Soil Enrichment Protocol Public Comment Meeting

Wednesday April 29, 2020

CLIMATE ACTION RESERVE

Housekeeping

- All attendees are in listen-only mode
- We will be happy to take questions throughout the session
- We will follow up via email to answer any significant questions not addressed during the meeting
- The slides and a recording of the presentation will be posted online

Agenda

I. Introductions
II. Process Overview
III. Protocol Overview
IV. Next Steps

I) INTRODUCTIONS

Introductions

Reserve Staff:

- Craig Ebert, President
- Sami Osman, Senior Policy Manager
  - Protocol development lead
- Heather Raven, Senior Project Coordinator
  - Development process coordinator
- Jon Remucal, Senior Forest Policy Manager
  - Protocol development
- Sarah Wescott, Senior Forest Program Manager
  - Protocol development

Workgroup Members

Name (alphabetical)	Organization
Adam Chambers	USDA Natural Resources Conservation Service
Amrith Gunasekara	California Department of Food & Agriculture
Dan Kammen	UC Berkeley
Dorn Cox	Wolfe's Neck Center for Agriculture & the Environment
Christian Davies	Shell
Jacqueline Gehrig-Fasel	TREES Consulting LLC
Grayson Badgley	Columbia University
Jon Sanderman	Woods Hole Research Center
Justin Allen	Salk Institute of Biological Studies
Karen Haugen-Kozyra	Viresco Solutions
Keith Paustian	Colorado State University

Name (alphabetical)	Organization
Ken Newcombe	C-Quest Capital
Matt Ramlow	World Resources Institute
Max DuBuisson	Indigo Ag
Mitchell Hora	ContinuumAg LLC
Nicholas Goeser	Alliance of Crop, Soil and Environmental Science Societies
Patrick Splichal	SES, Inc.
Robert Parkhurst	Sierra View Consulting
Stephen Wood	The Nature Conservancy
Tom Cannon	Goodson Ranch
Tom Stoddard	NativeEnergy
William Schleizer	Delta Institute

II) PROCESS OVERVIEW

Protocol Development Timeline

CLIMATE ACTION RESERVE

1. *Scoping meeting (January 15, 2020)*
2. *Workgroup process (Jan – Feb 2020)*
   - *Formation (Jan 2020)*
   - *Meeting 1 (Feb 6, 2020)*
   - *Meeting 2 (Mar 6, 2020)*
   - *Meeting 3 (April 3rd 2020)*
   - 30-day public comment period (*Apr 17th – May 18th 2020*)
   - **Public Comment Meeting (April 29th, 2020)**
     - **Public comments due C.O.B. Monday May 18th, 2020**
3. Board adoption *(Jun 10, 2020)*

~ 5 months

III) PROTOCOL OVERVIEW

Protocol overview

CLIMATE ACTION RESERVE

1) Introduction
2) Project Definition
   – Activities, area, aggregation, ownership, leakage
3) Eligibility
   – Start date, crediting period, additionality, permanence, payment stacking
4) GHG Assessment Boundary
5) Quantification
   – Baseline modeling, reversible/non-reversible emission reductions
6) Monitoring
   – Permanence, grazing, project emissions, soil sampling/testing, modeling, parameters
7) Reporting
   – Documentation, reporting periods
8) Verification
   – Monitoring plan, verification activities
9) Glossary
10) References

Appx A) Rationale for Additionality

Appx B) Illustrative List of Practices

Appx C) Assessing Leakage

Appx D) Quantifying Uncertainty

Section 2

PROJECT DEFINITION

Project Definition

- Cropland or grassland, not cleared of native ecosystem within prior 10 years
- Adopt one or more new practices which result in change(s) to:
  - Fertilizer (organic or inorganic) application
  - Water management/irrigation
  - Tillage and/or residue management
  - Crop planting and harvesting (e.g., crop rotations, cover crops, etc.)
  - Fossil fuel usage
  - Application of synthetic inputs other than fertilizer
  - Grazing practices and emissions

