



ENVIRONMENTAL SERVICES, INC.

Verified Carbon Standard New Methodology Element - First Validation Report

Adoption of Sustainable Grassland Management Through Adjustment of Fire and Grazing, V3.4, Dated 28 May 2015

1 June 2015

Methodology Developed by:
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Co-sponsored by:
Jadora International, LLC

Validation Conducted by:
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Project Number FV10015.00



ANSI ACCREDITED PROGRAM
GREENHOUSE GAS
VALIDATION AND VERIFICATION
0800



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VALIDATION STATEMENT

This validation statement confirms that Environmental Services, Inc. (VCSA Scope 14 - Approved Validator) has evaluated the methodology element documentation by the Syracuse University/ Soils for the Future, LLC. / Jadora International, LLC. team (Methodology Developer) entitled *Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015* according to the criteria outlined by the Verified Carbon Standard and confirms that this validation statement is consistent with ISO 14064-3:2006 and ISO 14065:2007.

Environmental Services, Inc. confirms all validation activities including objectives, scope and criteria, level of assurance and the methodology adherence to the VCS 2007.1 as documented in the validation report entitled *Verified Carbon Standard New Methodology Element - First Validation Report ~ Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, Version 2.2, dated 28 May 2015*, are complete and concludes without any qualifications or limiting conditions that the methodology element documentation meets the requirements of VCS 2007.1 and the VCS Program Normative Document: Double Approval Process (version 1.1).

Attestation:

Shawn McMahon

Lead Validator (Print Name):

Janice McMahon

Vice President and Forestry, Carbon, and GHG Services Division Director (Print Name):

Signature:

Signature:

Date: 1 June 2015

Date: 1 June 2015

Submitted to:

VCSA Board
Syracuse University/ Soils for the Future/
Jadora International



EXECUTIVE SUMMARY

Environmental Services, Inc. (ESI) was contracted by the methodology developers to perform the first validation of the methodology element entitled *Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015* – prepared by Syracuse University and Soils for the Future, LLC, hereafter referred to as SU/SFTF, in accordance to the VCS 2007.1 and the VCS Program Normative Document: Double Approval Process. Our validation process closely follows the VCS Voluntary Program Normative Document: Double Approval Process (Version 1.1, 21 January 2010), Guidance for Agriculture, Forestry and Other Land Use Projects (18 November 2010), VCS Program Guidelines (18 November 2008), VCS 2007.1, ISO14064-3:2006, and ISO 14065:2007.

Specifically the first validation (assessment) included the review of the requirements outlined in the VCS 2007.1, Section 5 and 6 (Project Level Requirements and Methodologies). The assessment included the following items: eligibility criteria, baseline approach, additionality, project boundary, emissions, leakage, quantification of GHG reductions/removals, monitoring, data and parameters, and adherence to the project-level principals (relevance, completeness, consistency, accuracy, transparency, conservativeness). ESI's assessment also included a detailed analysis of the methodology, literature reviews, technical reviews, and SU/SFTF's responses to all corrective action requests (CAR) and clarifications (CL).

The ESI validation team identified 51 CAR's/ CL's. All were addressed satisfactorily by SU/SFTF during the first validation process. Appendix A details each CAR/CL and the resolution; the most significant CAR's and CL's included revisions to potentially misleading language, revisions to how leakage is addressed, and the addition of specific language and tools necessary to satisfy VCS specific requirements.

ESI confirms all validation activities including objectives, scope and criteria, level of assurance and the methodology adherence to the VCS 2007.1 as documented in this report are complete and concludes without any qualifications or limiting conditions that the methodology element documentation (*Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015*) meets the requirements of VCS 2007.1 and the VCS Program Normative Document: Double Approval Process (version 1.1).

ESI recommends that VCSA approves the methodology element (*Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015*).



INTRODUCTION

This report is prepared in accordance with the outlined requirements of the Verified Carbon Standard (VCS 2007.1). Environmental Services, Inc. (ESI) presents our first validation findings of the new methodology element – *Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015* – prepared by SU/SFTF. The first validation was conducted as part of the VCSA Double Approval Process (version 1.1, January 21, 2010). ESI is accredited by the American National Standards Institute under ISO14065:2007 for greenhouse gas validation and verification bodies including ISO 14064-3:2006, ISO 14065:2007, and validation/validation of assertions at the project level for Land Use and Forestry (Group 3) and is approved to validate/verify for VCSA under Scope 14.

Contact Information Including Roles and Responsibilities

<p>Methodology Developer:</p> <p>Syracuse University, Soils for the Future, LLC. and Jadora International</p>	<p>Dr. Mark E. Ritchie – SU/SFTF (315-447-1612 / meritchi@sy.edu)</p> <p>Donald Tuttle – Jadora International, LLC. (don@jadorallc.com)</p> <p>Ethan Fried – Jadora International, LLC. (ethan@jadorallc.com)</p>
<p>Accredited Validation Entity:</p> <p>Environmental Services, Inc.</p>	<p>Shawn McMahon – Lead Validator (330-833-9941 / smcmahon@esinc.cc)</p> <p>Rich Scharf – Validation Team Member (252-402-7354 / rscharf@esinc.cc)</p> <p>John Kimble – Technical Expert (AFOLU Expert-ALM) and Validation Team Member (402-489-1319 / soilcarbon@aol.com)</p> <p>Janice McMahon – QA/QC (330-833-9941 / jmcmahon@esinc.cc)</p>

General Description

ESI was contracted by SU/SFTF to conduct the first validation of the proposed methodology element entitled *Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015* developed by SU/SFTF. The methodology element fits within the Agriculture, Forestry, and other Land Use (AFOLU) Scope (i.e. Scope 14).

VALIDATION DETAILS

Validation Objective

The first validation objective included an assessment of the likelihood that implementation of the methodology element would result in the accurate calculations and appropriate



eligibility criteria of the GHG emission removal methodology as stated by the methodology developer (ISO 14064-3:2006).

Validation Scope

The scope of the methodology element first validation was to “evaluate whether or not the methodology was prepared in line with VCS Program requirements, including Section 5 and Section 6 of the VCS 2007.1.” Our assessment included a detailed review of: eligibility criteria, baseline approach, additionality, project boundary, emissions, leakage, monitoring, data and parameters, and adherence to the project level principles of the VCS program (relevance, completeness, consistency, accuracy, transparency, and conservativeness).

