SUMMARY AND RESPONSE TO PEER REVIEW COMMENTS

A draft Methodology for Improved Forest Management (IFM) on Small Non-Industrial Private Forestlands was developed by American Carbon Registry (ACR) and Finite Carbon for potential approval by ACR.

All new methodologies and methodology modifications, whether developed internally or brought to ACR by external parties, undergo a process of public consultation and scientific peer review prior to approval.

The methodology was posted for public comment on April 16, 2021 – May 16, 2021. The methodology was submitted for scientific peer-review June 1, 2021 – September 24, 2021. Comments and responses to scientific peer-review are documented here.

#	Reviewer	Document Section	Reviewer Comment	Author Response	Reviewer Comment (R2)	Author Response (R2)
1	1	Overall	Leakage: While the protocol does a good job of addressing leakage across an individual's property, it does not address the issue of leakage across ownership boundaries. While I understand this is challenging to address, if harvesting is shifted to the others' lands then the net accumulation of carbon may be negligible, may be negative, or may be positive – it depends on what the "other" lands are that are being harvested. This a potentially fatal flaw if the goal is net carbon sequestration and needs to be addressed. This is an issue with all approaches that are relying on harvest	In the carbon market, harvesting outside the boundaries of an ownership is termed "market leakage". Market leakage is addressed in section 5.7 of the methodology with a deduction in credit issuance.	I saw section 5.7 and the accompanying "A Review of Market Leakage Risk For Forest Carbon Projects" is useful. It is good that this is addressed and coming up with a single number is indeed challenging and hope this will be revisited as additional data and studies are made available. Whether to use the 40% or 25% discount depends on the total area impacted, so even if each individual project may be relatively small, the combined impact could be more than "de minimis."	Thanks for your comments. Scale as a component of leakage is discussed in section 5.7. We do intend to periodically revisit the leakage estimators as additional data and studies are available. *Note: Reviewer 1 responded with one general comment to the author team's round 2 responses (see below):* *"*I have read through the responses to my second round of comments. I am fine with those responses and I have no further comments*".* Issue closed.

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			deferral, not just this protocol.			
2	1	Overall	Justification: While the equations and other protocols are presented in good detail, the justification for many of the decisions is not explained. For example, what is the justification for the number of sample sites selected? I am sure there was a rationale, but I have no idea what it was. This information will not be of immediate interest to most people, but it is necessary for transparency and for a full evaluation of the protocols. These issues could be addressed in an appendix or a separate document so as not to over clutter the current document.	The existing ACR IFM methodology forms the basis for many aspects of the approach and are justified therein. Each project must also adhere to requirements of the ACR Standard, which specifies ACR's overall programmatic requirements. Further justification of the approach is provided in subsequent comments. In regard to sample size, the central limit theorem states that if the sample size is sufficiently large, the data can be expected to be normally distributed. A general rule of thumb is that n≥30 is of sufficient size to meet	Good.	Issue closed.

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				this distribution. Section 3 contains this minimum sample size requirement.		
3	1	Overall	Small-scale "problem": Although an improvement over traditional approaches, it will be interesting to see how much this protocol solves the "small-scale forestry problem." The protocol is still very complex and requires a high level of expertise to implement. This would require owners to work with professionals and likely work across ownerships. Working with professionals, while great, is only done by a minority of owners. Working across boundaries, especially when financial issues are	The development of forest carbon offset projects remains a complex and difficult process. Approved methods for mensuration, quantification, growth and yield modeling, and financial modeling will continue to be barriers for private landowners seeking to register their forests independently. This methodology aims to improve access to carbon markets for small landowners with the understanding that in most cases the highly technical work of administration and	Understood. It will be interesting to see how many owners and what type of owners participate.	Issue closed.

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			involved, has proven problematic. Most family forest owners are not managing to maximize net present value. This may make this protocol applicable to a much smaller segment of this population, which may be fine.	quantification will still need to be performed by experienced developers. Efficiencies in project design, implementation, validation/verification and monitoring allowed by this methodology will bolster efforts by a variety of stakeholders in carbon offset markets to reach this segment of private landowners and provide financial incentives for their participation.		
4	1	Overall	Modeling error: The protocol addresses sampling errors, but not necessarily other sources of error, such as those that arise from using models.	Uncertainty in offset programs is estimated from the sample. All calculations and models are standardized, such that any errors and/or biases in the calculations would be the same in the baseline and project totals. Since it is the difference that is of	Good point.	Issue closed.

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				interest it is assumed that any error attributed to models is mitigated by requiring use of the same model in the baseline and project scenarios. The error remaining is the sampling error. Clarification on this was added to the methodology sections 4.2.2 and 4.3 in response to public comment.		
5	1	Overall	My expertise: I study the attitudes and behaviors of private landowners. I am aware of many of the topics related to carbon monitoring, but that is not my area of expertise. The selection and parametrization of equations will need to be addressed by others.	Thanks for the perspective. No response required.		Issue closed.
6	1	Overall	FIA sample: I like the use of FIA data for	Thank you for this comment. We agree that	Okay. So a lot depends on the individual project and	You're correct that ACR periodically assesses their

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			establishing a baseline, but granted I am a part of the FIA program and am biased towards it. One challenge with this approach is making sure the right "donor" plots are selected. Although likely too complicated for this protocol, a propensity score matching approach may be more justifiable or at a minimum this approach can be used to verify what is being proposed. One variable I did not see included in the selection criteria is ownership category, which can have a large impact on management practices across much of the U.S.	Project Proponents using a Regional Inventory must carefully consider their approach and how the FIA plots are used to develop carbon stock estimates. This includes consideration of donor plots and selection criteria. Please see section 3 which contains the following plot specifications to ensure that FIA data is accurately reflecting the project sites enrolled in the project: • FIA plots must be sourced directly from USFS FIA and not a third-party. • Project proponent must demonstrate the	review of the project, that makes sense. At some point, it may be good to a general review of how well everything is working (e.g., an audit), but that is likely already planned.	methodologies and procedures to ensure they're performing as intended. Reviewer Response: Issue closed.

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				approach used to map the strata was unbiased. • Project Proponent must demonstrate that the stratification of FIA plots is spatially explicit. In other words, the location of FIA plots must be specific to the location of mapped strata in the project region. • A regional inventory must include a minimum of 30 FIA plots • Each stratum must have at least 4 plots		

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				However, the methodology is intentionally not overly prescriptive because there is not a “one size fits all” approach to project design and implementation and overly prescriptive guidance can unnecessarily block innovation. There is more than one way to develop a valid and sound regional inventory using FIA plots. With respect to ownership criteria, including all ownership types may help to increase precision and decrease uncertainty. There may also be reasons for systematically excluding plots based on specific		

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				site or ownership characteristics. These decisions must be clearly described and documented in a stratification SOP (section 3; see also below) and validated/verified.		
7	1	1.1	As an example of the lack of justification, why was 40-5,000 ac selected as the definition. I think this is reasonable, but it would have been good to see the reasoning for this (and other) choices.	We considered a range of possible acreage limits for the applicability of the protocol. On the upper end, projects over 5,000 acres are likely better served as standalone offset projects than as part of aggregated PDA projects. On the lower end, the factors that drive forest management choices on tracts below 40 acres are expected to be more likely related to	Okay.	Issue closed.