Ownership & Aggregation

- Allow for decoupling GHG rights from land rights
  - Assume the grower owns GHG rights *unless* contractually transferred to an aggregator
  - Don’t require grower to produce deed/title to the property
  - Single aggregator would own all GHG rights for any field within the project, meaning **“project” would have a single point of ownership**
- No limit on number of fields or combos of crop/region/practice in an aggregate
- CRTs issued to the aggregated project as a whole, not differentiated by field
- Quantification allows for a sampling approach, accounting for introduced uncertainty

Section 3

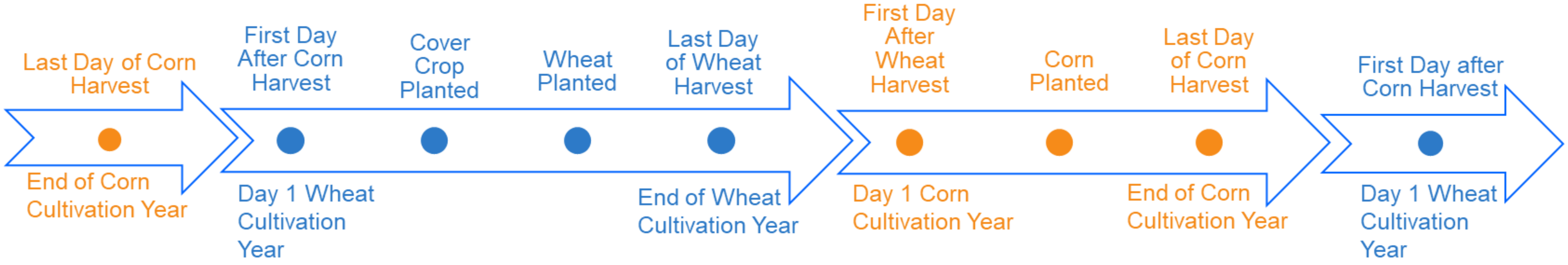
ELIGIBILITY

Additionality

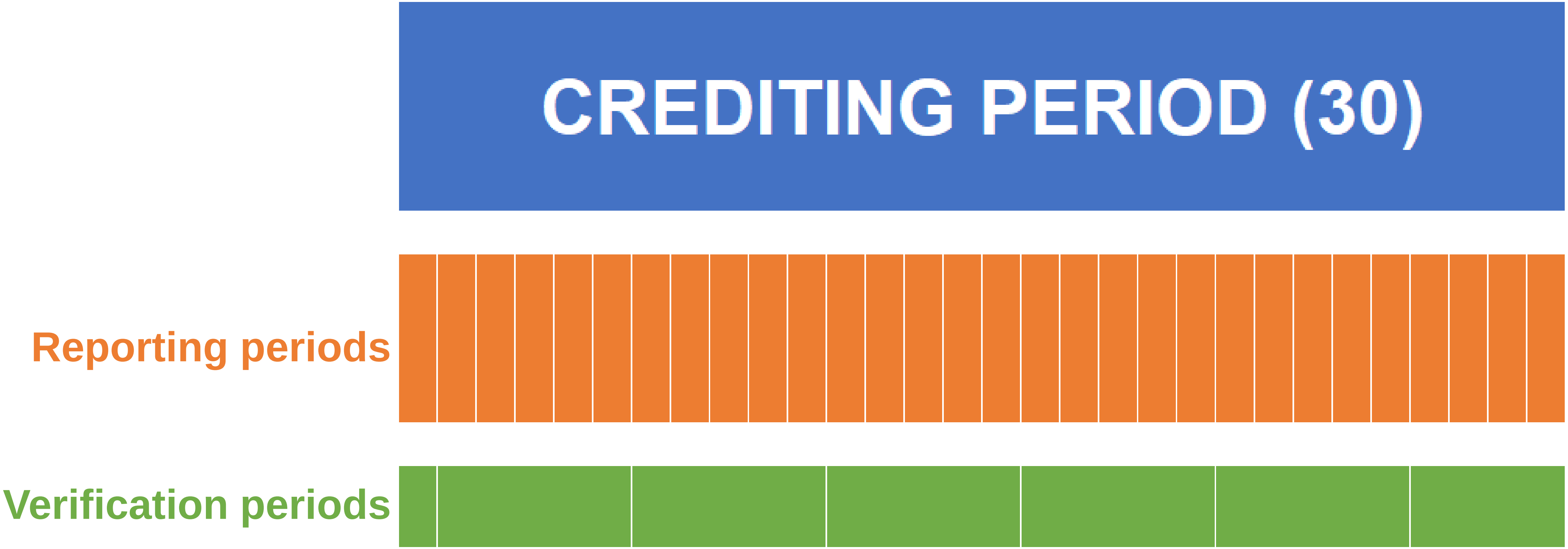
- Practices must not be legally mandated
- Growers must implement at least one ***new*** practice change
  - Existing practices will be considered as the baseline
  - Growers adopt sustainable practices one at a time, so we cannot scale to many growers doing multiple practices if we don't start with growers adopting one new practice
  - Rationale for Performance Standard: *Generally speaking,*
    - Growers are risk averse
    - Growers are not making decisions solely to maximize long-term profits
    - There are cultural, financial, and systemic barriers to adoption sustainable practices
    - While some practices have seen some measure of success in some regions, overall management focused on enriching soils is not common practice
      - Protocols which focus on single practices have not seen much success
    - **This protocol goes further than existing incentives by crediting for quantified performance, rather than simple practice adoption, and requires permanence of the SOC pool**

