough County
	McHenry County
	McLean County
	Menard County
	Mercer County
	Monroe County
	Montgomery County
	Morgan County
	Ogle County
	Peoria County
	Perry County
	Pike County
	Pope County
	Pulaski County
	Putnam County
	Randolph County
	Richland County
	Rock Island County
	Saint Clair County
	Saline County
	Schuyler County
	Scott County

STATE	COUNTY
	Shelby County
	Stark County
	Stephenson County
	Tazewell County
	Union County
	Vermilion County
	Wabash County
	Warren County
	Washington County
	Wayne County
	White County
	Whiteside County
	Will County
	Williamson County
	Winnebago County
IN	Adams County
	Allen County
	Benton County
	Blackford County
	Boone County
	Brown County
	Carroll County
	Cass County
	Clark County
	Clay County
	Crawford County
	Daviess County
	Decatur County
	DeKalb County
	Delaware County
	Dubois County
	Elkhart County
	Fayette County
	Floyd County
	Fountain County
	Franklin County
	Fulton County
	Gibson County
	Greene County
	Hamilton County
	Harrison County
	Hendricks County
	Henry County
	Huntington County
	Jackson County
	Jasper County
	Jay County
	Jefferson County
	Jennings County
	Knox County
	Kosciusko County
	LaGrange County
	LaPorte County
	Lawrence County
	Madison County
	Marshall County
	Martin County
	Miami County
	Monroe County
	Montgomery County
	Morgan County
	Newton County
	Noble County
	Orange County
	Owen County
	Perry County
	Pike County
	Porter County
	Pulaski County
	Putnam County
	Randolph County
	Ripley County
	Rush County
	Saint Joseph County
	Scott County
	Spencer County
	Starke County
	Steuben County
	Tippecanoe County
	Union County
	Vermillion County
	Vigo County
	Warren County
	Warrick County
	Washington County
	Wayne County
	White County
	Whitley County
KS	Allen County
	Atchison County
	Barton County
	Bourbon County
	Brown County
	Butler County
	Cherokee County
	Cheyenne County
	Clay County
	Cloud County
	Comanche County
	Crawford County
	Decatur County
	Dickinson County
	Doniphan County
	Douglas County
	Edwards County
	Ellis County
	Finney County
	Ford County
	Franklin County
	Gove County
	Graham County
	Grant County
	Gray County
	Greeley County

STATE	COUNTY
	Hamilton County
	Harper County
	Harvey County
	Haskell County
	Hodgeman County
	Jackson County
	Jefferson County
	Jewell County
	Johnson County
	Kearny County
	Kingman County
	Kiowa County
	Labette County
	Lane County
	Leavenworth County
	Lincoln County
	Linn County
	Logan County
	Marion County
	Marshall County
	McPherson County
	Meade County
	Miami County
	Mitchell County
	Montgomery County
	Morton County
	Nemaha County
	Neosho County
	Ness County
	Norton County
	Osage County
	Osborne County
	Ottawa County
	Pawnee County
	Phillips County
	Pratt County
	Rawlins County
	Reno County
	Republic County
	Rice County
	Rooks County
	Rush County
	Russell County
	Saline County
	Scott County
	Sedgwick County
	Seward County
	Shawnee County
	Sheridan County
	Sherman County
	Smith County
	Stafford County
	Stanton County
	Stevens County
	Sumner County
	Thomas County
	Trego County
	Wallace County
	Washington County
	Wichita County
	Wilson County
KY	Adair County
	Allen County
	Ballard County
	Barren County
	Bath County
	Bourbon County
	Boyle County
	Breckinridge County
	Bullitt County
	Butler County
	Caldwell County
	Calloway County
	Carlisle County
	Carroll County
	Casey County
	Christian County
	Clark County
	Clinton County
	Crittenden County
	Cumberland County
	Daviess County
	Edmonson County
	Estill County
	Fleming County
	Franklin County
	Fulton County
	Graves County
	Grayson County
	Green County
	Greenup County
	Hancock County
	Hardin County
	Hart County
	Henderson County
	Henry County
	Hickman County
	Hopkins County
	Larue County
	Lewis County
	Lincoln County
	Livingston County
	Logan County
	Lyon County
	Marion County
	Marshall County
	Mason County
	McCracken County
	McLean County
	Meade County
	Mercer County
	Metcalfe County
	Monroe County
	Muhlenberg County