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				aesthetics, HBU values, or other non-timber objectives and these ownerships were therefore excluded. 40 acres is also a common tract size for NIPF's in areas of the country where metes and bounds delineation is less common.		
8	1	1.2	It is interesting that an entity can just own the timber or carbon rights and that will be permissible. That makes sense from a legal perspective, but I do wonder what the potential implications are for the people who are the owners of the underlying land.	Our concern is that the entity controlling right to the carbon stock is legally bound to ACR terms and conditions. If circumstances between the owner of carbon rights and owner of the underlying land (in cases when they are different) cause carbon stocks to decrease, the Project Proponent is ultimately responsible for any carbon stock losses or	Okay.	Issue closed.

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				reversals that may occur.		
9	1	1.2	What is the definition of forest?	"Forest" is defined in the Definitions section of the methodology.	Okay.	Issue closed.
10	1	1.2	Are there situation where non-native species would be allowed?	We have addressed this response in section 1.2 methodology text. We have also included "naturalized" in the Definitions section.	Okay.	Issue closed.
11	1	1.2	Draining of wetlands is prohibited, what about filling? And how are wetlands flooded?	We have addressed this response in section 1.2 methodology text.	Okay.	Issue closed.
12	1	1.2	May want to add text on what "burning of biomass" means in lay terms	We have changed to "Burning of **woody** biomass" in section 1.4.	Okay.	Issue closed.
13	1	1.2	Market leakage is listed here, but where is it addressed later in the protocol?	Market leakage is addressed in section 5.7.	See response above.	Issue closed.
14	1	2.1	Do standards of accuracy need to be included?	Specific standards of accuracy for mapping project boundaries are not prescribed in the	Okay.	Issue closed.

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				methodology; however, Project Proponents must describe their approach, methods and tools used for project delineation and demonstration of ownership in the GHG Plan and Project Design Document. Validation and verification confirm best practices and control measures were implemented, and that mapped locations align with their true position on the ground.		
15	1	2.2.2	20-year – another example of a specific value whose justification is not explained.	A 20-year crediting period is consistent with the ACR Standard requirement for all agriculture, forestry and other land use projects. This clarification has been added in section 2.2.2.	Okay.	Issue closed.
16	1	2.4	These requirements are untenable for most	We are in full agreement. See	Okay.	Issue closed.

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			individual family forest owners, but this is where "grouping" projects becomes advantageous.	response to comment #3 for more background information.		
17	1	3	What are minimum sample sizes required? What are target SEs or CVs? Some of this addressed elsewhere (e.g., site visit tool), but I was expecting more.	Changes were made during public comment to address minimum sample size when using a Regional Inventory (see comment 6). The methodology also requires Project Proponents to evaluate uncertainty and take discounts when uncertainty exceeds certain thresholds (also see sections 4.3, 5.3, 5.8 and 6.4).	Okay.	Issue closed.
18	1	3	May be helpful to translate the criteria to specific FIA variables. And be careful that age data can be weak for FIA data and relatively meaningless for multi-age stands.	We agree that Project Proponents using a Regional Inventory must carefully consider their approach and how the FIA plots, and their variables, are used to develop carbon stock	Okay.	Issue closed.

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				estimates and evaluate uncertainty in a statistically sound manner (see also response to comment 6).		
19	1	3	Land use conversion is allowed?	Having some flexibility for unanticipated management activities in the future is important to the authors and to NIPF's. In the protocol, landowners are granted the flexibility to cut firewood, widen a road, create a turn-around area, expand a borrow pit, put in a small structure, establish a wildlife opening, or the equivalent over time. Limits for land use change in the project area have been defined in section 5.5.1 at 2	Okay.	Issue closed.

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				percent up to a maximum of 5 acres. Landowners must declare their intent to exercise this option, which then results in deductions to their carbon outcome from that point forward.		
20	1	General	The term NIPF is dated and ill-defined. Family forests is the more common term, but there are certainly folks who still use the NIPF term.	Feedback on the terminology is appreciated. Alternative terminology was considered, but NIPF was ultimately felt to be more inclusive.	Okay.	Issue closed.
21	1	3	I did not follow the trail, but it looks like there is justification for use of the 5% discount rate. This is great and I would have liked to have seen similar justification, or at least documentation, of other decisions.	Correct, the 5% discount rate for NIPF's is consistent with that approved and justified in ACR's IFM methodology.	Okay.	Issue closed.
22	1	Eq. 3	There is a high degree of variability in terms of	Noted. While we acknowledge there are	Okay.	Issue closed.

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			long term storage carbon in forest products. Using the average here addresses this issue, but is less precise than other potential approaches.	alternative approaches to calculating long term carbon stored in forest products, this approach is consistent, replicable and within precision requirements for forest carbon offset accounting best practices.		
23	1	4 (equations)	While the equations look reasonable to me, this is out of my area of expertise.	No response required.		Issue closed.
24	1	4.2.1	Example of a complexity that will be difficult for most forest owners and some foresters to implement. I am not questioning the need for it, but it will impact who participates.	We are in full agreement. See response to comment #3 for more background information.	Okay.	Issue closed.
25	1	4.2.1	Are worksheets or other documents required to verify calculations were made correctly? This would at least facilitate desktop reviews.	Sections 6.3.1.1 and 6.3.1.2 outline the validation and verification scopes, respectfully. Any documents necessary for	Okay.	Issue closed.

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				the validation/verification body to confirm this scope is required. Note that "Methodologies, algorithms and calculations that will be used to generate estimates of baseline and project scenario stocks and emissions reductions and removal enhancements…" is a specific requirement.		
26	1	4.2.4	Any requirements or recommendations on data sources? TPO?	Required data sources (such as USFS Wood Product Handbook, conversion factors, mill efficiencies, decay rates and wood product distributions) are specified in section 4.2.4. Those cited in the methodology but not included in text will be added to the	Okay.	Issue closed.