Start Date & Crediting Period

- **Start date** = initiation of growing season within which the initial practice change occurred
  - Typically the day after the harvest/termination of the previous growing season
  - Defined separately for each field within the project
- **Crediting period** = 30 years (for each field), nonrenewable
- **Cultivation cycle** = all growing seasons within approximately 12 months
- Initial **reporting period** may include multiple cultivation cycles
- **Verification period** may include multiple reporting periods



Time Periods



- Verification at least once every 5 reporting periods

Permanence

- Assess permanence at the **project level**
  - Risk and liability are placed on the aggregator, rather than the grower
- Buffer pool contributions for unavoidable reversals range from 5% to 16.8%
  - Unavoidable reversals = 7.5% contribution or 5% if project geographically dispersed
  - "Risk of financial failure" ($Risk_{FF}$) = between 0 or 9% contribution
  - $Risk_{FF}$ mitigated through use of guarantor or financial protection (e.g., surety bond)
- Avoidable reversals compensated by the project developer
- Legal commitment via Project Implementation Agreement (PIA)
- Tonne-year accounting **option** to only credit atmospheric benefit for the term of the PIA
- If PIA term is <100 years after crediting, and tonne-tonne accounting used, then at end:
  - PIA is extended; or,
  - Reserve approves alternative mechanism to ensure permanence (next slide); or,
  - Reserve declares reversal

