SUMMARY AND RESPONSE TO PUBLIC COMMENTS

A draft *Methodology for the Quantification, Monitoring, Reporting and Verification of Greenhouse Gas Emissions Reductions and Removals from Improved Forest Management on Small Non-Industrial Private Forestlands*, was developed for approval by the American Carbon Registry (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 from April 16, 2021 – May 16, 2021. Comments and responses are documented here. If applicable, additional public comments received after the formal close of the public comment period are also documented herein.

#	Organization	Comment	Author Response
1	American Forest Foundation / TNC	1. Use of Forest Inventory and Analysis (FIA) data The opportunity to use FIA data to replace costly inventory plots on small landowners will undoubtedly help reduce a significant barrier to entry. However, to promote quality control with FIA data use, we recommend incorporating more strict requirements. Current guidance in the methodology states only that projects utilizing FIA data "are required to use stratification to estimate carbon stocks… carbon estimates must be representative of plot data within the discrete sampling frame of the project boundaries…[and] strata may be defined using a number of parameters." We are concerned that the amount of ambiguity left by this lack of specific guidance leaves open the possibility of 1) dissimilar FIA data being substituted for similar project areas and 2) under or over crediting for projects where selected FIA plots are a less suitable substitute for stands within the project boundaries. Specific guidelines for identifying FIA plots that are "representative" of the project area seem warranted. The use of physical proximity, a specific set of forest types, multi-species density metrics, and other predictive covariates would ensure that FIA data would more accurately reflect the project property under consideration. We agree with the set of stratification parameters suggested within the methodology but suggest the use of a more prescriptive approach to stratification in the use of FIA	We have added additional clarification in section 3 regarding stratification requirements for regional inventories, including: • FIA plots must be sourced directly from USFS FIA and not a third-party. • Project proponent must demonstrate the 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 as recommended by FIA - Bechtold, A. W., and P. L. Patterson., Editors. (2005). The Enhanced Forest Inventory and Analysis Program--National Sampling Design and Estimation Procedures. Gen.Tech. Rep. SRS-80. Asheville, NC: U.S. Department of Agriculture Forest Services, Southern Research Station. 85p. This added guidance will help ensure that FIA data is accurately reflecting the project sites under consideration. However, the methodology is intentionally not overly

		data. FFCP's Science Team has done extensive FIA covariate analyses that could inform these decisions.	prescriptive because there is not a "one size fits all" approach to project design and implementation. There is more than one way to develop a valid and sound regional inventory using FIA plots. The inventory design may also be a function of how a project proponent administers and implements the methodology and again, rigid, and overly prescriptive guidance can unnecessarily block innovation. To be clear, it is important that any inventory used with this methodology follow all applicable requirements and guidance in the methodology. When developing a regional inventory, the use of FIA plots and how they are stratified, must be clearly described, and documented in a stratification standard operating procedures document. The overall sampling design must demonstrate sound principles in forest measurements and statistics. *(Sect. 3) If stratification is employed, a stratification standard operating procedures (SOP) document detailing relevant design, inputs, parameters, rules and techniques must be provided as an attachment to the initial GHG Project Plan for validation. The stratification SOP document should contain information necessary such that the stratification can be examined and duplicated as necessary to provide reasonable assurance of the validity and non-bias of associated techniques.*