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				methodology webpage as reference documents.		
27	1	4.2.4 Step 3	I have no idea where these values came from and some seem questionable (e.g., hardwood lumber)	Source was originally cited in the ACR IFM methodology. Citation added to updated version of this methodology: Smith JE, Heath LS, Skog KE, Birdsey RA (2006) Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. In: General Technical Report NE-343 (eds Usdafs), PP. 218. USDA Forest service, Washington, DC, USA.	Okay.	Issue closed.
29	1	4.3	What about other sources of error (e.g., modeling errors)?	Please see our response to comment 4.		Issue closed.
30	1	4.3	Why 90% CI and not the more common 95%?	The 90% confidence interval aligns with	Okay.	Issue closed.

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				ACR's programmatic requirements and is industry standard in the carbon market.		
31	1	5.2	Reference to section 8.2.1 which is not in this document	Updated to reference 5.5.1.	Okay.	Issue closed.
32	1	5.7	I think there is flawed logic here and additional justification (and research?) is needed. I think part of the issue is scale – what are the impacts across the entire woodshed? If landowner X defers harvesting for some number of years, harvesting will likely increase for other owners. The mills will still have the same demand so it becomes an issue of elasticity of (aggregate) supply. This gets complex, but	The text in section 5.7 proposes a lower market leakage deduction for small landowners (relative to ACR's existing IFM methodology for larger landowners) based on fundamental research in the field (see Murray et al 2004; Galik 2018 and others cited). Galik 2018 explains that market leakage risk can be ameliorated through project design characteristics. Regional PDA projects realize those design	See response above.	Issue closed.

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				characteristics in the form of a diverse ownership, geographic diversity, mix of wood products produced, number of woodsheds covered, and others. This host of factors can reasonably be expected to amount to an inherently lower relative market leakage risk over the project duration. For more detail on this logic and the supporting research referenced please review the attached position paper and the citations therein.		
33	1	5.7.1	Why was 0.2 selected? I would think it would be whatever the observed leakage is. It is also unclear to me how	.2 or 20% standard deduction was selected because it recognizes the relative market leakage risk between PDA projects with	See response above.	Issue closed.

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			leakage will actually be measured.	inherent diversity characteristics when compared to the current ACR IFM methodology (which employs a higher standard deduction). 20% is also a commonly used leakage standard deduction in other voluntary and compliance protocols currently in use in the US. For more information on this topic please reference the answer to 32 above and the attached position paper and citations therein.		
34	1	Eq. 20	Representing errors as CIs is not what I am used to seeing in equations like this. In general, we would calculate the total error and then construct our CIs. (this comment	The method presented for quantifying error and uncertainties in is consistent with other approved ACR methodologies. It is considered industry	Okay.	Issue closed.

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			also applied to other summations of errors in the protocol).	standard in the forest carbon offset space (see also CAR and CARB methodologies which, when combined with ACR, represent the vast majority of U.S. forest carbon market).		
35	1	6.3.1.1	Seems odd that this would not be required prior to start	Carbon projects, including those listed under ACR, are required to undergo Validation/Verification at the end of the initial reporting period. This methodology aims to streamline some of this process and to reduce the uncertainty for landowners and developers by allowing a concept validation to start after listing but before the end of the initial reporting period. However, it is still not practical to undergo	Okay.	Issue closed.

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				Validation before the start of a project.		
36	1	6.3.2.1	To what levels is adherence required? What are the MQOs?	Projects must be in full compliance with eligibility and quantification requirements. Project verification must meet a reasonable level of assurance and comply with the current ACR Validation and Verification Standard objectives.	Okay.	Issue closed.
37	1	Eq. 21	Double check that squares are applied properly.	Equations 13, 20 and 21 have been confirmed.	Okay.	Issue closed.
38	1	A.1	70% of NIPF harvesting sounds high, maybe this is area based?	70% was derived by querying USFS data from the National Woodland Owner Survey. Specifically, we examined responses to the question "Have any trees been cut or removed from your wooded land since	I am not sure how that was derived. That stat is for all tree harvesting/removals, not just commercial harvesting. But maybe that is okay. And depending how you are doing this, be careful that some options are not additive. And make sure the stat is for	We obtained the raw NWOS data from the USFS, constrained specifically for the eligible enrollee landholding size. The stat is the ownership-based response to the question of whether trees have ever been cut or removed from any of their wooded land

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				you've owned it". Data was constrained for eligible enrollment (40 – 4,999 acres) and averaged across all 50 states.	ownerships (not acres) or restate it however is appropriate.	since they've owned it. Considering this is a no harvest methodology (with specific allowable management exceptions) we feel the comparison is appropriate. Reviewer Response: Issue closed.
39	2	2.1 and 3.0	This section states that "Where projects utilize stratification to increase statistical precision, ACR requires geographical identification of strata boundaries and description of stratification criteria within the GHG Project Plan. Cohorts enrolling after project start date must provide this information in within the Project Design Document	Stratification details are to be included in the GHG Plan and the Stratification SOP. Any stratification changes must be detailed and tracked in the stratification SOP, as well as the monitoring report (see response to comment 6 and section 3 of methodology). The review of the stratification is part of each validation and verification.	It is now clear that the baseline of existing sites is not affected by changes in stratification due to the addition of new sites. It remains unclear whether the project stocks of existing sites are recalculated each time the stratification is altered due to the inclusion of new sites. The section details changes to during the crediting period but only those as "baseline and with-project management	Project Stocks for sites are additive as new sites are enrolled, but for individual sites the project stocks stay consistent with their start date. The addition of new sites is not considered a divergence, although their project and baseline stocks will be calculated to that site specific implementation date. We agree that stratification has an impact on stock calculation, and that project developers need to be consistent with their

			appendix to the GHG Plan." Are the details to be included in the stratification SOP document? Are there any limitations to the changes allowed to the stratification of the project based solely on the inclusion of a new site? Changing stratification has the potential to change the FIA plots that should/would be included in a regional inventory, is the regional inventory assessed each time a change in stratification occurs?	Stratification changes may only affect the baselines of current or future enrolling sites (not retroactively applied).	practices diverge". Is the addition of new sites considered a management divergence? As stratification has a large impact on the calculation of stocks, I believe the protocol needs to be clear when updates are applied and how they affect existing and new sites.	management of site level modeling and reporting. For further clarification, see response to Question 40 below. Reviewer Response: Issue closed.
40	2	2.2	The relationship between start date, implementation date, project term, crediting periods, sites/cohorts, and reporting periods is not clear in the document.	All projects must adhere to requirements of the ACR Standard and relevant methodology. The terms you've identified are all defined in the ACR Standard and/or methodology.	The confusion was mostly related to site start date versus implementation date. There are still sections of the protocol that seem to suggest that implementation date and start date can be different for a site. Section 2.2	The project has a single start date and each site has an implementation date corresponding to the initial deployment of project activities and the beginning of generation of ERTs for the given site. Sections 1.2, 2.2, 2.2.1, 2.4.2, 6.3 and the