Validation Criteria

The following criteria were used to validate the methodology element:

- *Voluntary Program Normative Document: Double Approval Process (Version 1.1, 21 January 2010).*
- *Voluntary Carbon Standard Program Guidelines (18 Nov 2008)*
- *Voluntary Carbon Standard 2007.1(18 Nov 2008)*
- *Guidance for Agriculture, Forestry and Other Land Use Projects (18 Nov 2008)*
- *Tool for AFOLU Methodological Issues (18 Nov 2008)*
- *Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination (18 Nov 2008)*

Validation Level of Assurance

The level of assurance was used to determine the depth of detail that the validation team placed in the validation plan to determine if there were any errors, omissions, or misrepresentations (ISO 14064-3:2006). For this methodology element first validation, ESI assessed the methodology (proposed data, sampling descriptions, documentation, calculations, etc.) to provide *reasonable assurance* to meet the Project Level and Methodology requirements of the VCS Program (VCS 2007.1, Section 5 and Section 6).

Validation Materiality Threshold

Materiality is a concept that errors, omissions and misrepresentations could affect the GHG reduction assertion and influence the intended users (ISO 14064-3:2006). The materiality of a methodology element was based on an evaluation of whether or not the methodology element followed the VCS Program requirements. If the methodology did not adhere to the VCS program requirements, the methodology developer was given the opportunity to correct the non-conformity and amend the methodology.

Handling of records

ESI shall keep all documents and records in a secure retrievable manner for at least two years after the Double Approval Process has been completed; however, records can be destroyed at any time, pending agreement between the client, ESI, and VCS. ESI shall maintain and manage records of its methodology element first validation activities including:



- Application information and validation scopes
- Justification for how validation time was determined
- Confirmation of the completion of validation, including findings and information on material or non-material discrepancies
- Validation statements
- Records of complaints and appeals, and any subsequent correction or corrective actions

ESI maintains all methodology element first validation records securely and confidentially, including during their transport, transmission or transfer. ESI shall retain validation records in accordance with any legal, contractual, and/or VCS requirements, per ISO 14065:2007, Sec. 7.5.

VALIDATION PROCESS

Our validation process closely followed the VCS Voluntary Program Normative Document: Double Approval Process (Version 1.1, 21 January 2010), Guidance for Agriculture, Forestry and Other Land Use Projects (18 November 2010), Voluntary Carbon Standard Program Guidelines (18 November 2008), Voluntary Carbon Standard 2007.1, ISO14064-3:2006, ISO 14065:2007, and ESI's internal Management System and Management System Manual, Section V.2 (VCS) 3.0. As defined by ISO 14064-3:2006 (E), "validation is the systematic, independent and documented process for the evaluation of a greenhouse gas assertion in a GHG project plan against agreed validation criteria". In the case of a new methodology validation, the validation is the systematic, independent documented process for the evaluation of methodology element documentation against the VCS Program criteria.

Specifically the first validation (assessment) included the review of the requirements outlined in the VCS 2007.1, Section 5 and 6 (Project Level Requirements and Methodologies). The assessment included the following items: eligibility criteria, baseline approach, additionality, project boundary, emissions, leakage, quantification of GHG reductions/removals, monitoring, data and parameters, and adherence to the project-level principals (relevance, completeness, consistency, accuracy, transparency, conservativeness).

ESI's validation approach/process was generally broken down into three parts: ESI review and assessment; utilization of independent technical experts; and review of methodology developer's explanations/ clarifications and insight. ESI's assessment included a detailed analysis of the methodology, literature reviews, technical reviews, and SU/SFTF's responses to all corrective action requests and clarifications. Documents received/reviewed, meetings/interviews, and validation milestones are described below.

Documents Received/Reviewed

During the first validation, ESI received and reviewed the following documents provided by SU/SFTF:

- soil methodology word version.doc (10/7/10 via email)
- soil methodology word version.pdf (10/7/10 via email)
- soil methodology word version (1/4/2011 via email)



- soil methodology word version 2.docx (2-12-11 via email)
- Conant et al 2001 Ecol Appl grassland mngmnt carbon.pdf (2-12-11 via email)
- Ellis et al 2010 Glob Ecol Biogeog global biome fractions.pdf (2-12-11 via email)
- Response to Review Questions.docx (2-12-11 via email)
- soil methodology word version 2 track changes.docx (2-12-11 via email)
- Methodology_Valid_Checklist 2 MER_comments.xls (4-4-11 via email)
- soil methodology word version 2.doc (4-4-11 via email)
- soil methodology word version 2 (2).doc (5-2-11 via email)
- soil methodology word version 2.1 May 4 2011.doc (5-4-11 via email)
- VCS AFOLUResponse to SunOne comments.doc (5-9-11 via email)
- VCS AFOLUResponse to SunOne comments MER revision May 10 2011.doc (5-10-11 via email)
- VCS grassland soil methodology v 2 2 May 13 2011.pdf (5-12-11 via email)
- VCS ALM SGM Meth v3 24 FEB 2015.docx (3-3-15 via email)
- 2nd-Ass-Report_SGM_v2 +VCS.pdf (4-20-15 via email)
- VCS ALM SGM Meth v3 27 APR 2015 MER revised.docx (5-4-15 via email)
- VCS ALM SGM Meth v3 27 APR MER track changes.docx (5-4-15 via email)
- ESI SFF response to CARs May19 2015.docx (5-20-15 via email)
- VCS ALM SGM Meth v3 19 May 2015 MER revised.docx (5-20-15 via email)
- VCS ALM SGM Meth v3 21 May 2015 MER revised TC.docx (5-21-15 via email)
- VCS ALM SGM Meth v3 27 May 2015 MER revised clean.docx (5-28-15 via email)

Meetings/Interviews

During the course of the first validation, ESI and SU/SFTF held three meetings via conference call. All other correspondence occurred via email. The details of the meetings are briefly described in the table below:

Date	Attendees	Topics Discussed
1/11/2011	Shawn McMahon – ESI Janice McMahon – ESI Mark Ritchie – SU/SFTF Don Tuttle – Jadora International, LLC.	Opening Meeting – Validation Plan, validation process, timelines, etc.
1/14/2011	Shawn McMahon – ESI Mark Ritchie – SU/SFTF Richard Scharf – ESI John Kimble – Technical Expert Don Tuttle – Jadora International, LLC.	Meeting held between SU/SFTF and ESI Team to discuss methodology
5/16/2011	Shawn McMahon – ESI Mark Ritchie – SU/SFTF	Closing meeting – next steps, feedback on process



Validation Milestones

The following table documents the main validation activities that occurred during the first validation process:

Project/Validation Activity	Date
ESI Internal Conflict of Interest (COI) process completed and approved (no issues). SU/SFTF notification.	9/3/2010
Full contract execution and undated documentation received from SU/SFTF Submission of Validation Plan to SU/SFTF for approval after contract fully executed	1/7/2011
Signed Validation Plan received from SU/SFTF	1/7/2011
Opening Meeting with SU/SFTF	1/11/2011
Meeting held between SU/SFTF and ESI Team to discuss methodology	1/14/2011
ESI submits first round of findings (questions, comments, corrective actions, etc.)	1/24/2011
SU/SFTF submits first round responses back to ESI	2/12/2011
ESI submits second round of findings	2/28/2011
SU/SFTF submits final responses (round 2) back to ESI	4/4/2011
SU/SFTF submits responses to public comments to ESI	5/9/2011
SU/SFTF submits revised responses to public comments to ESI	5/10/2011
Draft validation report submitted to SU/SFTF for review	5/12/2011
Closing Meeting with SU/SFTF	5/16/2011
ESI's Final report submitted to VCSA/ SU/SFTF	6/1/2011
ESI's receives notification from VCSA to proceed with reconciliation	4/20/2015
ESI coordinates with SFTF to address leakage and uncertainty questions	4/21/2015 – 5/28/2015
ESI submits final report to VCSA/SFTF	6/1/15

VALIDATION FINDINGS

Summary

The ESI validation team identified 51 corrective action requests (CAR) and clarifications (CL). All were addressed satisfactorily by SU/SFTF during the first validation process. Appendix A details each CAR/CL and the resolution; the most significant CAR's and CL's included revisions to potentially misleading language, and the addition of specific language and tools necessary to satisfy VCS specific requirements.

VCS 2007.1 Criteria

The following criteria were used to validate the methodology element:



- *Voluntary Program Normative Document: Double Approval Process (Version 1.1, 21 January 2010).*
- *Voluntary Carbon Standard Program Guidelines (18 Nov 2008)*
- *Voluntary Carbon Standard 2007.1(18 Nov 2008)*
- *Guidance for Agriculture, Forestry and Other Land Use Projects (18 Nov 2008)*
- *Tool for AFOLU Methodological Issues (18 Nov 2008)*
- *Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination (18 Nov 2008)*

Eligibility Criteria

The VCS 2007.1 (Section 6 Methodology) requires that VCS Program methodologies satisfy the following criteria. The validated methodology satisfies these criteria (see below), clearly defines the applicability conditions for its use, and effectively applies the additional AFOLU requirements found in the current version of the “Tool for AFOLU Methodological Issues”, as required under Section 3.4 of the VCS 2007.1.

Baseline Approach

The methodology identifies procedures and assumptions for how to determine the most conservative baseline scenario. The methodology includes methods to assess the baseline for methane and N₂O due to plant consumption by grazing animals, methane due to biomass burning, direct N₂O emissions due to N-fixing plants, emissions due to reductions in SOC stocks, and removals due to changes in woody perennials.

Additionality

The methodology requires that additionality be demonstrated through application of the VT0001 AFOLU Additionality Tool.

Project Boundary

The methodology identifies procedures that address the establishment of spatial and temporal project boundaries, including the selection of mandatory carbon pools, i.e. the sources, sinks, and reservoirs relevant to the baseline scenario.

Emissions

The methodology adequately addresses the emissions criteria as described in the baseline approach and estimation of GHG reductions/removals sections.

Leakage

The methodology limits the displacement of livestock outside the project area through applicability criteria. The remaining primary potential source of leakage is a shift in wood harvesting for cooking and heating from inside to outside the project area, which is addressed through monitoring of a reference area. Leakage attributable to market effects is not applicable with this AFOLU ALM project methodology; accordingly the methodology appropriately does not account for market leakage.



Quantification of GHG Reductions/Removals

The methodology identifies appropriate procedures for estimating net emission reductions/removals in avoided baseline emissions, project emissions, and confidence deductions for each monitoring period.

Monitoring

The methodology clearly specifies the data and parameters to be monitored, and monitoring procedures and frequency.

Data and Parameters

The methodology provides a complete list of data and parameters required, along with the variables necessary for all equations.

Project-Level Principals

The project level principles of the VCS 2007.1 (relevance, completeness, consistency, accuracy, transparency, conservativeness) were followed during the development of the methodology and are adequately addressed within the methodology.

Global Stakeholder Consultation

The VCSA Global Stakeholder Consultation period for the methodology was conducted between 6 July 2010 – 4 August 2010. One set of public comments were received from SunOne Solutions. SU/SFTF provided adequate and sufficient responses addressing each comment (Appendix B).



VALIDATION RESULTS / CONCLUSION

ESI confirms all validation activities including objectives, scope and criteria, level of assurance and the methodology adherence to the VCS 2007.1 as documented in this report are complete and concludes without any qualifications or limiting conditions that the methodology element documentation (*Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015*) meets the requirements of VCS 2007.1 and the VCS Program Normative Document: Double Approval Process (version 1.1).

Therefore, ESI recommends that VCSA approves the methodology element (*Adoption of Sustainable Grassland Management through Adjustment of Fire and Grazing, V3.4, dated 28 May 2015*) prepared by SU/SFTF.

REPORT RECONCILIATION


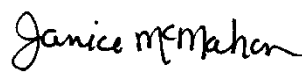
Once the second assessment of the methodology was completed, ESI undertook review of the methodology to determine if changes made during the second assessment resulted in additional questions from the first assessor. It was determined that the approach to address uncertainty lacked clarity. For example the methodology did not include units in the variable definitions, ULE_t was not included in estimates of Total Project Uncertainty, it was unclear how uncertainty was estimated using the “measured approach”, and the proportion of the project area in stratum m was described in words but never shown in equation form. Corrections were made by the methodology developer and all uncertainty issues were adequately addressed in the final version of the methodology.