STATE	COUNTY
	Nelson County
	Ohio County
	Powell County
	Pulaski County
	Rockcastle County
	Rowan County
	Russell County
	Scott County
	Shelby County
	Simpson County
	Spencer County
	Taylor County
	Todd County
	Trigg County
	Trimble County
	Union County
	Warren County
	Washington County
	Wayne County
	Webster County
LA	Allen Parish
	Avoyelles Parish
	Bossier Parish
	Evangeline Parish
	Grant Parish
	Iberville Parish
	Jefferson Davis Parish
	Natchitoches Parish
	Pointe Coupee Parish
	Rapides Parish
	Red River Parish
	Saint Landry Parish
MD	Allegany County
	Baltimore County
	Carroll County
	Cecil County
	Frederick County
	Garrett County
	Harford County
	Howard County
	Montgomery County
	Queen Anne's County
	Washington County
MI	Alcona County
	Allegan County
	Alpena County
	Arenac County
	Barry County
	Bay County
	Berrien County
	Branch County
	Calhoun County
	Cass County
	Clinton County
	Eaton County
	Genesee County
	Gladwin County
	Grand Traverse County
	Hillsdale County
	Huron County
	Ingham County
	Ionia County
	Iosco County
	Isabella County
	Jackson County
	Lapeer County
	Leelanau County
	Lenawee County
	Livingston County
	Macomb County
	Manistee County
	Mason County
	Mecosta County
	Missaukee County
	Muskegon County
	Oceana County
	Ogemaw County
	Oscoda County
	Ottawa County
	Saginaw County
	Saint Clair County
	Saint Joseph County
	Sanilac County
	Shiawassee County
	Tuscola County
	Washtenaw County
	Wayne County
MN	Aitkin County
	Anoka County
	Becker County
	Beltrami County
	Benton County
	Big Stone County
	Carver County
	Cass County
	Chippewa County
	Chisago County
	Clay County
	Clearwater County
	Cottonwood County
	Crow Wing County
	Dakota County
	Dodge County
	Douglas County
	Fillmore County
	Freeborn County
	Goodhue County
	Grant County
	Hennepin County
	Houston County
	Hubbard County
	Isanti County
	Jackson County

STATE	COUNTY
	Kanabec County
	Kandiyohi County
	Lac qui Parle County
	Lake of the Woods County
	Le Sueur County
	Lincoln County
	Lyon County
	Mahnomen County
	Marshall County
	McLeod County
	Meeker County
	Mille Lacs County
	Morrison County
	Mower County
	Murray County
	Norman County
	Olmsted County
	Otter Tail County
	Pennington County
	Pine County
	Pipestone County
	Polk County
	Pope County
	Red Lake County
	Redwood County
	Rice County
	Roseau County
	Scott County
	Sherburne County
	Sibley County
	Stearns County
	Steele County
	Stevens County
	Swift County
	Todd County
	Traverse County
	Wabasha County
	Wadena County
	Washington County
	Wilkin County
	Winona County
	Wright County
	Yellow Medicine County
MO	Adair County
	Andrew County
	Atchison County
	Audrain County
	Barry County
	Barton County
	Bates County
	Benton County
	Bollinger County
	Boone County
	Buchanan County
	Butler County
	Caldwell County
	Callaway County
	Cape Girardeau County
	Carroll County
	Cass County
	Cedar County
	Chariton County
	Clark County
	Clay County
	Clinton County
	Cole County
	Cooper County
	Dade County
	Daviess County
	DeKalb County
	Dunklin County
	Franklin County
	Gasconade County
	Gentry County
	Greene County
	Grundy County
	Harrison County
	Henry County
	Hickory County
	Holt County
	Howard County
	Jackson County
	Jasper County
	Johnson County
	Knox County
	Lafayette County
	Lawrence County
	Lewis County
	Lincoln County
	Linn County
	Livingston County
	Macon County
	Madison County
	Marion County
	Mercer County
	Moniteau County
	Monroe County
	Montgomery County
	Morgan County
	New Madrid County
	Newton County
	Nodaway County
	Perry County
	Pettis County
	Pike County
	Platte County
	Polk County
	Putnam County
	Ralls County
	Randolph County
	Ray County
	Saint Charles County
	Saint Clair County
	Saint Francois County