			For example, the document indicates that the monitoring report must define "implementation and start date for newly enrolled sites" but the next section is clear that the PDA must have single overarching start date. Presumably, this means that the start date for all newly enrolled sites is the single overarching start date and only the implementation date varies by site? If so, should the section in 2.2.1 that details how the "start date" is determined for each site instead refer to how the "implementation date" for each site is determined? If there is a distinction between a "site start date" and a "site implementation date" it is not clear what that distinction is.	ACR's Aggregation and PDA guidance for IFM is specific to ACR's existing IFM methodology and does not constitute specific requirements for this methodology. Projects must designate a single overarching project start date. For projects using project-level inventories, this corresponds to the earliest start date among the site(s) included in the initially validated cohort. Projects using regional inventories may submit a listing application to designate a project start date, and start dates for each site must qualify under one of the approved options in Section 2.2.1.	states that the monitoring report must contain "implementation and start date for new sites". In your reply you've said that "The site start date is the implementation date", are these still reported separately?	definitions of "implementation date" and "start date" now better clarify this distinction. Reviewer Response: Issue closed.

			This section also states that “All sites sharing a crediting period within a PDA must be on the same validation and verification schedule”. Is it possible for sites within a PDA to not have the same crediting period? The Aggregation and Programmatic Development Approach Guidance For Improved Forest Management document indicates that the Crediting Periods are applied at the PDA level (Section 2.2.2.1) . If a PDA with a 20 year crediting period adds a site in year 4, are there only 16 years available to that site for crediting? If all the sites must share a start date and the crediting periods are connected to the project (PDA)-level as the guidance document	For PDA projects, all subsequent enrolling sites must have an implementation date that is the same or after the established project start date and may be no later than 5 years after the project start date. Site-specific start dates for crediting must be based on the date a landowner enrolls in a contractual relationship to implement a carbon project. Sites cannot begin generating credits until their site-specific implementation date. You’re correct that a site joining in year 4 would have 16 years remaining in the current crediting period.		

			indicates, how is it possible that the crediting period varies by site or cohort?	The site start date is the implementation date. Clarification has been added to the definition of "Implementation Date."		
41	2	2.2.2	The statement "All sites wishing to renew participation for a subsequent crediting period may be consolidated into a single cohort." implies there is a choice in whether sites are consolidated, however; the Aggregation and2. Programmatic Development Approach Guidance For Improved Forest Management document uses firmer language indicating that these sites will be considered a single cohort. "At Crediting Period renewal, all renewing Sites shall be consolidated into a single	This methodology has been updated to require all renewing sites across all cohorts to be combined into a single "crediting cohort" upon the first site request for a renewed cohort. All sites that choose not to renew the initial crediting period will be combined into a single "non crediting cohort." See updates to section 2.2.2. See also response to comment 40.	No further questions here.	Issue closed.

			Cohort and validated according to the then-current version of the relevant methodology." Is the consolidation of sites at crediting period renewal optional?			
42	2	2.4.1	Are non-crediting sites included in the weighted risk assessment to determine reversal risk?	No, non-crediting sites will not be included in the risk assessment. The outputs of ACR's Tool for Risk Analysis and Buffer Determination are applied to gross ERTs at each issuance. Non-crediting sites will have already contributed to the buffer pool during the period in which they were credited. The risk assessment in a given reporting period will be determined for project sites that are contributing to the gross ERTs. Further clarification added to section 2.4.1.	No further questions regarding this item, thanks.	Issue closed.

43	2	4.1	As the baseline is site specific, is the start of the 100 year period the site implementation date or is it the project start date (with the inventory de-grown if necessary)?	The start of the 100-year period is the site implementation date.	Thank you for clarifying.	Issue closed.
44	2	4.1	While the baseline is site-specific, the regional inventory is not. If sites/cohorts are added in the 5 years following the project start date and the regional inventory changes as a result, would the change affect all relevant baseline sites, or only the newly added sites?	If the regional inventory changes it only affects the baseline of new sites entering after the change. Once the baseline is validated it is set for the 20-year crediting period. Sites entering the project between years 0 – 5 must use the most recent inventory data available from FIA in modeling their baseline.	Thank you for clarifying.	Issue closed.
45	2	4.2.1	Is the intention to allow the same project to utilize varying growth models across sites (potentially not just different FVS variants but	Although we expect most projects will use a single growth and yield model, this optionality could be advantageous in circumstances where appropriate. We have	Thank you for clarifying, no further questions on this item.	Issue closed.

			different models entirely)?	clarified this optionality in section 4.2.1. If multiple models are chosen, techniques to integrate multiple G&Y outputs must be clearly specified in the GHG Plan and/or Project Design Document. For a given plot/project area, the same G&Y model shall be used in the baseline and project scenario and consistently applied over the crediting period.		
46	2	4.2.1 & 4.2.2	Has the implication of having a wide geographic area on the calculation and comparison of project and baseline stocks been fully addressed? The regional inventory approach relies on strata-level estimates of stocks that are applied across the various project sites. Depending on the	Section 4.2.1 states "Modeling must be completed with peer reviewed forestry model(s) calibrated for use in the project's specific geographical region(s) and approved by ACR". We have also added additional text more specifically clarifying that all model	Thank you for adding the additional text and for clarifying the intent. Given the geographic extent, site specific baselines, and the potential for varying growth and yield models and volume equations, I believe the verification/validation process will be an	We understand that the nature of this project type may increase validation and verification complexity. However, as a whole, we feel that these complexities will be outweighed by efficiencies of the approach which will allow small landowners previously excluded from carbon markets to now participate.

			geographic extent of the project area it seems plausible that the use of differing volume equations or different growth models or variants may be appropriate. Will the geographic location of the FIA plots dictate the appropriate model or volume equation for that plot? If the carbon stock estimates of a single plot are tied to geographic location, can plots that utilize different volume/carbon estimates be grouped into a single stratum? If plots utilizing different volume estimates are permitted in a single stratum what are the implications for baseline modeling given that treelists are often combined and then run through the growth	inputs and outputs must be documented and verified. FIA plot locations will dictate the appropriate variant and equations to be used for each plot and FVS variants must be used within their defined geographic scope. Whether plots utilizing different models/volumes/calibrations are combined in the stratification is at the discretion of the project proponent, but the approach must be documented, statistically sound and verifiable.	increased burden on these projects.	Reviewer Response: Issue closed.