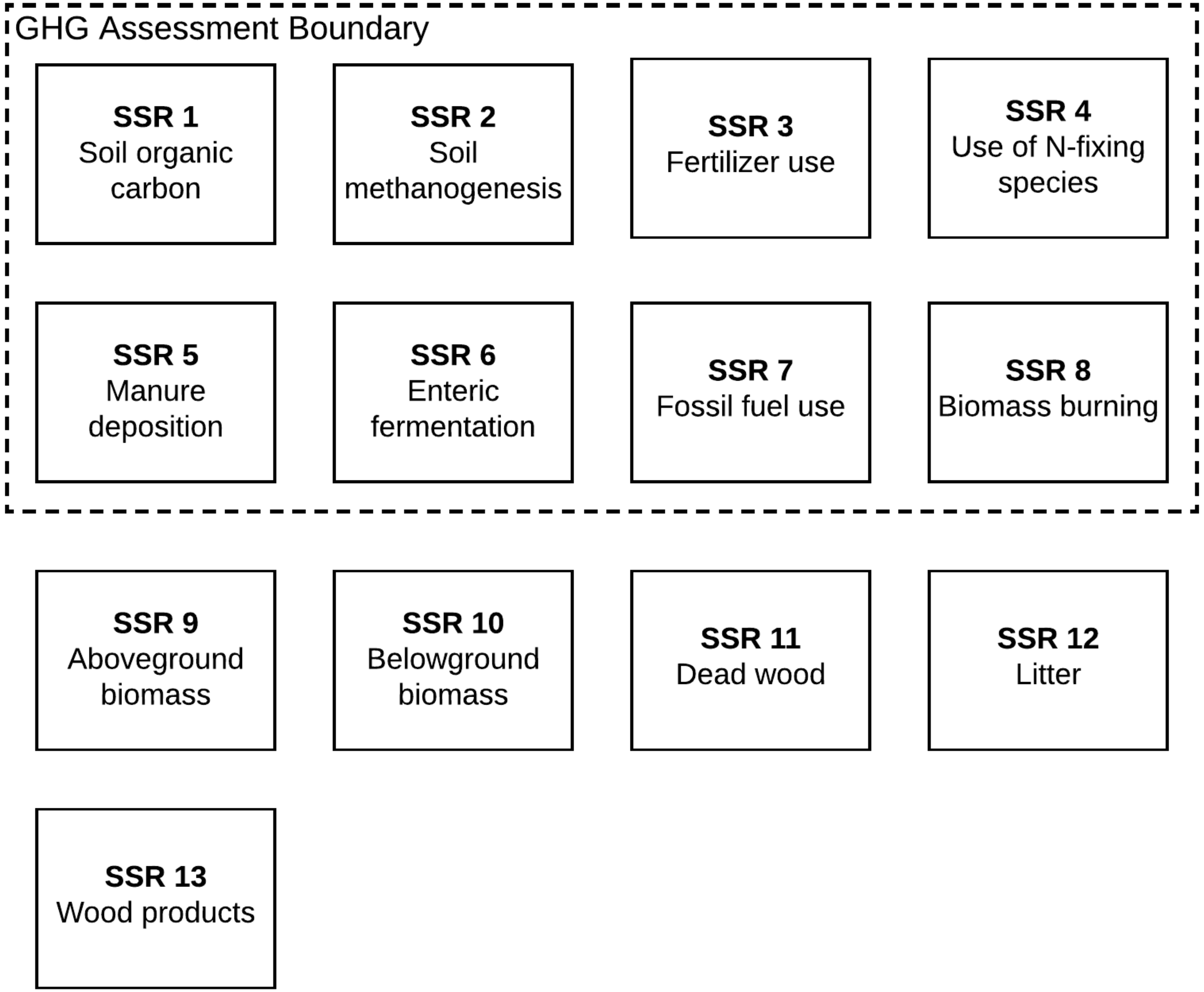
Alternative Mechanisms to Ensure Permanence

- Example 1: Demonstrate that risk of reversal acceptably low for remainder of permanence period
  - Example: Monitor grower practice for 5 years *after* the crediting period and ensure that at least 95% of practices are maintained
- Example 2: Provide method to monitor project area and compensate for reversals
  - Example: Develop system to use remote sensing and trained algorithms to identify specific reversal indicators, and secure financial mechanism to compensate for reversal (e.g., surety bond)
- No specific methods have been approved at this time
- Reserve must review and approve any alternative to legal commitment through the PIA