Additionally the leakage assessment approach lacked sufficient detail to enable users to implement. To address this, the methodology developer has now included the VCS module VMD0033 “Estimation of emissions from market leakage.” within the methodology.

All issues raised within the reconciliation process have now been sufficiently addressed and closed.

Report Submitted to:	Dr. Mark E. Ritchie Department of Biology Syracuse University 107 College Place Syracuse NY 13244 Voluntary Carbon Standard Association 1730 Rhode Island Ave. NW Suite 803 Washington, D.C. 20036
Report Submitted by:	Environmental Services Inc. Corporate Office 7220 Financial Way, Suite 100



	Jacksonville, Florida 32257
ESI Lead Validator Name and Signature	 Shawn McMahon Lead Validator
ESI Division Director Name and Signature	 Janice McMahon Vice President and Forestry, Carbon and GHG Division Director
Date:	1 June 2015

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APPENDIX A
Corrective Action Requests, Clarifications



Environmental Services, Inc.
 Corrective Action Requests and Clarifications
 SU Soil For The Future Methodology
 5/3/2011

Question Type	Question No.	Page No.	Line No.	ESI Round 1 Comment /Question/Clarification	SU Response	ESI Round 2 Comment /Question/Clarification	SU Response	ESI Round 3 Comment /Question/Clarification	SU Response	Addressed
Technical Questions										
CAR	1	4	13-15	While the management practices described may be the only options available for land managers in some areas, is there evidence available to show it is the case for 14% of the land surface? Can the lands for which this methodology is proposed be more precisely defined here? Can the frequency of burning and terms like "high fire frequency" be defined?	Question 1. Document changed to read: In unfertilized and uncultivated grasslands, which encompass more than 10% of the earth's terrestrial land surface1, including a variety of soil types and annual precipitation from 200 to as high as 1600 mm/yr, the management of fire and grazing constitute major options that effect sequestration of greenhouse gases. In section 1.3 Explanation/Justification i) is changed to: i) current management practices, such as fires that occur annually or 1 every 2 years, or intense grazing that has resulted in permanent vegetation species changes to unpalatable species, exposed more than 50% bare ground, or that annually consumes more than 75% of production, that result in a loss of SOC will continue in the absence of the project.	What is the purpose of the rainfall cutoff at 1600mm/year? Are there any further environmental conditions the methodology is targeting, but that are not explicitly stated here?	This section on v2 page 4 has been changed to read: Unfertilized and uncultivated grasslands, savannas (grass-tree mixtures), shrublands or other rangelands, are defined as lands with no potential to produce "forests," defined by the UNFCCC27 as continuous lands > 0.1 ha with > 30% canopy cover and mean woody plant height > 5 m, but capable of supporting at least 30% ground cover of herbaceous plants more than 30% grasses by biomass are hereby referred to as "grasslands." Grasslands occur on a variety of soil types with annual precipitation greater than 200 mm/yr. Such grasslands encompass more than 10% of the earth's terrestrial land surface1 and may have the potential to sequester greenhouse gases in soil carbon and in the tissues of woody plants.	None	None	Yes
CAR	2	4	20-22	Can reference to specific passages in AFOLU - ALM methodology SALM that state no change in numbers of grazing animals are allowed, be provided?	Question 2: We have provided the reference for: The proposed Voluntary Carbon Standard (VCS) AFOLU - ALM methodology SALM (Sustainable Agricultural Land Management)2, the only other publically available soil carbon methodology, does not consider the effects of fire on soil organic carbon and does not allow changes in the numbers of grazing animals, either livestock or wildlife (as per section 1.3. Applicability Conditions, line f)	Why emphasize that this is the only method looking at fire, when fire is only mentioned when using the models? The SALM methodology uses the same models, for example.	The sentence relating the SGMAFG to the SALM has been eliminated	None	None	Yes
CAR	3	5	1-11	How is past cultivation history of the land taken into account? Is this standard directed at semi-arid conditions, or is it applicable across climate regions?	Question 3: Section 1.3.a is changed to: Land is uncultivated, unfertilized (no net import in dung or fertilizer) grassland at the start of the project and has been uncultivated for at least 3 years. Conversion from cropland to grassland for less than 3 years would likely be covered under Voluntary Carbon Standard (VCS) AFOLU - ALM methodology SALM (Sustainable Agricultural Land Management)2	Which climatic zones are covered? (Past cultivation question answered satisfactorily.)	This section now reads: Land is uncultivated, unfertilized (no net import in dung or fertilizer) grassland, i.e., conservatively following UNFCC definitions27 : continuous areas greater than 0.1 ha with less than 30% canopy cover and mean woody plant height less than 5 m, but capable of supporting at least 30% ground cover of herbaceous plants composed of at least 30% grasses by biomass, with mean annual precipitation > 200 mm/yr at the start of the project and has been uncultivated for at least 3 years. These conditions include a broad range of climatic, soil, and fire propensity conditions under which grasslands can occur, but do not include true deserts.	None	None	Yes
CAR	4	5	18-20	Since evidence suggests the removal of some woody plants in favor of grasses increases SOC, why is removal of biomass limited?	Question 4: Section 1.3.d. is changed to: Existing woody perennials are not removed during the first two years of project implementation and no net decrease in terrestrial carbon stocks in wood or soil organic matter from loss of woody perennials occurs during the project from either human removal, fire or animal-caused herbivory or mortality;	Why is there a limit on woody vegetation removal, when one of the best ways to increase soil C stocks is to remove woody invaders from grasslands?	I have eliminated no change in woody biomass from the applicability conditions. Woody plant carbon stocks were already part of the calculations of baseline, project and ex ante emissions calculations.	None	None	Yes
CAR	5	5	19	How can a project manager or proponent control the number of grazers that herdsmen outside the project boundaries introduce on their lands?	Question 5: Section 1.3.e. is changed to: There will be no net displacement of livestock from areas inside that of the project to areas outside that of the project and the project proponents must be able to prevent incursion of livestock from outside the project area through fencing, patrolling by game scouts, or other such enforcement of project boundaries	Given that the VCS defines leakage as "...any increase in greenhouse gas emissions that occurs outside a project's boundary, but is measurable and attributable to the project's activities," how does this methodology account for potential leakage from diverse sources, including displaced subsistence firewood gathering activities?	I have an expanded section on leakage in Section III.1.1 on p. 17 that includes fuel wood harvesting displacement and the issue of market leakage.	None	None	Yes