			model to produce the strata level projections used in baseline modeling? Will plots have to be run separately and then combined? While the protocol has a simple statement requiring the same set of equations be used for both baseline and project stocks, the geographic extent combined with strata-level estimates introduces a grey zone that could potentially lead to inconsistent interpretations.			
47	2	4.1 – 5.8	Section 4.1 states that "baseline determination is site-specific". That statement implies that each site will have a baseline model with accompanying projections, legal constraints and silvicultural treatments. While the descriptions of the baseline are	When we say "baseline determination is site specific" this means each site considers its specific legal/financial constraints, stocking (derived from regional estimates in this case) and silvicultural treatments in determining baseline trajectory.	Thank you for adding the clarification to the sections/equations. I do not have any further questions regarding the application of the equations.	Issue closed.

			consistent in referring to site, the equations 1-10 do not mention a scale and equation 20 appears to be at the project level. Can you clarify the intended meaning of a baseline that is "site-specific"? If these are intended to be separate baseline models that are site specific, at what scale do the equations apply? At what point are the baseline estimates combined to a project level number? If a new site is added to the PDA within the first 5 years how does that affect the existing baseline and the baseline moving forward in the crediting period?	We have added additional clarification regarding the scale in which the equations may be applied (see sections 4.2, 4.3, 5.5, 5.7.1, 5.8, 6.4 and 7). Once baselines are validated they remain static over the crediting period.		
48	2	5.8	To clarify, the "input inventory" is always used to calculate uncertainty in project stocks? In the case of the regional inventory, the FIA measured data will be	Uncertainty equations rely on sample errors from the input inventory and are established in the initial year of the crediting period. Once established, uncertainty	Thank you for clarifying, no additional questions for this item.	Issue closed.

			combined but not grown to determine uncertainty? Uncertainty will only be updated when plot measurements are updated?	is held constant over the crediting period. This is further clarified in section 6.4. In the case of establishing uncertainty for a Regional Inventory baseline, FIA plots should be grown/degrown to a common implementation date and uncertainty calculated based on uncertainty within those plots (further explained in response to comment 49). We have clarified the scale for which uncertainty should be applied in response to comment 47.		
49	2	5.8 & 6.3	If a regional inventory is used, are PP's obligated to update the input as FIA plots are re-	The inventory is established in RP1 and modeled over the crediting period. All plot	Thank you for the clarification; no additional questions.	Issue closed.

			measured? If they are not required to update inputs as FIA plots are remeasured, what is the timeline for updating plots within the regional inventory? With project-based inventories these would normally coincide with the site visit, but there is no tree measurement component to verifying regional inventories. The only requirement I've seen related to FIA regional inventories is that the inventory be no more than 10 years old. Is the 10 year requirement assessed annually?	inventory data used in baseline setting, biomass calculations and growth and yield projections may not be older than 10 years. Growth and yield projections are valid for up to one crediting period. For example, a PP may use FIA plots no older than 10 years in project year 1, and that projection is good for 1 crediting period. However, for new sites entering in year 2, new projections must be made based on FIA plots no older than 10 years from that current year.		
50	2	6.3.2	The proposed site assessment of regional inventories has no requirement for assessing the stratification of the sites	Assessment of the initial stratification falls within the scope of concept and project validation. We have added		No response provided from the reviewer. Issue closed.

			visited. Given that great latitude is allowed in the determination of stratification with only a subjective requirement of determining reasonableness, why is the stratification not directly considered during the site visit? The stratification will have the greatest impact on the stock calculations for the regional inventories and there no currently no requirements to assess it on the ground.	evaluation of "Stratification updates" to the scope of full and desk-based verification (section 6.3.2.1 and 6.3.2.2) and amended a site visit question within the site visit tool.		
51	2	6.4	The footnote for equation 22 states "If calculated UNCt in equation (22) exceeds 10%, then the estimated amount of the combined carbon stock at the project area level cannot be verified without additional sampling or stratification to improve statistical confidence" but equation 22 assess	Equations 21 and 22 work in conjunction to calculate total uncertainty and the uncertainty deduction, respectively. The implication is that 1) if total uncertainty is <10% no deduction is necessary, 2) if total uncertainty is between 10-20% a deduction is calculated and applied,	Thank you for the clarification and modifying the footnote. I have no further questions.	Issue closed.

			"UNCt" to determine whether it is above or below 10% so the meaning of this footnote is not clear.	and 3) if total uncertainty exceeds 20% the project must conduct additional sampling or stratification to improve statistical confidence. We have changed this sentence to "If calculated **$UNC_{DED,t}$** in equation (22) exceeds 10%, then the estimated amount of the combined carbon stock at the project area level cannot be verified without additional sampling or stratification to improve statistical confidence" based on your comment.		
52	2	7	The calculation of ERT's relies on reporting period. If new sites/cohorts are added during the first 5 years of the PDA how is the reporting period for the	Reporting periods are at the discretion of the Project Proponent. Additional language has been added as to the scale of the equations and that ERTs must be	Thank you, no further questions.	Issue closed.

			new sites determined and used in the ERT calculations?	prorated based on site implementation dates.		
53	2	6.3.2.1	If a project employed a project level inventory but contains non-crediting sites that are exempt from site-visit requirements, how will the requirement to demonstrate that the carbon stocking levels of non-crediting sites remains above previously credited stock levels?	The methodology utilizes change detection (which may be done via remote sensing) to ensure that carbon stocks are maintained above previously credited levels. Following public comment, clarifying text was added to sections 5.2, 6.3.2.1, and 6.3.2.2 stating that a change detection assessment will ensure landowners stay compliant with the required practices.	I have reviewed the additional text and have no further questions, thank you.	Issue closed.
54	3	whole	Thank you for the opportunity to review your GHG and carbon quantification methodology. The methods are sufficiently described and provide enough flexibility and detail to accommodate	Concerns addressed in subsequent comments.	*Note: Reviewer 3 posed two general questions, rather than responding to specific comments (see below):* "Thank you for the response to my comments and methods. All	Question 1: It is known that the FIA sampling design emerges as the result of the implementation of a regional program. The national sampling design and national plot configuration follow standardized measurement

			various sampling approaches for estimation. While some models are used to transform species dbh into carbon and GHG, the estimation methodology is primarily concerned with design-based inference and as such my comments and questions are squarely focused on sample design and inference. This is not to imply that models used to transform dbh into carbon or GHG are accurate or inaccurate, but instead highlights that the described approach uses design-based inference to compare relative differences in estimation. Moreover, this is not to diminish the importance of selecting the correct carbon and GHG models when estimating amounts of carbon or		comments have been addressed in one form or another and in general I understand ACR's point of view with regards to my comments and suggestions. However, there remains two primary points that I disagree with regarding the approach described. 1) The use of FIA regional inventories and plot stratification to infer small area estimates. Even when using stratification, FIA sampling intensities are too coarse to provide inference at scales finer than the bounds of a county, especially when stratified by species groups, size classes, percent cover, land cover	protocols and target national precision guidelines of estimates for areas sizes larger than the single county level for which FIA usually reports estimates. However, with FIA's sample-based estimation, enhancements can be achieved via stratified estimations using combinations of remotely sensed data as the basis for stratification (Bechtold and Patterson 2005) (i.e., a stratification other than the Phase 1 used in FIA). Using a detailed stratification in conjunction with the sample-based estimators used by the FIA program (Chapter 4 in Bechtold and Patterson 2005) produce unbiased population and subpopulation estimators. The estimators remain valid for the full extent of each stratum (the general recommendation is to include at least 4 plots in each stratum). Design-based (also model-assisted)