Section 4

GHG ASSESSMENT BOUNDARY

GHG Assessment Boundary



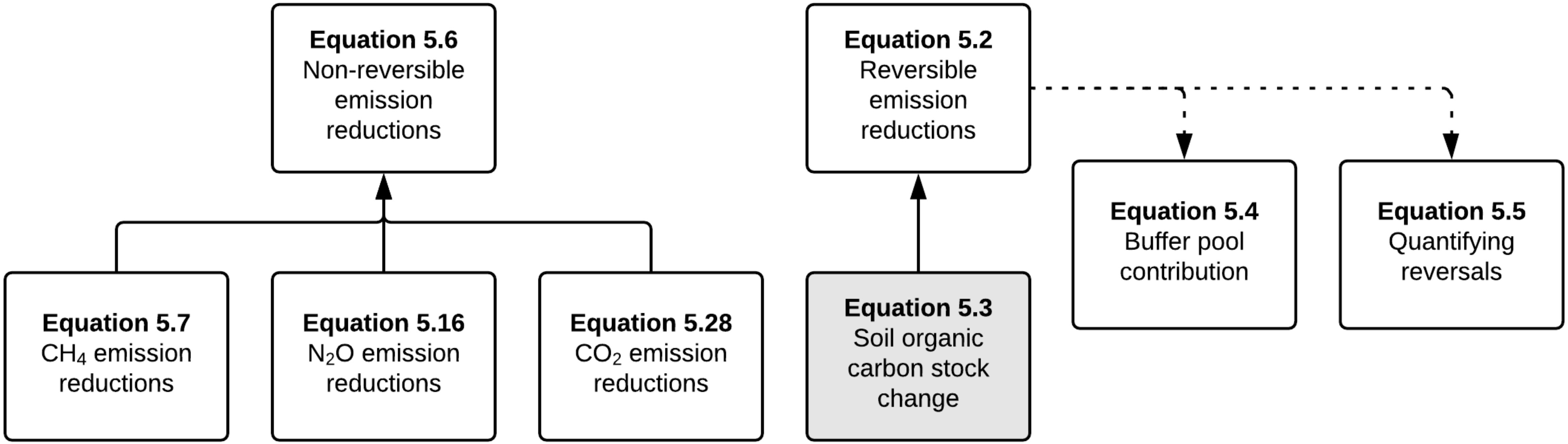
Section 5

QUANTIFICATION

Quantification Overview

- **Hybrid of modeling and direct measurement**
- ***Baseline***
  - Initial SOC is directly measured
  - Historical baseline period used to set the crops and management activities that defines baseline
  - Baseline SOC is modeled for each reporting period – using reporting period weather data
- ***Reporting period***
  - Project SOC may be modeled or directly measured
  - Other project GHG sources may be either modeled or quantified using default equations
  - At least every 5 years must directly measure SOC
- Projects may employ a mix of modeling, measurement, and default equations
- Separate quantification of reversible and non-reversible emission reductions
- Comprehensive quantification of uncertainty, with deduction applied to reversible and non-reversible emission reductions

Quantification Overview



Reversible vs. Non-Reversible Emission Reductions

CLIMATE ACTION RESERVE

- Goal: have these issued separately in the registry
- Reversible emission reductions
  - SOC stock increases
  - Source of buffer pool contribution
- Non-reversible emission reductions
  - Fertilizer use
  - Grazing
  - Use of N-fixing species
  - Biomass burning
  - Fossil fuel combustion
- Uncertainty deduction is applied across both categories