Question Type	Question No.	Page No.	Line No.	ESI Round 1 Comment /Question/Clarification	SU Response	ESI Round 2 Comment /Question/Clarification	SU Response	ESI Round 3 Comment /Question/Clarification	SU Response	Addressed
CAR	6	5-6	24-27, 17-20	How can the emissions for activities described here be considered leakage, given the VCS definition, ...any increase in greenhouse gas emissions that occurs outside a project's boundary, but is measurable and attributable to the project's activities? These appear to be new sources of GHGs generated by project activities.	Question 6: Section I.3.g. is changed to: Anticipated in the use of fossil fuels for grazing or fire management (i.e., use of vehicles to herd livestock or control fire) or for ecotourism (vehicles, lodges, camps, etc.) are considered new emission sources, and will be monitored during the project and either deducted from calculated offsets or offset by other activities within the project.	None		None	None	Yes
CAR	7	6	2-5	How can the assumption that there is no displacement of livestock be made, when it is out of the control of the project manager/proponent? How will this be quantified?	Question 7: Lines 17-24 now read: Management practices are assumed to not involve the displacement of livestock from inside the project boundary to outside the project boundary that might lead to higher GHG losses due to higher methane emissions or vegetation and soil degradation due to overgrazing. This will be measured by establishing long-term baseline counts of grazing animals both on and adjacent to the project area and monitoring subsequent changes in livestock numbers through ground and aerial censuses. It is assumed that project proponents have control over the management of grazing animals through land ownership or legal grazing rights (in addition to rights to carbon offsets) as enforced by fences, or in communal grazing areas in developing countries, human patrols.	How does this methodology address the displacement of general grazing activity in the country or region, that does not involve the specific animals owned/controlled by the project developer?	Per the response to question 5, in a new section III.1.1 (p. 17), I expand the discussion of leakage and address the possibility of market leakage that would result from individuals outside the project deciding to raise more livestock to compensate for the lack of supply of livestock from project areas. I point out that market leakage is assumed to be negligible for VCS ALM projects.	None	None	Yes
CAR	8	6	12	For consistency, can the authors use a single term, either 'manure' or 'dung,' in the document, rather than use them interchangeably?	Question 8: All uses of "manure" are changed to "dung."	None	None	None	None	Yes
OPI	9	7	unnumbered	Can the assorted formatting of table 2 be adjusted so that the explanation/justification column is better aligned with the preceding columns?	Question 9: We have inserted a revised Table 2.	None	None	None	None	Yes
CAR	10	7	14	See question for page 6, line 12.	Question 10: see response to Question 8	None	None	None	None	Yes
OPI	11	8	2-4	For ease of use and clarity, can suggestions for acceptable models be made here?	Question 11: suggested CENTURY and RothC models here.	None	None	None	None	Yes
CAR	12	8	6-7	What is the definition of <i>transient soil carbon</i> ?	Question 12: Item I.5.2.6 now reads: Conservatively, use the baseline and project equilibrium soil organic carbon densities in the project to calculate the transitional soil organic carbon for the project year, assuming a linear change in soil organic carbon;	None	None	None	None	Yes
CAR	13	9	7-9	Can a more precise definition of <i>reasonable stock transport distance</i> be supplied?	Question 13: Section II.1.3 now reads: aggregated within a region of reasonable maximum livestock transport distance, such as a single U.S. state or within the country of the project, or, in large countries where mechanized transport is not available or beyond the means of landholders, within a 200 km radius circle.	None	None	None	None	Yes
CAR	14	9	16	What are the definitions of discrete area and unique geographical identification?	Question 14: Changed "discrete" to "continuous." Changed "geographical identification" to "name"	None	None	None	None	Yes
CAR	15	9	30-35	Passage is unclear.	Question 15 and 16: The text has been changed substantially (see new p. 10). We left in the repeated reference to the AR Tool because it is used for both calculating the baseline and for determining additionality.	None	None	None	None	Yes
OPI	16	9	38-40	It seems repeating the language from the previous paragraph here is not necessary and could be removed for ease of reading.	Question 15 and 16: The text has been changed substantially (see new p. 10). We left in the repeated reference to the AR Tool because it is used for both calculating the baseline and for determining additionality.	None	None	None	None	Yes
CAR	17	9	48	What is the definition of the variable BEN? A differently named variable is listed. Is there any reason that the definitions of variables are not listed in the order they appear in the equations?	Question 17: Added the N ₂ O superscript in equation 1 to match the variables defined below it. Variables are listed in the order they occur in the equation.	None	None	None	None	Yes
CAR	18	10	11-20	The meaning of this paragraph is unclear. Please discuss the intent of this paragraph.	Question 18: Section II.4.3 is now re-written to clarify that it is methane emissions from burning that contribute to baseline emissions.	None	None	None	None	Yes