			GHG. Instead, given the focus of design-based estimation, my comments and suggestions revolve around sample design, estimators, and error. In general, the described sample design approach is valid. However, there are issues with scope of inference and consistency in techniques. As such, my attached comments and recommendation highlight these issues.		types, and etc. Additional plots will need to be collected at the project level to address biases associated with sub-domain estimation. Without additional project plots, estimates from the regional approach will amount to a simplistic model-based estimate that has not been validated (i.e., assuming the mean and variation are the same for the subpopulation as the larger population). 2) Mixing variable radius and fixed area plots will produce inconsistent	estimators based on stratification are generally unbiased or nearly so when applied to the area of interest. When the estimates are required for smaller areas than the original design, the problem is not directly related to the size of the area. Instead, estimate accuracy and uncertainty are related to the sample size available for a given area (Moisen and Coulston, 2020). When adding more sampling units is prohibitive or highly costly, small area estimation methods increase the efficiency of the unbiased estimator by increasing their precision, but the domain average prediction remains the same. For those less precise estimators for carbon offsets, the methodology includes a discount if the uncertainty exceeds 10%. In this way, the inefficiencies are considered and accounted for in the final

					estimates. Moreover, small tree accounting will be underestimated if variable radius plots are used. While I understand the desire to mix techniques, ACR will get better results if one approach is specified, preferably fixed area. “	carbon offset calculations. Although a simple post-stratification approach to estimation may not be the most precise, it has well-understood variance properties and results in unbiased estimators. Question 2: Thank you for pointing this out. In 1999, the FIA program started using the National Field Guide. This field guide recommends using a plot design based on fixed-radius plots. Current FIA inventories use a national standard with a fixed-radius plot layout (Forest Inventory and Analysis National Core Field Guide, Volume I: Field Data Collection Procedures for Phase 2 Plots (fs.fed.us)). Older FIA inventories with variable radius plots remain in public databases. However, because the SLM methodology requires plots to be 10 years old or

						younger, we are using only fixed area plots for our analysis. We agree that mixing variable radius and fixed area plot designs is more complicated and, in some cases, can lead to inconsistent estimates. As a result, we recommend that projects use a consistent plot design wherever possible. If any project combines different plot designs, data from each design must be adjusted using appropriate expansion techniques and the project proponent must explain how this approach results in unbiased combined population estimates. Reviewer response #54 continued at bottom of table.
55	3	1; 3; 4; 5	FIA sampling intensity is insufficient to accurately monitor changes in area as small as 5,000 acres. Inferences from FIA plots used to monitor changes	Additional inventory parameters were added in public comment, including a minimum number of plots per strata (n=4) and	See response to comment 54.	Issue closed.

			in carbon, GHG, etc. are only applicable at national (potentially regional) scales and in aggregate across projects and species. Even at regional scales, area estimate used to expand per unit population estimates may not capture small localized differences for relatively scarce occurrences. This result can amount to inconsistencies in area estimates that when applied in aggregate can amount to substantial acreage and estimates that are inaccurate. A recent example of this phenomena occurred in a longleaf pine restoration projects in southeastern United States [1, 2]. Due to sampling intensity, area estimates of longleaf pine ecosystems derived from FIA data did not	minimum number of inventory plots (n=30, see also response to comment 6) to ensure adequate representation of underrepresented forest types and a normally distributed dataset. Project proponents may use remote sensing to increase stratification precision and change detection to monitor disturbance. For regional inventories, FIA plot data are used in combination with remote sensing data and stratification to increase estimation accuracy. If the Project proponent cannot demonstrate their methods and systems are accurate enough to monitor changes necessary to quantify offsets and comply with the		

			capture changes that were known to have occurred and were documented (a census of restoration activities). In this instance, FIA data indicated that declines in longleaf ecosystem acreage occurred across the historic range of longleaf (~90 million acres) for two separate inventory periods when it was known to increase based on census records. Moreover, area estimation error did not account for the differences. The underlying issue with area estimation in this example was the relative scarcity of longleaf pine ecosystems in this region (accounting for ~ 4% of the area within the region), sampling intensity, and stratification. As such estimates derived from	methodology requirements, the project may not be able to pass verification.		

			FIA data were insufficient to capture localized changes in longleaf ecosystem area at a regional scale. It is very likely that similar inconsistencies will occur when estimating GHG or biomass when using the regional approach.			
56	3	3	If strata are used, consistence mechanisms will need to be defined and used to denote strata. This can be difficult to implement across time but is needed to result in comparable variation estimates and identifying differences in estimates.	Agreed. Project proponents will need to define their stratification process in a SOP, and the V/V process will ensure the SOP is replicable and consistently applied.	See response to comment 54.	Issue closed.
57	3	1; 3; 4; 5	Mixing variable radius plots and fixed radius plots will likely produce inconsistent results. This is especially relevant in the context of using FIA	While we agree that mixing variable and fixed radius plots within a single project inventory may introduce complexity, the	See response to comment 54.	Issue closed.

			data. For individual projects, one method should be selected and used. For consistency sake I would suggest limiting project inventories to either fixed or variable radius plots, preferably fixed as they are suited to better account for smaller trees and potential growth and can more readily be related to remotely sensed imagery (Hogland and Affleck 2019).	methodology as currently written allows the flexibility for project proponents to determine the most efficient way to implement an inventory. Should a project proponent wish to implement both fixed and variable radius plots, this should be permissible so long as it is done in a technically and statistically sound manner.		
58	3	1; 3; 4; 5	Estimation improvements can be gained by incorporating ancillary data into the estimation process. In one regard stratification is an example of how ancillary data can reduce estimation error. However, given the amount of remotely sensed data available, further reduction in error	This methodology limits the scope of remote sensing to stratification, rather than direct biomass/carbon quantification or model extrapolation. This is because on-the-ground field inventories and measurements are the carbon market norm and lend themselves well to transparency and	See response to comment 54.	Issue closed.

			can be gained by using design-based estimation approaches such as generalized ratio and regression estimators (Gregoire and Valentine, 2008). Additionally, small area estimation techniques can also be incorporated to reduce error (Roa and Molina, 2015).	verifiability. We agree further efficiencies may be achieved using the techniques suggested, but feel they are outside the scope of this methodology and may be incorporated in future versions. See also response to comment 62.		
59	3	1; 3; 4; 5	Few if any FIA plots will fall within a given project. The spatial intensity of FIA plots is approximately 1 plot per 6000 acres.	The reviewer is correct. However, many FIA plots can be expected to fall within the region and forest types represented by participant sites under a PDA format. The development of a regional inventory for a PDA project should include a robust sample of FIA plots that can be stratified and compared to project site strata of the same definition.	See response to comment 54.	Issue closed.