Quantification Approaches

Table 5.2. Acceptable Quantification Approaches by Source and Gas

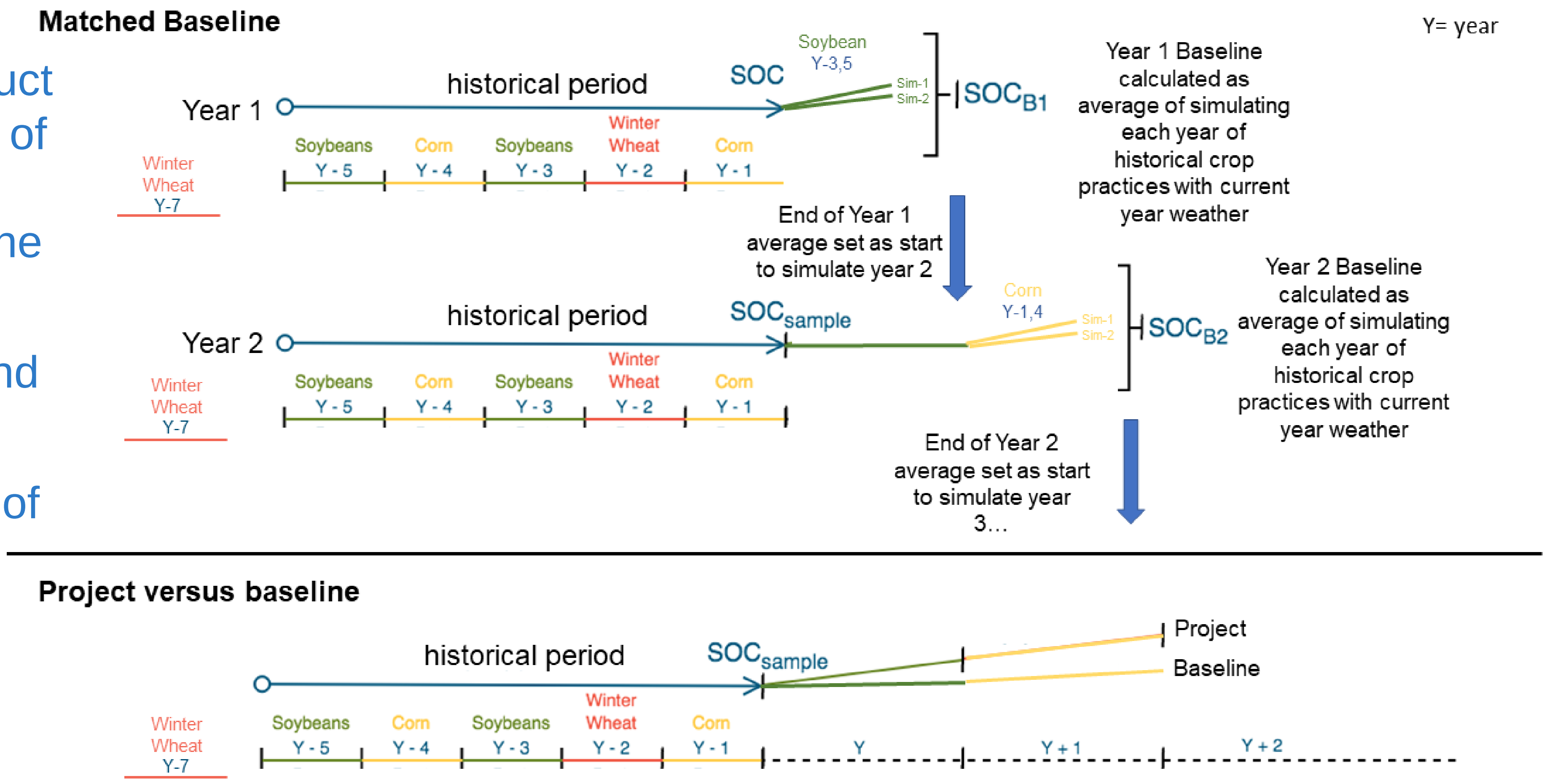
GHG	Source	Modeled (external to protocol equations)	Directly Measured	Calculated
CO_2	Soil organic carbon	X	X	
	Fossil fuel use			X
CH_4	Methanogenesis	X		
	Enteric fermentation	X		X
	Manure deposition	X		X
	Biomass burning			X
N_2O	Nitrification/denitrification	X		X
	Manure deposition	X		X
	Biomass burning			X

Defining the Historical Baseline

- Determine length of historical baseline period
  - Minimum of 3 years prior to start date
  - Include additional years so that the baseline period contains full crop rotations
    - E.g., in a corn-soy rotation, the baseline period should be 6 years, capturing 3 years of each crop
  - Encourage longer baseline periods where possible
- Two options for baseline modeling:
  - **Matched baseline**: where the project scenario crop rotation matches up with the baseline crop rotation, the modeling will be “like-for-like”
    - Must include at least 2 years per crop
  - **Blended baseline**: where the project scenario crop doesn’t match the baseline crop pattern, the baseline is a blend of each year of the historical baseline period
    - Includes the entire historical baseline period