Question Type	Question No.	Page No.	Line No.	ESI Round 1 Comment /Question/Clarification	SU Response	ESI Round 2 Comment /Question/Clarification	SU Response	ESI Round 3 Comment /Question/Clarification	SU Response	Addressed
CAR	19	10	29-30	Is the project proponent/manager allowed to choose the soil C model based on the most favorable output?	Question 19: Section II.4.5 now reads: The baseline soil organic carbon at equilibrium can be estimated using the soil carbon dynamic model chosen for II.4.5. If alternative models are available, project proponents should choose the one that either best predicts current SOC (highest adjusted R ² , lowest Akaike Information Criterion (AIC)), as per standard model selection procedures (add to REF – Burnham and Anderson 2002)	None	None	None	None	Yes
CAR	20	10	29-30	Is it possible to further clarify that a baseline based on a soil C model AND a measured soil C baseline is required in this methodology?	Questions 20-25: These have been addressed by considerably rewriting the last four paragraphs of Section I.2 and virtually all of section II.4.5.	None	None	None	None	Yes
CAR	21	11	20-28	Is an area, mentioned here, the same as one of the discrete areas described on page 9? How large are they? What is a weighted average, in this case? Are models run for each change in management (i.e., grazing density and fire), or are both put into the model at the same time? Does one input affect another, or are they additive?	Questions 20-25: These have been addressed by considerably rewriting the last four paragraphs of Section I.2 and virtually all of section II.4.5.	None	None	None	None	Yes
CAR	22	11	23	Does "are expected to use" mean the same thing as <i>required</i> ? Please clarify.	Questions 20-25: These have been addressed by considerably rewriting the last four paragraphs of Section I.2 and virtually all of section II.4.5.	None	None	None	None	Yes
OPI	23	11	17-18	For the sake of clarity, can the variables be <i>listed</i> in the order in which they appear in the equation?	Questions 20-25: These have been addressed by considerably rewriting the last four paragraphs of Section I.2 and virtually all of section II.4.5.	None	None	None	None	Yes
CAR	24	11	27-28	What are the implications for a project when models are not used to estimate SOC? Is it mentioned elsewhere that soil modeling is not required when using this methodology?	Questions 20-25: These have been addressed by considerably rewriting the last four paragraphs of Section I.2 and virtually all of section II.4.5.	None	None	None	None	Yes
CAR	25	12	45	Can a description of stratification, as it relates to parameters important to soil C content, be included?	Questions 20-25: These have been addressed by considerably rewriting the last four paragraphs of Section I.2 and virtually all of section II.4.5.	None	None	None	None	Yes
CAR	26	13	25-26	Does "soil carbon with transitions" refer to intermediate gains in soil C, before the conclusion of the project?	Question 26: Section III.1.7 now reads III.1.7. Project estimate of transitional soil organic carbon. The estimate of transitional soil organic carbon, or soil carbon at intermediate years between the baseline and project equilibria in a Modeled Offsets approach can be estimated using:.....	None	None	None	None	Yes
CAR	27	13	46-48	Which methodology do the authors suggest for measuring the soil C baseline, and subsequent soil C measurements?	Question 27: This is addressed in paragraph 4 of section IV.1.1 Sampling design.	None	None	None	None	Yes
CAR	28	14	13-33	Aren't most of these sources of GHG emissions due to new management practices, rather than leakage? How does the project proponent or manager prevent the leakage due to livestock displacement, which is not under his/her control?	Question 28: This is addressed by a completely rewritten Section III.2. Estimation of leakage and new emissions sources.	None	None	None	None	Yes
CAR	29	15	15	As stated earlier, this GHG emission appears to be part of the project and not leakage. Please clarify.	Question 29: see answer to question 28	None	None	None	None	Yes
CAR	30	17	1-6	Please discuss why it appears there is considerable emphasis on stratification using above-ground indices, but no explanation as to how soils should be stratified for direct sampling and measurement?	Question 30: We have introduced a completely new section to address stratification - III.1.6.2. Stratification of the project area	None	None	None	None	Yes

Question Type	Question No.	Page No.	Line No.	ESI Round 1 Comment /Question/Clarification	SU Response	ESI Round 2 Comment /Question/Clarification	SU Response	ESI Round 3 Comment /Question/Clarification	SU Response	Addressed
CAR	31	17	15-25	What methodology is used for stratification and direct measurement of soil C?	Question 31: WE introduce reference 19 for soil sampling methods and reference 27 for keys to stratifying soil sampling.	Please refer to a detailed soil sampling methodology that is applicable to the scenarios anticipated for this methodology. The methodology should either be one previously accepted by VCS, or developed for this methodology.	I have added a new Tool under Section VI that discusses methodological considerations for soil sampling, including the purpose (model validation) and scale of the project. This is referenced in the Section IV on monitoring	Does the referenced laboratory methods manual offer a detailed explanation of bulk density sample collection and handling, including correction for coarse fragments? Also, is there a reference for methods to permanently establish soil sampling sites?	The CRC manuals do discuss how to measure bulk density, but I could also add a more recent reference from a newer CRC methods handbook: 34. Hao, X., Ball, B.C., Culley, J.L.B., Carter, M.R., Parkin, G.R. 2007. Soil density and porosity. Pages 789-799. In Carter, M.R., Gregorich, editors, Soils sampling and methods of analysis, second edition, CRC Press. A reference for methods to establish permanent sampling sites is from the same book: 35. Ellert, B.H., Janzen, H.H., VandenBygaart, A.J., Bremer, E. 2007. Measuring change in soil organic carbon storage. Pages 25-38. In Carter, M.R., Gregorich, editors, Soils sampling and methods of analysis, second edition, CRC Press. These references 34 and 35 would be added to section VI.4.3, last sentence, and to section VI.4.4, third sentence and last sentence.	Yes
CAR	32	17	34-35	Isn't this GHG emission part of the project?	Question 32: We have created a new section III.2 to distinguish leakage (from exporting or importing livestock) from new emission sources that may arise from project activities.	None	None	None	None	Yes
OFI	33	18	11-14	It seems this language is repeated numerous times throughout the document and could be removed for ease of reading.	Question 33: WE have eliminated the redundant request to stratify the project area. The request is now contained in III.1.6.2. Stratification of the project area, and we have brought up only once the request to establish permanent sampling stations in section IV.1.1 Sampling design	None	None	None	None	Yes
CAR	34	18	38-39	See item 24.	Question 34: see our response to questions 20-25	None	None	None	None	Yes
CAR	35	18	5-6	See item 32. Also, why a 30 cm depth?	Question 35: see our response to Question 32 plus we added a paragraph discussing the reason for the soil depth of 30 cm but also include language that allows for deeper depths. The majority of studies measure SOC to 30 cm depth because that is the zone with > 90% of roots, and the RothC soil carbon dynamics model accounts for changes to a 30 cm depth. However, any soil carbon model can be re-scaled to account for changes in SOC to deeper depths.	None	None	None	None	Yes
CAR	36	18	sampling design	Can more information on what is entailed in sampling for soil C, or a reference to a recommended methodology be included here?	Question 36: These details are provided in paragraph 4 of IV.1.1 Sampling design	See #31	See my response to Question 31	None	None	Yes
CAR	37	20	3-7, 19-23	See items 29 & 30.	Question 37: see response to Question 32	None	None	None	None	Yes
CAR	38	25	eq. definitions	Please review the definitions? Why do some variables have identical definitions?	Question 38: Fixed the equation definitions in Tool V1.2 Estimation of N2O emissions from biomass of N-fixing plant species	None	None	None	None	Yes
Programmatic Questions										
CAR	39	9	38-39	You have proposed to utilize the "Combined tool to identify the baseline scenario and demonstrate the additionality in A/R CDM project activities", however to our knowledge this has not been approved for use in other project categories (i.e. ALM). Please discuss.	Question 39 - the correct VCS approved tool for determining additionality is now cited in section II.3	None	None	None	None	Yes
CAR	40	9	38-39	VCS Guidance for AFOLU Projects states "At verification, the size of the project becomes fixed and the certifier verifies whether the project took sufficient account of leakage and monitoring accuracy." In this regard, please justify the allowance of future adjustment of project boundary.	Questions 40: We changed the last sentence of section II.1 to read: The project boundary shall be fixed upon the validation of the project.	None	None	None	None	Yes