STATE	COUNTY
	Saint Louis County
	Sainte Genevieve County
	Saline County
	Schuyler County
	Scotland County
	Scott County
	Shelby County
	Stoddard County
	Sullivan County
	Vernon County
	Warren County
	Wayne County
	Worth County
MS	Adams County
	Alcorn County
	Benton County
	Calhoun County
	Chickasaw County
	Clay County
	Covington County
	DeSoto County
	George County
	Humphreys County
	Leake County
	Lee County
	Leflore County
	Lowndes County
	Monroe County
	Noxubee County
	Pontotoc County
	Sunflower County
	Union County
	Washington County
MT	Blaine County
	Broadwater County
	Chouteau County
	Daniels County
	Dawson County
	Fallon County
	Gallatin County
	Glacier County
	Golden Valley County
	Hill County
	Liberty County
	McCone County
	Petroleum County
	Phillips County
	Pondera County
	Roosevelt County
	Sheridan County
	Teton County
	Toole County
	Valley County
NC	Alamance County
	Anson County
	Burke County
	Cabarrus County
	Catawba County
	Cherokee County
	Clay County
	Cleveland County
	Davidson County
	Davie County
	Durham County
	Franklin County
	Gaston County
	Henderson County
	Hyde County
	Iredell County
	Lincoln County
	Mecklenburg County
	Mitchell County
	Orange County
	Pasquotank County
	Randolph County
	Rowan County
	Stanly County
	Surry County
	Transylvania County
	Union County
	Warren County
	Wilkes County
	Yadkin County
ND	Adams County
	Barnes County
	Benson County
	Billings County
	Bottineau County
	Bowman County
	Burke County
	Burleigh County
	Cass County
	Cavalier County
	Dickey County
	Divide County
	Dunn County
	Eddy County
	Emmons County
	Foster County
	Grand Forks County
	Grant County
	Griggs County
	Hettinger County
	Kidder County
	LaMoure County
	Logan County
	McHenry County
	McIntosh County
	McLean County
	Mercer County
	Morton County
	Mountrail County
	Nelson County

STATE	COUNTY
	Oliver County
	Pembina County
	Pierce County
	Ramsey County
	Ransom County
	Renville County
	Richland County
	Rolette County
	Sargent County
	Sheridan County
	Slope County
	Stark County
	Steele County
	Stutsman County
	Towner County
	Walsh County
	Ward County
	Wells County
	Williams County
NE	Adams County
	Antelope County
	Banner County
	Boone County
	Box Butte County
	Boyd County
	Buffalo County
	Burt County
	Butler County
	Cass County
	Cedar County
	Clay County
	Colfax County
	Cuming County
	Dakota County
	Dawes County
	Dixon County
	Dodge County
	Fillmore County
	Franklin County
	Furnas County
	Gage County
	Gosper County
	Greeley County
	Hall County
	Hamilton County
	Harlan County
	Holt County
	Howard County
	Jefferson County
	Johnson County
	Kearney County
	Kimball County
	Knox County
	Lancaster County
	Madison County
	Merrick County
	Nance County
	Nemaha County
	Nuckolls County
	Otoe County
	Pawnee County
	Perkins County
	Phelps County
	Pierce County
	Platte County
	Polk County
	Red Willow County
	Richardson County
	Saline County
	Sarpy County
	Saunders County
	Seward County
	Sherman County
	Stanton County
	Thayer County
	Thurston County
	Valley County
	Washington County
	Wayne County
	Webster County
	Wheeler County
	York County
NJ	Hunterdon County
	Warren County
NM	Curry County
	Quay County
	Roosevelt County
NY	Albany County
	Allegany County
	Broome County
	Cattaraugus County
	Cayuga County
	Chautauqua County
	Chemung County
	Chenango County
	Clinton County
	Columbia County
	Cortland County
	Dutchess County
	Erie County
	Franklin County
	Genesee County
	Herkimer County
	Jefferson County
	Lewis County
	Livingston County
	Madison County
	Monroe County
	Montgomery County
	Niagara County
	Oneida County
	Onondaga County
	Ontario County