Modeling the Baseline

- Each project year, conduct model run for each year of baseline, using current weather, then average the results
- Applies to SOC, N_2O, and CH_4
- Same approach for use of default equations



Default Equations

- Modeling is needed for SOC stock change and soil methanogenesis
- For other sources/gases, the protocol offers default equations derived from two sources

Reserve Grassland Protocol	IPCC Guidelines
• CH_4 emissions from livestock manure deposition and enteric fermentation	• N_2O emissions from fertilizer, crop residue, and burning • CH_4 emissions from burning

Equations for N_2O Emissions

CLIMATE ACTION RESERVE

- Current default equations for N_2O emissions are from the IPCC Guidelines
- A workgroup member has suggested that the SEP should employ the equations and guidance from the USDA "Blue Book" [1]
  - More detailed, U.S.-specific approach to direct N_2O emissions
    - Base emission rates by crop, LRR, and soil texture, modeled with Daycent and DNDC
    - Scaling factors for practices such as slow release fertilizers, nitrification inhibitors, and no-till management
  - Essentially identical approach to indirect N_2O emissions
- Note that this is only applicable when a project chooses NOT to use a model for these emissions
- **Request for feedback:**
  - If you are familiar with the IPCC and USDA equations for N_2O emissions, would you support the SEP employing the USDA equations rather than the IPCC equations?
  - Alternatively, the Reserve could continue to compare the approaches and consider this as a V1.1 update

[1] USDA Technical Bulletin 1939 (July 2014) "Quantifying Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory"

Uncertainty

CLIMATE ACTION RESERVE

Sample error + **Model structural uncertainty** = ***UNC$_t$***

Error from measuring and modeling only a subset of the project

Estimated from validation data external to the project

If >15% @ 95% confidence, linear deduction applied to all emission reductions

- More robust approach than employed in other soil methodologies
- Uncertainty deduction applied if total uncertainty exceeds 15% at 95% confidence
- Design-based approach, with flexibility in:
  - Choice of sample units (and, relatedly, whether to cluster sampling at the level of fields or farms)
  - How to stratify
- Thorough appendix provided to walk the user through the uncertainty calculations

Section 6

MONITORING

Monitoring

- Monitoring for land use change
  – Use remote sensing or other means to identify land use
- Monitoring for project emissions
  – Direct data collection from grower
  – Allow for machine data and remote sensing where available and reliable
- Monitoring for permanence
  – Assess land use and tillage
  – Allow for remote sensing
- Additional guidance for soil sampling, testing, and modeling

Soil Sampling Guidance

- Stratification required, should consider the following:
  - Practice change(s), soil texture, soil series, precipitation, temperature, climate zone, aridity index, soil wetness index, indicator variable for flooding, slope, aspect
- Minimum sample depth 30 cm
  - If deeper, suggest splitting into depth increments
  - Can sample to deeper depth and retain results to remodel later when the models are capable
- Geographic locations established prior to sampling, with records and geotagged photographs after the fact
- Organic material cleared from soil surface
- If multiple cores composited, they must be from same depth
- Shipped within 5 days of collection, and kept cool until shipping
- Sample error goes into the quantification of uncertainty

Soil Testing Guidance

- Monitoring plan must provide detail on soil testing procedures used
- Soils dried within 48 hours of arrival or kept in refrigeration
- Aggregates broken and sieved to <2 mm, with SOC analysis on this fine fraction
  - Coarse content correction required for bulk density estimates
- May use dry combustion or spectroscopy
  - Loss on ignition and Walkley-Black excluded due to subpar accuracy and precision
- For dry combustion, must account for inorganic carbonates
- Standards and duplicate samples should be run routinely to characterize within-run and between-run precision
- For spectroscopy, accuracy and precision of the device across range of geographies and soil types within the project must be accounted for in the uncertainty deduction.
  - Includes any measurement errors related to calibration transfer between different devices