60	3	3	Techniques used to define strata need to be documented and consistently performed when making comparisons across time. Furthermore, when using data in which strata do not play a role in determining sampling intensity (such as with FIA data and post stratification) it will be important that the area associated with a stratum is sufficiently large to address sampling intensity and area estimation.	Please refer to comments 2 and 6 regarding additional sample size and stratification parameters added during public comment.	See response to comment 54.	Issue closed.
61	3	1; 3; 4; 5	Remotely sensed data such as Sentinel 2 are readily available, have been successfully used to spatially quantify basal area, biomass, and tree counts, and can be used to track land use change, improve estimation, and account for localized differences from both	We agree that using remote sensed data, including Lidar and satellite imagery, is beneficial for developing the stratification and project monitoring for change detection. Language was added to section 3 and 5.2 for clarification after the	See response to comment 54.	Issue closed.

			design and model-based approaches. The benefits of using remotely sensed data include smaller sample sizes, the ability to census the landscapes, and reduced estimation error. It would be a good idea to allocate a section within the methodology to using remotely sensed data, what types of data will be allowed (spatial, spectral, and temporal resolutions), and techniques (design based) that incorporate remotely sensed data. Stratification is one such example but is relatively limited in application and does not fully leverage the potential of remotely sensed data. Others include generalized ratio and regression estimators (Gregoire and Valentine, 2008) and small area estimation	public comment period. See also response to comment 58.		

			techniques (Roa and Molina, 2015).			
62	3	1; 3; 4; 5	The regional estimation approach is only applicable in aggregate, across the region, and as a subset of FIA strata that are limited to nonindustrial private landowners and those applying for credits. It is not appropriate to draw design-based inferences from the regional estimates at project level scales without incorporating additional information. In this case, using regional stratum estimates alone to inform local populations would be considered a simplistic model-based estimate with no measure of model error. I would suggest modifying the regional based approach to incorporate small area estimation concepts or	Project proponents must demonstrate how they have incorporated small-area estimate concepts and additional information to ensure their use of FIA plots is appropriate for the scale of their project design. This must be documented in their SOP. Furthermore, Project proponents must demonstrate that the stratification of FIA plots is spatially explicit. In other words, the location of FIA plots must be specific to the location of mapped strata in the project region, and that their approach was unbiased.	See response to comment 54.	Issue closed.

			remove this option for quantifying GHG and Carbon for subpopulations of the region.			
63	4	whole	Generally this is a robust protocol. Main concern is lack of rigor in guidance for pairing FIA plots with project strata. Several public reviewers also targeted this issue.	Noted. Please see our response to comment 6 for more detail.	Thanks, and I appreciate the clarifications in response to comment 6. No further comment from me other than to note that this process should be a learning experience in the future	Issue closed.
64	4	whole	The version I was given to review seems to be the one that was released for public review and does not include the proposed modifications that resulted from the public review.	Sorry for this misunderstanding. The final public comment draft (with redline of changes resulting from public comment) will be provided separately.	OK	Issue closed.
65	4	1.3	I'm concerned about making the inclusion of dead wood pools optional. This could invite gaming of the system. For example, enrolling a project on	The methodology assumes that project activities will increase dead wood stocks compared to the baseline over the 40-year minimum project	I'm not so sure that project activities would always increase dead wood stocks. For example, if the activity were to remove unhealthy trees to allow others to grow better, those	While site-specific variations are possible, the overall impact of excluding standing dead in an aggregated project is expected to be conservative. Project Proponents may choose

			land that was disturbed and not counting emissions from dead wood decomposition. Also, I'm not sure why standing and down-dead wood are treated differently in terms of including these pools or not.	term, and hence, excluding dead wood stocks is conservative because their inclusion is expected to increase crediting. However, their inclusion comes at an additional measurement expense which does not always pencil out. In the existing carbon market, inclusion of standing dead wood is common while measuring lying dead wood is rarely included due to costs. As the methodology states, all pools included in the project must also be included in the baseline. Crediting is based on the difference between baseline and project stocks.	removed trees would likely have died. For standing dead trees, the additional measurement expense is rather trivial. In the end it will not matter much in most cases, so I am OK with your method for now. But with more dead trees because of drought and other disturbances, you might need to revisit this issue.	whether the additional measurement expense is warranted. We do plan to reassess this concern in subsequent versions of the methodology. *Note: Reviewer 4 responded with one general comment to the author team's round 2 responses (see below):* "I read over all of the comments and responses focusing on those still open. As far as I am concerned, my comments (reviewer 4) can all be closed. I think the responses to the open comments from other reviewers can also be closed, though I can't speak for those reviewers." Issue closed.
66	4	1.3	CO2 emissions from burning biomass -- carbon stock decreases due to burning	The pools included in this methodology were designed to promote operability and conservative accounting.	Sorry, but if you don't monitor dead wood and litter, you will not detect emissions from changes in these stocks. But perhaps	We agree that it is reasonable to consider this impact "de minimus" in relation to a projects overall carbon stocks.

			are accounted as a carbon stock change. I'm skeptical that inventories of C stocks would detect emissions (i.e. reduction in C stocks) especially from low severity fires.	It is not financially feasible to include and measure all carbon sources on the landscape. Stock decreases due to burning can reasonably be expected to be detected by measuring stock change.	these would nonetheless be "de minimus" and could be safely ignored.	Reviewer Response: Issue closed.
67	4	3	Stratification. As mentioned in my general comment, obtaining a statistically unbiased sample of inventory plot data requires a much more rigorous set of guidelines than presented. Experience in CA had shown that project developers can purposely select sets of "unbiased" FIA plots that consistently show that projects exceed the regional averages, thus gaining false credits.	While there are still many unanswered questions about the analysis and methods used by the group who disseminated their non-peer reviewed opinions about CA's ARB offset protocol program, we acknowledge your concerns. We feel strongly that changes made during the public comment process around the use of FIA plots (see response to comment 6) have increased requirements and obligations for Project Proponents to	I think you have done a better job explaining your approach for this round, and certainly better than the CA protocol.	Issue closed.