			(Sect. 6.1) Standard operating procedures and QA/QC procedures for forest inventory and modeling, including field data collection and data management, shall be documented. Use or adaptation of SOPs already applied in national forest monitoring (USFS FIA), or available from published handbooks, or from the IPCC GPG LULUCF 2003, is recommended.
2	American Forest Foundation / TNC	Relatedly, we feel there should be an explicit mechanism or standards for assessing how representative the selected FIA plots are of the project properties they represent. From one perspective, the Concept Validation described in the methodology seems to assess many of the mechanics of establishing a project using the regional inventory approach but does not seem to explicitly assess how representative selected FIA plots are of project properties. Furthermore, the ability of the Concept Validation to correct for insufficiently representative plot selection is further hampered by the fact that it "may occur before the first site enrolls". We suggest the development of an additional objective mechanism and standard for assessing the correlation between selected FIA plots and the project properties.	Regarding whether FIA plots can be considered representative of enrolled project properties, see response in comment 1. The Concept Validation can occur before the first site enrolls; however, all inventories and ERT claims are still subject to project validation and verification after sites enroll and prior to credit issuance. We have also clarified in the text (sections 6.3.1.1 and 6.3.1.2) that stratification falls within the scope of both the concept and project validation steps and lack of bias must be confirmed prior to issuance.
3	American Forest	Finally, given the proposal to use FIA data in place of on-the-ground inventory plots, it is critical to confirm that enrolled landowners are not substantially	Participation in this methodology inherently prompts a change in management (harvest deferral), such that comparisons of FIA plot data post-project start date is no

	Foundation / TNC	diverging from agreed practices, in order to prevent unrecognized reversals. Our current understanding of this methodology is that a field visit must occur once every five years on a subset of properties enrolled in a given cohort and that FIA plots are considered exempt from site visits. Though the Excel tool "PDA Verification of Small Non-Industrial Private Forestlands Site Visit Tool" does confirm that "additional critical aspects of the project must be part of the site visit", we feel the requirement of site visits at project properties employing the regional inventory approach should be made more explicit.	longer representative of the project inventory (FIA plots can and are periodically harvested). For this reason, we developed a site visit tool to assess landowner practices in the project scenario on the ground. We have now added change detection requirements to the methodology (sections 5.2 6.3.2.1 and 6.3.2.2) to ensure detection of enrolled landowners diverging from agreed practices. The site visit tool for projects that utilize a regional inventory also requires the verifier to confirm that enrolled landowners are not diverging from agreed practices (i.e., deferred harvest) using remote sensing and site visit observations.
4	American Forest Foundation / TNC	2. Baseline assumptions Thank you for improving equations addressing the scenarios regarding when t =T, t < T, and t > T (equations 6 through 10), as well as revising the denominator in equation 5 (now appropriately 21). We support these changes from previous ACR methodologies….	Thanks for this comment and encouragement.
5	American Forest Foundation / TNC	We appreciate the intention to update baseline assumptions for each 20-year crediting period. However, we suggest you consider updating the baseline more frequently for projects leveraging FIA data which is cyclically updated every 5 years.	See response in comment 3.

6	American Forest Foundation / TNC	We see mixed evidence to support the assumption that the "typical" small private forest landowner manages their forest to "maximize NPV of perpetual wood product harvests"--the baseline scenario used by this methodology. There is a rich literature on family forest ownerships from the National Woodland Owners Survey which calls into question this assumption. For example, "timber products" are cited as an important/very important motivation for only approximately 12% of ownerships and 34% of acres from a national survey of family forest ownerships >10 acres, (see Butler et al. 2021). Universal application of this assumption increases the risk of adverse selection of landowners. Thus, we suggest that clearer justification be provided for use of a NPV maximization baseline scenario.	Meta-analysis by Silver et al. (2015) supports that private landowner decision to harvest timber is often driven by exogenous (e.g., timber price or forest damage) and endogenous (e.g., debt to income ratio) factors beyond direct control of the landowner. It also confirms that while private landowners may own and manage their lands with a variety of intentions (many unrelated to timber revenue), landowner financial and personal circumstances are incredibly dynamic and prone to abrupt change, such that intent often does not equate to behavior. This is especially true over the relatively long periods in which timber is grown and managed. Hence, the assumption that landowner intention will equate to reality is not scientifically based and is an area in need of further research. This methodology (similar to the ACR IFM methodology) relies on quantitative principles of utility maximization as a predictor of landowner behavior. It is based on a robust body of work (see Newman and Wear 1993; Silver et al. 2005; Zhang and Schelhas 2005; Galik et al. 2012, Zhao et al. 2020 and citations therein) supporting the responsiveness of private landowners to timber price and NPV maximization. We argue use of an NPV maximization baseline is justified.
7	American Forest Foundation / TNC	The baseline discount rate of 5% for NIPF landowners was originally established in the 2011 ACR IFM methodology "Improved Forest Management (IFM) on Non-Federal U.S. Forestlands". Given our evolving	Regarding NPV maximization as a reasonable predictor of landowner behavior, please see our response to comment 6.