Modeling Guidance

CLIMATE ACTION RESERVE

Models must be:

- Publicly-available (free or for a fee)
- Peer-reviewed by a recognized, competent organization, or an appropriate peer review group
- Able to support repeating the project model simulations. This includes clear versioning of the model use in the project, stable software support of that version, as well as fully reported sources and values for all parameters used with the project version of the model.
- Incorporate one or more input variables that are monitored *ex post*
- Calibrated and validated according to requirements set forth in an external guidance document (next slide)
- PD must provide sufficient evidence to VB to demonstrate validation was done appropriately – declare what datasets they used – provide model sensitivity analysis

Model Calibration & Validation Guidance Document

- Provided as external guidance document to allow for updates over time
- Four steps proposed:
  1) Declare practice categories
  2) Define the project domain
     a. Unique crop type bins
     b. Soil textural classes
     c. Climate zones
  3) Gather validation data that meet minimum requirements
     a. Peer-reviewed and published datasets using control plots that test practice effect
     b. Measurements that cover practice effect, soil textural class & clay content, crop type, and LRR
     c. Options for single-site validation and whole-project validation
  4) Use model performance criteria to demonstrate lack of bias or conservative bias for each practice
     - Calculation of bias ≤ 0
     - Alternatively can publish model validation, so long as project domain requirements are met and made explicit
- Peer-review publication is acceptable for validation if the same model version and parameters are used, and the publication demonstrates overlap with the project domain

Section 7

REPORTING

Reporting Periods

- Each field will have a defined cultivation year
  - More or less than 12 months, with start/end dates that align with agronomic cycles in order to most accurately capture full growing seasons
  - May include multiple growing seasons in single cultivation cycle
- Initial reporting period may include multiple cultivation cycles
- Verification period may include multiple reporting periods (up to 5)

Section 8

VERIFICATION

Verification

- Risk-based sampling approach
  - No need to visit thousands of fields or review 100% of data/evidence
- Site visits selected using combination of risk-based assessment / random sampling
  - Minimum of ½ square root of all fields receive site-visit – selected first using risk-based assessment
  - Allow the use of proxies for site visits or to otherwise supplement verification activities
    - Existing government programs that involve third-party reviews
    - Leverage expertise of trusted 3rd parties (e.g., university extension, NRCS)
      - Consider COI review for such 3rd parties
    - Remote sensing
    - Existing data capture systems/tools

Fields	Site Visits *(minimum)*
1	1
10	2
100	5
1,000	16
10,000	50

- External guidance document with model verification guidance
  - Example: BGC model results and input files packaged with a digital signature to verify they have not been tampered with since the model run can preclude need for verifier to rerun the model

Verification Activities

- Key verification activities
  - Confirmation of eligibility
  - Assessment of soil sampling and testing practices (for years when relevant)
  - Assessment of use of biogeochemical models (where relevant)
  - Assessment of use of default factor-based equations (where relevant)
- Desk review
  - Recalculation of subset of project data
  - Data from square root of all fields subjected to review
    - Site visit fields not eligible for selection during the same reporting period

IV) NEXT STEPS

Remaining Development Process & Timeline

Milestone	Date
Public comment period	April 17 – May 18
Public comments due	**COB May 18**
Protocol presented to Reserve Board for approval	*Expected June 10*

Next Steps

- **Stakeholders:**
  - **Email written comments, organized by protocol section**
  - Send to policy@climateactionreserve.org by **COB Monday May 18th**
  - Reach out if you'd like to set up 1:1 chat with staff
  - Note: Workgroup members may also submit comments during the public comment period
- **For Reserve staff:**
  - Respond to public comments
  - Update protocol as needed

Key Contacts

- General questions or assistance:
  - Policy@climateactionreserve.org

- Protocol development lead:
  - Sami Osman, Senior Policy Manager
  - sosman@climateactionreserve.org