				demonstrate and document their approach and results for regional inventories so they may be fully inspected and evaluated for bias during validation and verification.		
68	4	3	"Established strata may be merged if reason for their establishment is no longer relevant or to improve statistics". Consider revising earlier reported estimates if the improved statistics show a reduction in bias.	ACR does not permit previously reported and credited ERTs to be revised based on improved statistics in a subsequent reporting period. Uncertainty calculations/deductions could be updated going forward based on the improved statistics.	Maybe ACR should be reviewed!	The methodology equations calculate ERTs on the basis of stock change from the end of the previous reporting period. Uncertainty and subsequent crediting is updated on a forward moving basis. Reviewer Response: Issue closed.
69	4	4.1	"…to perpetuate existing onsite timber producing species." May need to define "timber producing species", and what if the species change over time? e.g. from climate change	Rather than specifically defining "timber producing species", which vary by site and region, the methodology allows developer discretion in determining exact species to managed based on particular site	OK	Issue closed.

				characteristics. Choice of species must be confirmed by the VB and ACR to be reasonable for the site conditions and regional timber market.		
70	4	Equation 3	Should make it clear that "wood products" includes wood in solid waste disposal (landfills).	Clarification added in equation 3.	Thanks	Issue closed.
71	4	4.2.1	In addition to the 3 criteria shown for models, they should be validated for use in the specific ecosystems to which they are applied.	From section 4.2.1: "Modeling must be completed with a peer reviewed forestry model that has been calibrated for use in the project's specific geographical region(s) and approved by ACR. The GHG Project Plan must detail which model is being used and variants selected. All model inputs and outputs must be available for review by the verifier, and the VVB shall document the methods used in validating the growth	So, why not add the word "ecosystems" or a clear reference to "site-specific conditions" in section 4.2.1 after the words "specific geographic region(s)"?	Section 4.2.1 has been updated to address this suggestion. Reviewer Response: Issue closed.

				and yield model outputs in the Validation Report." Though "ecosystems" are not specifically referenced, regional and site-specific calibration and parameterization have been addressed in the selection of approved models and criteria established by ACR.		
72	4	4.2.4	The calculations of C in wood product is somewhat confusing. Particularly, I'm not sure how the calculation of the amount of C remaining after 100 years is applied as an average for a reporting period somewhere within that 100 years. Need more detail or an example. Maybe a text box.	Long-lived HWP's are accounted by determining amount of carbon in trees delivered to mills, adjusting for mill efficiencies and applying storage factors according to wood product class. Baseline HWP's are averaged over years 0 - 20 in equation 5. We have clarified a reference to a 100-year average in 4.2.4. step 5	OK thanks	Issue closed.

73	4	4.2.4	"…for landfill carbon storage, …. Assign a percentage to each product class for hardwoods and softwoods according to mill data or default values for the project." Very unlikely that mills will have this information, in my opinion.	While we agree this data may be unlikely, we provide the option to accommodate the case that specific mill information is available. A default mill data approach is provided for use on ACR's IFM website as an alternate option.	OK thanks	Issue closed.
74	4	5.6.1	Activity-shifting leakage -- shifting to other lands owned, or under management control, by the timber rights owner(s). This would be very hard to verify. I can imagine scenarios where landowners make arrangements with each other than cannot be easily uncovered.	Lack of activity shifting leakage (beyond de minimis) is a requirement of this methodology. Enrollment of all lands, owned or managed, is one option for demonstrating lack of activity shifting leakage. If this option is chosen, it must be verifiably demonstrated before credits may be issued.	I think it is written well, but still will be a challenge to verify.	Demonstration of lack of activity shifting leakage is already required in ACR's existing IFM methodology and has been verified for numerous projects. There are several options for demonstrating lack of activity shifting leakage detailed in 5.6.1. Regardless of the method chosen, verification must arrive at reasonable assurance for ERTs to be issued. Reviewer Response: Issue closed.

75	4	5.7.1	Market leakage -- This section is pretty squishy and does not seem to account for international responses to supply changes.	Please reference the attached position paper and the citations therein for the reasoning and justification for the adoption of a 20% standard deduction for leakage risk. See also responses in 32 and 33 above.	OK thanks, this is a difficult issue and I think you have made some good progress here to account for it.	Issue closed.
76	4	6.3.3.2	For paired tests, a minimum of 5% of the original forest inventory must be resampled. 5% seems very low.	The 5% plot remeasurement establishes a minimum threshold over which measurement procedures can be assessed. Plot selection must be risk based and non-biased, and further sampling or remeasurement is triggered where discrepancies in data collection and/or processing are identified.	OK	Issue closed.

COMMENT #54 CONTINUED (Reviewer response to authors):

"Comment 1-

With regards to using spatial overlays to extract plot values and assign stratum:

1. Defining strata spatially will be very important (this has already been covered) and it may be the case that regional areas with strata based on NIPFs may be spatially arranged such that they do not have 4 FIA plots located within the NIPFs. If this is the case, additional field plots will need to be collected to meet the 4 plot minimum. Finally, a MOU will need to be established with FIA to gain access to the spatial location of FIA plots. MOUs can be challenging to obtain.

With regards to non-spatially explicit stratification

2. If NIPFs boundaries are a sub-region of a given stratum and that stratum's mean and variance are being used to populate the sub-region, then the estimates derived for the stratum may not represent the sub-region and vice versa, even if the sub-region is part of the stratum. For this to be the case, sub-regions would have to be randomly placed within the stratum.

Comment 2 – Issue closed.

Author Response:

In response to comment 1:

1. Thank you for your observation regarding the spatial arrangement of strata. Yes, maintaining a minimum of four plots per strata could include additional plots or other stratification strategies. MOU's are a possible solution for the location of FIA plots, should the developer require exact plot locations.
2. We appreciate your observations. Any time strata level averages are used some sub-regions or in this case project sites may be under or over represented within known limits. However, the project region would be well represented using this strategy.

Reviewer Response:

"I appreciate the author's comments, the difficulty of the task ACR is attempting, and want to couch my comments within a broader context. I think what ACR is attempting to do is admirable and at the same time very difficult. The approach you have described falls in line with numerous designs that have been put into practice and appears to be addressing real world constraints while trying to accommodate statistical rigor.

Moreover, it is clear that the ACR methodology is trying to take a conservative approach to estimation and that there is precedent for the approach described.

As a researcher, I am tasked with exploring new questions and my work often brings me to the very forefront of new techniques and approaches designed to address existing limitations in estimation. However, those approaches can be extremely specialized and are often not available in an applied setting. As such, my comments might be better thought of as cautionary with regards to the ACR estimation approach and may point to future methodologies and techniques that when/if made easier to implement within the practitioner communities, will substantially improve estimation accuracy and provide more information for decision making.

Thank you for the opportunity to be part of the review process and please consider my comments to be addressed. I look forward to future collaborations." Issue closed.

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