STATE	COUNTY
	Orleans County
	Oswego County
	Otsego County
	Rensselaer County
	Saint Lawrence County
	Saratoga County
	Schoharie County
	Schuyler County
	Seneca County
	Steuben County
	Tioga County
	Tompkins County
	Washington County
	Wayne County
	Wyoming County
	Yates County
OH	Adams County
	Allen County
	Ashland County
	Ashtabula County
	Athens County
	Auglaize County
	Brown County
	Butler County
	Champaign County
	Clark County
	Clermont County
	Clinton County
	Columbiana County
	Coshocton County
	Crawford County
	Darke County
	Defiance County
	Delaware County
	Fairfield County
	Fayette County
	Franklin County
	Fulton County
	Gallia County
	Greene County
	Hardin County
	Highland County
	Hocking County
	Holmes County
	Huron County
	Jackson County
	Knox County
	Licking County
	Logan County
	Lorain County
	Madison County
	Mahoning County
	Marion County
	Medina County
	Mercer County
	Montgomery County
	Morgan County
	Morrow County
	Muskingum County
	Perry County
	Pickaway County
	Pike County
	Portage County
	Preble County
	Richland County
	Ross County
	Sandusky County
	Scioto County
	Seneca County
	Shelby County
	Stark County
	Trumbull County
	Tuscarawas County
	Union County
	Warren County
	Wayne County
	Williams County
	Wyandot County
OK	Alfalfa County
	Beckham County
	Blaine County
	Bryan County
	Caddo County
	Canadian County
	Cimarron County
	Cotton County
	Craig County
	Custer County
	Garfield County
	Grant County
	Greer County
	Harmon County
	Harper County
	Jackson County
	Jefferson County
	Kay County
	Kingfisher County
	Kiowa County
	Le Flore County
	Major County
	McCurtain County
	Muskogee County
	Ottawa County
	Roger Mills County
	Sequoyah County
	Texas County
	Tillman County
	Tulsa County
	Wagoner County
	Washita County
OR	Benton County
	Gilliam County
	Linn County

STATE	COUNTY
	Marion County
	Morrow County
	Polk County
	Sherman County
PA	Adams County
	Allegheny County
	Armstrong County
	Beaver County
	Bedford County
	Berks County
	Blair County
	Bradford County
	Butler County
	Cambria County
	Carbon County
	Centre County
	Chester County
	Clarion County
	Clearfield County
	Clinton County
	Columbia County
	Crawford County
	Cumberland County
	Dauphin County
	Erie County
	Fayette County
	Franklin County
	Fulton County
	Greene County
	Huntingdon County
	Indiana County
	Jefferson County
	Juniata County
	Lancaster County
	Lawrence County
	Lebanon County
	Lehigh County
	Luzerne County

STATE	COUNTY
	Lycoming County
	Mercer County
	Mifflin County
	Monroe County
	Montour County
	Northumberland County
	Perry County
	Potter County
	Schuylkill County
	Snyder County
	Somerset County
	Sullivan County
	Union County
	Venango County
	Warren County
	Washington County
	Westmoreland County
	York County
SC	Cherokee County
	Chesterfield County
SD	Aurora County
	Beadle County
	Bennett County
	Bon Homme County
	Brookings County
	Brown County
	Brule County
	Buffalo County
	Campbell County
	Charles Mix County
	Clark County
	Clay County
	Codington County
	Davison County
	Day County
	Deuel County
	Douglas County

STATE	COUNTY
	Edmunds County
	Faulk County
	Grant County
	Gregory County
	Haakon County
	Hamlin County
	Hand County
	Hanson County
	Hughes County
	Hutchinson County
	Hyde County
	Jackson County
	Jerauld County
	Jones County
	Kingsbury County
	Lake County
	Lincoln County
	Lyman County
	Marshall County
	McCook County
	McPherson County
	Meade County
	Miner County
	Minnehaha County
	Moody County
	Pennington County
	Perkins County
	Potter County
	Roberts County
	Sanborn County
	Spink County
	Stanley County
	Sully County
	Tripp County
	Turner County
	Union County
	Walworth County
	Yankton County

STATE	COUNTY
TN	Bedford County
	Benton County
	Bledsoe County
	Blount County
	Bradley County
	Cannon County
	Carroll County
	Cheatham County
	Chester County
	Clay County
	Cocke County
	Coffee County
	Crockett County
	Davidson County
	Decatur County
	DeKalb County
	Dickson County
	Dyer County
	Fayette County
	Franklin County
	Gibson County
	Giles County
	Grundy County
	Hamblen County
	Hardeman County
	Hardin County
	Haywood County
	Henderson County
	Henry County
	Hickman County
	Houston County
	Humphreys County
	Jackson County
	Jefferson County
	Lauderdale County
	Lawrence County
	Lewis County
	Lincoln County
	Loudon County
	Macon County
	Madison County
	Marion County
	Marshall County
	Maury County
	McMinn County
	McNairy County
	Meigs County
	Monroe County
	Montgomery County
	Obion County
	Perry County
	Polk County
	Robertson County
	Rutherford County
	Sequatchie County
	Smith County
	Stewart County
	Sumner County
	Tipton County
	Trousdale County
	Warren County
	Wayne County
	Weakley County
	White County
	Williamson County
TX	Archer County
	Armstrong County
	Bailey County
	Bell County
	Borden County
	Bosque County
	Bowie County
	Brazoria County
	Callahan County
	Cameron County
	Carson County
	Castro County
	Chambers County
	Childress County
	Clay County
	Cochran County
	Coleman County
	Collin County
	Collingsworth County
	Comanche County
	Concho County
	Cooke County
	Coryell County
	Cottle County
	Crosby County
	Dallam County
	Dallas County
	Dawson County
	Deaf Smith County
	Delta County
	Denton County
	Ellis County
	Falls County
	Fannin County
	Fisher County
	Floyd County
	Gaines County
	Glasscock County
	Gray County
	Grayson County
	Guadalupe County
	Hale County
	Hall County
	Hamilton County
	Hansford County
	Hardeman County
	Harris County
	Hartley County
	Haskell County