		understanding of landowner motivations and economic drivers to action, we recommend revisiting the applicability of this assumption and choosing a more accurate or conservative assumption. We fear that using overly aggressive discount rates in NPV analyses puts the credibility of such methodologies at risk, especially given the recent spotlight on methodologies that use this approach. Furthermore, the literature provides mixed evidence for the responsiveness of private landowners to simplistic models like NPV maximization, providing further incentive to use a conservative discount rate. We suggest the Silver et al. (2015) Evidence-based Review of Timber Harvesting Behavior among Private Woodland Owners as a useful starting place in evaluating the range of evidence.	Regarding revisiting NPV discount rates, recent analyses (Chuddy and Cubbage 2020, Cubbage et al. 2019) support that the 6% discount rate established in the ACR IFM methodology for U.S. private industrial forestlands is still valid. While discount rates for NIPF's are not as widely reported, it is well accepted that NIPF landowners often manage consistent with either joint optimization of timber and non-timber values (Pattanayak et al. 2002) or equivalent optimization of profit with a lower discount rate (Gan et al. 2001), such that their discount rate acceptance threshold can reasonably be expected to be lower than private industrial landowners and higher than public landowners (see also FIA analysis within "NPV citations and basis").
8	American Forest Foundation / TNC	3. Additionality Section 2.3.1 of the methodology states that current use/tax abatement programs are excluded from the Regulatory Surplus Test. The logic behind this is unclear given that these programs may mandate forestry practices that go beyond regional common practice and are in effect subsidized through public finance, thus undermining the assertion of regulatory surplus. The risk of this producing non-additional outcomes is likely to increase over time as states consider amending these programs specifically to incentivize carbon positive forestry practices. We recommend further investigation on this topic.	We now further clarify in section 2.3.1 that "This test must consider any and all legally binding constraints to forest management or requirements to manage according to a certain set of criteria or practices (e.g., forest practice rules)" and that "Conditions of non-regulatory requirements which do not present a legally binding encumbrance to forest management…are excluded from the Regulatory Surplus Test".

9	American Forest Foundation / TNC	4. Leakage a. The justification for the proposed 20% leakage deduction centers on the diversity of landowners involved in PDA projects and the complexity of non-economic drivers behind NIPF harvesting decisions. However, forest product markets are owner-agnostic, implying leakage assumption considerations should not center around impacts to specific landowner constituencies, but on the overall volume of material entering the marketplace. If a given NIPF landowner enrolls in a project under this methodology, when they otherwise would have harvested, that loss of volume will be felt in the market. This is true regardless of whether the timing of that landowner's harvest was predictable or not. As the climate impact from harvesting on any ownership type is the same, if a given NIPF's deferred harvest is compensated for by increased harvesting on industrial-owned lands, that should be considered leakage.	Leakage accounting is a fundamental to forest carbon offset projects and has been considered extensively in this methodology. The citations in the methodology support that, when compared, a large single owner project is expected to be a relatively higher leakage risk than a large project comprised of numerous smaller landowners. This is based on diversity in landowners and wood products as well as principles of elasticity. The 20% deduction in this methodology is consistent with relevant estimates of leakage in the literature and is conservatively applied to total ERTs (as opposed to difference between baseline and project HWP's).
10	American Forest Foundation / TNC	b. Furthermore, this methodology prevents harvesting altogether, with the slight except of *de minimus* harvesting for personal use or pest infestation. Assuming that some proportion of NIPF landowners will harvest in a given year, this implies that any application of this methodology that does not specifically target landowners who were unlikely to harvest their land will inherently involve a reduction in the volume of wood entering the marketplace. Given	See response in comment 9 above.