Question Type	Question No.	Page No.	Line No.	ESI Round 1 Comment /Question/Clarification	SU Response	ESI Round 2 Comment /Question/Clarification	SU Response	ESI Round 3 Comment /Question/Clarification	SU Response	Addressed
CAR	41	9	25-27	Please discuss the use of the "Further Clarification On The Application Of The Definition Of Project Boundary To A/R Project Activities" as it does not appear to have been approved for broader use (i.e. ALM projects). Additionally, the superscript reference "2" appears to lead to a different tool approved for use under VCS.	Question 41: We now refer to the correct guide: VCS Guide to AFOLU Projects, now reference 4	Reference 4 leads to the Tool for AFOLU Non-permanence Risk Analysis and Buffer Determination. Line 35 and 36 of page 10 appears to have two references (7 and 4). Please address.	This has been corrected. Only reference 7, the correct one, is used.	None	None	Yes
CAR	42	17	34-35	As defined by VCS, leakage are the net changes in emissions that occur outside the project boundary, however the methodology appears to refer to the potential for on-site leakage, specifically the increase in the use of fossil fuels due to project management and increased ecotourism. This instead would appear to be potential project level emissions. Please discuss.	Question 42: See our response to Question 32	Given that the VCS defines leakage as "...any increase in greenhouse gas emissions that occurs outside a project's boundary, but is measurable and attributable to the project's activities," how does this methodology account for potential leakage from diverse sources, including displaced subsistence firewood gathering activities?	Continuing my response to question 7, I In Section III.1 I address the possibility of market leakage but note it's inapplicability to VCS AFOLU projects. I do however address leakage from displaced harvesting of fuel wood outside the project boundary These changes are made on v2 page 17	None	None	Yes
CAR	43	17	34-35	As it is a CDM tool for A/R activities and does not appear to have been approved by VCS for broader use (i.e. ALM projects), please discuss the use of the "Estimation of GHG emissions related to fossil fuel combustion in A/R CDM project activities" to assess fossil fuel consumption.	Question 43: We have eliminated the reference to the A/R CDM guidelines and instead use the IPCC guidelines for calculating emission factors for fossil fuel combustion in vehicles and aircraft.	The IPCC guidelines references appear sufficient for calculating emissions for land based fossil fuel vehicles, but do not provide for the calculating of emissions from aircraft. Additionally, this is included under the section entitled "Estimation of Leakage", but appears to refer to potential on-site increases in emissions (i.e. not leakage). Please address.	We have added information, with references for calculating aircraft emissions and have shifted the discussion to section III.2 New Emission Sources	None	None	Yes
OFI	44	General		For ease of use, it would be helpful to include a page outlining the definitions of the major terms/units utilized in the methodology.	Question 44: We have added a new section V.2. Key Terms and Definitions to include definitions of the major terms and variables used in the methodology.	None	None	None	None	Yes
CAR	45	5-6	21, 7	The term "significant" is used to address manure and chemical fertilizer displacement. Please define what would qualify as "significant".	Question 45: We have eliminated the use of the term significant in the applicability condition for limiting addition of fertilizer or transfer of dung to the project area.	None	None	None	None	Yes
OFI	46	General		For ease of use, it would be helpful to have a line item referring to the appropriate VCS document where the criteria for start date is indicated.	Question 46: This has been added as section II.1.2.	As requested, reference has been made to the location in the VCS documentation, however VCS has stated they prefer that the specific language not be repeated, instead preferring only the reference to be included in case future changes are made to VCS requirements. Also, there appears to be a formatting issue that needs to be corrected for the title "II.1.2"	Specific page numbers have been removed and formatting of II.1.2 and II.1.3 fixed	None	None	Yes
OFI	47	General		For ease of use, it would be helpful to have a line item referring to the appropriate VCS document where the criteria for crediting period is indicated.	Question 47: This has been added as section II.1.3	VCS has stated they prefer that the specific language not be repeated in the methodologies, instead preferring only the reference to the correct VCS document in case future changes are made to VCS requirements.	We have eliminated the specific language regarding project duration.	None	None	Yes
CAR	48	6	25	Please discuss the decision to include non-tree above ground biomass, as the VCS Tool for Methodological Issues states that the "pool need not be measured because it is not subject to significant changes or potential changes are transient in nature."	Question 48: New text at the bottom of page 6 and top of page 7 addresses this: However, adjusting grazing and fire may change biomass of leguminous plants, either woody (e.g., Acacia species) or herbaceous, and the nitrogen inputs from nitrogen fixation in legume roots may greatly increase nitrous oxide emissions, so changes in such emissions from this source will be considered.	None	None	None	None	Yes
CAR	49	6	25	As indicated in the VCS Tool for Methodological Issues, please change "tree" and "non-tree" to "above ground woody" and "above ground non-woody".	Question 49: Tree and non-tree were replaced throughout the document.	None	None	None	None	Yes
OFI	50	General		For ease of use, it would be helpful to have a line item referring to the appropriate VCS document where the criteria for record retention and management are indicated.	Question 50: We added a new section IV.4 Records relating to the project: The project proponent shall keep all documents and records in a secure and retrievable manner for at least two years after the end of the project crediting period. All data should be archived in multiple locations and both on paper and electronically to provide the least risk of loss. Remote sensing data, if used, should be archived on multiple servers or computers.	VCS has stated they prefer that the specific language not be repeated in the methodologies, instead preferring only the reference to the correct VCS document in case future changes are made to VCS requirements.	This section now reads: The project proponent shall keep all documents and records following IPCC guidelines ¹⁶ .	None	None	Yes