STATE	COUNTY
	Hidalgo County
	Hill County
	Hockley County
	Howard County
	Hunt County
	Jackson County
	Jefferson County
	Johnson County
	Jones County
	Karnes County
	Kaufman County
	Lamar County
	Lamb County
	Limestone County
	Lubbock County
	Lynn County
	Martin County
	Matagorda County
	McCulloch County
	McLennan County
	Milam County
	Mills County
	Mitchell County
	Montague County
	Moore County
	Navarro County
	Nolan County
	Nueces County
	Ochiltree County
	Parmer County
	Randall County
	Reagan County
	Red River County
	Robertson County
	Rockwall County
	Runnels County
	San Patricio County
	Schleicher County
	Scurry County
	Sherman County
	Swisher County
	Taylor County
	Terry County
	Throckmorton County
	Tom Green County
	Uvalde County
	Wharton County
	Wheeler County
	Wichita County
	Wilbarger County
	Willacy County
	Williamson County
	Yoakum County
UT	Box Elder County
	Cache County
	Davis County
	Emery County
	Garfield County
	Juab County
	Millard County
	Morgan County
	Piute County
	San Juan County
	Sanpete County
	Sevier County
	Utah County
	Wayne County
	Weber County
VA	Albemarle County
	Amelia County
	Appomattox County
	Augusta County
	Bath County
	Brunswick County
	Buckingham County
	Campbell County
	Caroline County
	Charlotte County
	Clarke County
	Culpeper County
	Cumberland County
	Dinwiddie County
	Fauquier County
	Fluvanna County
	Franklin County
	Frederick County
	Goochland County
	Greene County
	Halifax County
	Hanover County
	King George County
	King William County
	Loudoun County
	Louisa County
	Lunenburg County
	Madison County
	Mecklenburg County
	Nelson County
	Nottoway County
	Orange County
	Page County
	Pittsylvania County
	Powhatan County
	Rappahannock County
	Richmond County
	Rockbridge County
	Rockingham County
	Shenandoah County
	Spotsylvania County
	Stafford County
	Wythe County
VT	Addison County
	Franklin County

STATE	COUNTY
	Grand Isle County
WA	Adams County
	Benton County
	Columbia County
	Douglas County
	Ferry County
	Franklin County
	Garfield County
	Grant County
	Kittitas County
	Klickitat County
	Okanogan County
	Skagit County
	Snohomish County
	Spokane County
	Stevens County
	Walla Walla County
	Whatcom County
	Whitman County
	Yakima County
WI	Adams County
	Ashland County
	Barron County
	Bayfield County
	Brown County
	Buffalo County
	Burnett County
	Calumet County
	Chippewa County
	Clark County
	Columbia County
	Crawford County
	Dane County
	Dodge County
	Door County
	Dunn County
	Eau Claire County
	Fond du Lac County
	Grant County
	Green County
	Green Lake County
	Iowa County
	Jackson County
	Jefferson County
	Juneau County
	Kenosha County
	Kewaunee County
	La Crosse County
	Lafayette County
	Manitowoc County
	Marquette County
	Monroe County
	Oconto County
	Outagamie County
	Ozaukee County
	Pepin County
	Pierce County
	Polk County
	Portage County
	Racine County
	Richland County
	Rock County
	Rusk County
	Saint Croix County
	Sauk County
	Shawano County
	Sheboygan County
	Trempealeau County
	Vernon County
	Walworth County
	Washburn County
	Washington County
	Waupaca County
	Waushara County
	Winnebago County
	Wood County
WV	Berkeley County
	Greenbrier County
	Hardy County
	Jefferson County
	Mason County
	Mineral County
	Preston County
	Tucker County
WY	Big Horn County
	Crook County
	Laramie County
	Lincoln County
	Weston County