		this, we feel that further justification needs to be provided for the decision to decrease leakage from 40 to 20 percent.	
11	Bluesource LLC	1. Site Visit Requirements The Site Questions to Determine Acceptance/Rejection seem to be too limited in scope and appear not to adequately assess the stocking estimates derived from FIA data. With such a heavy reliance on the stratification to determine stocking for a project area, we believe there should be some check in the field to confirm that the stand CO2 estimates from the FIA data are comparable to what is actually on the ground.	A regional inventory is defined in the methodology as a statistically unbiased sample inventory plot data collected as part of the USDA USFS FIA continuous forest inventory program. FIA plot data may or may not be derived from within participant site boundaries. A regional inventory is established across a Project Region, defined in the methodology as the defined geographical extent within which qualifying sites may enroll. A project region is subject to validation and is only applicable to projects utilizing the regional inventory method. If a regional inventory dataset is employed, the methodology requires stock estimates within the project boundary to be estimated through stratified stand typing. 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 the project start date must provide this information within the Project Design Document appendix to the GHG Project Plan.

			When FIA plots are stratified, a project proponent can obtain carbon stocking estimates and evaluate the uncertainty associated with the strata estimates. Therefore, carbon stocks come from a stratified estimate of a discrete population of FIA plots where the strata size and weight are known. The methodology assumes that FIA's population and subpopulation estimates are reliable and follow a public, widely accepted, and robust methodology to estimate regional forest sampling attributes. Also see responses for comments 1, 2 and 3. Regarding field-based estimates of CO2 stocking, please see response #12 below.
12	Bluesource LLC	b. There could be some basic basal area checks on stands visited during the site visit. For instance, quick variable radius plots along transects in randomly selected stands could provide an estimate of stand basal area. As an example, a verifier could be required to take 5 variable radius plots in each stand along a specified transect length. If the average basal area found in the variable plots is determined to be >20% lower than the predicted basal area from the FIA data, then this could trigger further examination of the stand stocking predictions. Conservative (higher than predicted) estimates should be allowed. Verifiers could perform checks at randomly selected stands at each property they visit. Such an approach would prevent	It can be expected that some stands will be below the strata average. However, it can also be expected that a similar number of stands will be above the strata average. Therefore, while it is possible for sites selected for a site visit to fall below the strata average, that doesn't necessarily warrant further examination of stand stocking predictions. In response to comment 1, additional stratification requirements regarding minimum number of total FIA plots and minimum number of plots per strata were added. Given strata means and uncertainties are calculated from sample data, the central limit theorem applies in this situation and

		bad stratifications that overestimate CO2 from entering in the project and could help identify such issues from the outset.	means and uncertainties can be expected to be normally distributed. If the stratified estimates were to be validated by a sample collected by the verifier, the correct procedure is to propose some sampling design equal or better than the FIA sampling design, conduct the sample and compare either basal area, volume, or biomass with the original stratified estimator. Using any method less than the FIA sampling design, one would expect some bias to be introduced. The methodology recognizes the FIA inventory is a trusted, reliable and unbiased source of plot data. Validation of FIA data collection procedures is beyond the scope of this methodology. Also see responses for comment 11.
13	Bluesource LLC	c. If forest types are utilized in the stratification approach as a proxy with FIA data they should also be checked in the field. Since the project stratification is used to determine the estimated project CO2, there should be some confirmation of the correct forest types are being estimated. Even if the forest types do not conform exactly, they should be checked to prevent project proponents from choosing forest types with advantageous stocking estimates that do not match with what is found on the property.	When FIA plots are stratified, a project proponent can obtain estimates of interest and evaluate the uncertainty associated with the strata estimates. It is the uncertainty associated with the strata estimates that validates the stratification scheme, and less so the name or label of the strata. Also see responses for comment 1, specifically “Project Proponent must demonstrate that the stratification of FIA plots is spatially explicit, and the same stratification rules were used to determine carbon stocks of participant sites”