Question Type	Question No.	Page No.	Line No.	ESI Round 1 Comment /Question/Clarification	SU Response	ESI Round 2 Comment /Question/Clarification	SU Response	ESI Round 3 Comment /Question/Clarification	SU Response	Addressed
CAR	51	9	31-32	Please discuss the selection of the "Combined tool to identify the baseline scenario and demonstrate the additionality in A/R CDM project activities" as it is intended for A/R activities, and not ALM.	Question 51: The reference was changed to guidelines on p. 21 of Voluntary Carbon Standard, Guidance for Agriculture, Forestry and Other Land Use Projects.	See question 41.	This has been corrected. Only reference 7, the correct one, is used.	None	None	Yes



APPENDIX B Reponse to Public Comments

Soils for the Future, LLC
Jadora International, LLC
Syracuse University

VCS AFOLU-ALM Sustainable Fire and Grazing Methodology Response to Comments from SunOne Solutions

Original response 9/6/2010

Revised to reference revised methodology more accurately, May 9, 2011

General Comments:

Aggregation - It seems that aggregation of strata is possible but not mentioned much. Can you have strata across a region? We need more clarity about how aggregation will specifically work.

The methodology contains several sections that discuss how projects can be stratified, particularly Section III.1.6.2. Projects can include several distinct, separated areas into a single project, where each separate area may be single or multiple strata. Certainly a collection of smaller private ranches could be aggregated into a single project under a single project document.

Project start date – is there a look back period?

Per the VCS guidelines, projects can have a starting date as early as 2002, provided that new practices were implemented for the purpose of reducing greenhouse gas emissions and not because they provided greater financial return

Clarification – are both fire and rangeland management requirements for eligibility?

There is no specific requirement for a fire management strategy; altering fire regimes remains an available option for generating carbon offsets. For example, in lower precipitation grasslands and savannas, fire may occur infrequently due to the lack of build-up of fuel, and therefore not need to be managed.

Specific Comments:

Pg. 4 (I.2) - Additionality - only financial additionality mentioned here, BUT in Section II.3 mention using CDM A/R tool. Consider elaborating on additionality.

The methodology follows VCS guidelines in calculating additionality, which allows both financial and change to common practice as reasons why a project would generate additional offsets.

Pg. 5 (I.3) – Applicability conditions - Why are A, B and D present tense and C future tense? It appears that C should also be present tense “is” and not “will”, as the future tense contradicts with



other areas of the document. Is animal husbandry and/or wildlife conservation not required on the land prior to project start but is a requirement as a part of future management?

The revised version of the methodology has changed the letter labels somewhat, but we eliminated any future tense to maintain consistency across the itemized conditions. In response to the second question, an absence of grazing remains a management option if it is likely to generate offsets. The project could switch management from grazing to complete grazing protection or from complete grazing protection to grazing.

*Pg. 5 (I.3)- Explanation/Justification — broaden definition to include conversion to other non grazing grass land uses (e.g. development not just cropland). **Currently reads (pg. 5):** “ ii) land that is grassland that will remain so or be converted to croplands, with accompanying SOC loss, in the absence of the project. “*

The methodology now clarifies the conditions that apply to the methodology. Recent (< 3 years') conversions of cropland to grassland

Pg. 6 (I.4) - CO₂ emissions from grazing animals = conflicting information in Table 2 and later in Section 2.4.2

The tables and text have now been changed to match. We clarify that CO₂ emissions from grazing animals are not used to calculate an offset, but may be an important parameter in soil carbon dynamic models used to calculate offsets.

Pg. 8 (I.5.3) - Soil Sampling/Model calibration - Every 3-10 years re-calibrate soil model; what calibration interval do you use then? Why would you need to measure more frequently? Better guidelines on sampling frequency would be beneficial.

Sampling frequency is much more thoroughly discussed in Sections IV.3.2. and VI.4.3. We provide a specific formula for determining the sampling interval in Section IV.3.2.

Pg. 8/9 –(II.1) – Better defined “under the control of the project participants” there should be an opportunity for distance to be a factor. It does not make sense to take cattle and transport state to state, so there should be a state limit or some other ability to segregate land owner’s properties that may be located in multiple different states. Contradiction in section III as well.

We present a much clearer description of the project boundaries and the area over which cattle movement could constitute leakage. This is specified in Section I.1

Pg. 10 (II.4.3 and II.4.4) - Tool names and numbers are reversed / confused and different than charts on back

Corrections were made to make the text and table match.

Pg. 12 (III.1.6) - Replace “equivalent” with “similar” in section III.1.6 because soil stratification is similar to A/R methodology (equivalent is a strong word).



This correction has been made.

Pg. 14 (III.2) – This section is mis-numbered and mis-labeled. Says “five” sources of leakage, but only 4 are named. In addition, (a) and (b) are labeled but (c) and (e) are not, and (d) is not even listed. The corresponding Table 3 then lists the then in reverse order (i.e. (e) is first and (a) is last.

This whole section has been revised to recognize that most of the list is new sources of emissions, not leakage and for the list to be consistent. Leakage occurs principally from increased use of project area wood for fuel and from shifting grazing off the project area.

Pg. 17 (IV.3.1) – 30 cm tend to be the industry standard, and what is used in the most common soil models. The additional C from 30 – 40 would be minimal at best. Why choose 40cm?

This section has been changed to allow any choice of depth, with the depth driven by depth to bedrock or hardpan, or by the data requirements of the chosen soil carbon dynamic model

Pg. 18 (IV.3.3) – There is language to reconcile using the buffer if one’s modeling has been to optimistic. But what if you’ve been too conservative in your project model of C and measure actual C sequestered is greater than anticipated? Do you get the additional offsets?

Section IV3.3 now states that “It is also possible that $PSQt > MPRSt$, in which case the project could claim offsets for the additional emissions reductions $PSQt - MPRSt$ not anticipated by modeling.” We also allow the soil carbon dynamic model to be modified to more optimistically calculate offsets in future project years