14	Bluesource LLC	d. In general, there should be more details on how verifiers should assess the adequacy of the stratification during the site visits. Since project proponents can stratify however they want, but the CO2 estimates are dependent on the validity of the stratification, more details should be included in the methodology on how verifiers are to examine and confirm the adequacy of various stratification approaches. For example, item 5 in Table B. Site Questions to Determine Acceptance/Rejection could ask "Does the Project's stratified stand typing show reasonable agreement with the FIA stratification typing on a few randomly selected stands within the site?"	See responses for comment 11, 12 and 13.
15	Bluesource LLC	e. If verifiers determine that stratification approaches are not accurate, ACR could consider enforcing uncertainty discounts to account for the uncertainty in the unreliable stratifications.	All stratification approaches must demonstrate they are valid and statistically sound. They must also apply uncertainty discounts using the formulas and thresholds prescribed in the methodology.
16	Bluesource LLC	2. Desk Verification Requirements a. There should be a standardized list of required documents from every participating landowner to prove eligibility.	We have now added a new section (1.3) prescribing standardized requirements for each site.
17	Bluesource LLC	b. There should also be a standardized checklist for verifiers to know an adequate number of deeds/easements that need to be reviewed to pass verification. If there are thousands of landowners	This requirement for verification is governed by the ACR Validation and Verification Standard, specifically the risk-based assessment described in section 10.A "Verification of

		participating in a project, there needs to be a systematic way to prevent ineligible landowners from entering into projects. A couple documented cases of ineligible landowners receiving credits could quickly diminish the legitimacy of the methodology and the credits generated from these projects.	Aggregated Projects" and section 10.B "Programmatic Development Approach."
18	Bluesource LLC	c. There should potentially be a remote sensing check incorporated into the desk verification process. Desk verifications could potentially require change detection to find any unsanctioned logging activities or large-scale disturbances that were not reported. The onus could even be put on the project developer to provide a change detection map at every desk verification, and the verifiers could verify the methods used to identify changes. With such scattered project areas and so many participating landowners remote sensing should play more of a central role in the development and verification/monitoring of these projects.	The methodology requires that the proponent must provide verifiable evidence to support the site stocking assertions and project compliance. Change detection has been added as a tool to ensure detection of landowners diverging from required practices (i.e. deferred harvest; also see response 3).
19	Bluesource LLC	3. Stratification a. The stratification examples given may not be representative of the carbon stocking and might lead to estimates of carbon stocking that are higher than actually present.	See response for comment 1, 11, 12, 13 and 20.
20	Bluesource LLC	b. The only examples given in the methodology that would be a decent proxy for average CO2 are size and density class and age class. More relevant examples	We have revised the stratification parameter examples as suggested.

		such as these should be provided and the other ambiguous examples should be removed.	
21	Bluesource LLC	c. The methodology should provide more concrete examples and requirements on how to adequately stratify projects so that stand attributes can be closely aligned with what is available in the FIA data.	See responses for comment 1, 11, 12 and 13.
22	Bluesource LLC	4. Remote Sensing a. We would like the methodology to explicitly state that it is acceptable to utilize inventory data that has been verified under other ACR approved carbon protocols for remote sensing model calibration and accuracy assessment. Since the CO2 of other properties enrolled in such carbon protocols is publicly known, utilizing this data to assess the accuracy of projects enrolled in the small landowner IFM program would be a valuable tool. A caveat should be provided that the volume/biomass/carbon equations need to be the same as the project when using training data from other carbon projects.	Regional inventory biomass and carbon estimates must be derived from USDA FS FIA plot data, as prescribed by the methodology. Using data from other ACR projects to directly estimate carbon is not allowed. However, remote sensing may be used to inform stratification, assuming methods and datasets are appropriately defined and verified (see response 3).
23	Bluesource LLC	b. Similarly, ACR could use other carbon projects in regions with small landowner projects to assess the accuracy of stratification and remote sensing quantification approaches.	See response to number 22 above.
24	Bluesource LLC	c. The methodology should explicitly state that it is acceptable to utilize LiDAR data with verified inventory	The use of LiDAR data for stratification would be allowable under the methodology, along with a range of other remote

		data (from other verified carbon inventories) to develop models for predicting CO2 stocking estimates for properties enrolled in small landowner projects.	sensing tools (now explicitly mentioned in section 3). However, inventory data used to develop growth models and quantify carbon stocks must come from either a project-level inventory (i.e. data from within the Project Area) or a regional inventory. See also response 22.
25	Bluesource LLC	d. If a project proponent can prove that a remote sensing approach is more accurate than a regional inventory approach, ACR should consider this as an acceptable way to determine project stocking.	See responses to 22 and 24.
26	Bluesource LLC	e. ACR could consider using remote sensing to provide another level of verification of project stocking estimates. If there is LiDAR data publicly available in a given area, ACR could utilize their own remote sensing methods to provide another check on project stocking estimates. Incorporating remote sensing at a programmatic level might help uncover examples of bad stratifications that could lead to unreasonable CO2 estimates for different properties. It could also flag instances of unreported harvesting and disturbance events.	We have added a change detection requirement to ensure adherence to the project activity. LiDAR is a potential tool that could be used by the validation/verification body to assess stratification and stocking estimates.
27	Forest Carbon Works	Site Visit Tool This methodology places narrow restrictions on verifier scope, to the point where it brings into questions the comprehensiveness and validity of the verification audit. Carbon stocks for projects utilizing regional inventories are, by definition, insulated from verifier scope under this methodology.	See responses for comments 1, 2, 3, 11, 12, 13 and 15.

		While the FIA data can be considered accurate, no real test or accuracy metric is required within the methodology or site visit tool to evaluate whether the project area contains the number of avoided emissions claimed. How can credits generated under this methodology, and approved by ACR, be viewed as legitimate by the market if there is no guarantee that each credit represents a real avoided emission.	
28	Forest Carbon Works	What is the purpose of conducting the site visit? It seems the verification body would not be conducting a single material check on the creditable carbon stocks claimed by the project developer while onsite. The VVB review would be limited to confirming project area boundaries and conducting spot checks of the stratification.	See response for comment 1, 2, 3, 11, 12, 13 and 15.
29	Forest Carbon Works	Regional Inventory The regional inventory approach is too broad and needs to provide specific instruction on how to appropriately select which FIA plots are eligible to be considered. What is the maximum allowable distance a FIA reference plot can be from the project area? 10 miles? 100? 500?	See response for comment 1, 2, 3, 11, 12, 13 and 15.

30	Forest Carbon Works	How would a project developer determine which FIA plots in a region would qualify for selection when establishing the statistically unbiased sample of inventory plot data described in the methodology? It seems that FIA plots would be eligible for selection if they shared the same stratified stand typing as found within the project area. What is preventing a project developer from identifying the FIA plots that are most favorable for project design, then defining the stratification parameters to reverse engineer a project-level stratified stand typing that enables the use of the most favorable plots?	See response for comment 1, 2, 3, 11, 12, 13 and 15.
31	Forest Carbon Works	Crediting period What is the benefit to designating cohorts as non-crediting after the initial crediting period? The benefit is that designating a cohort as non-crediting means that site visits are no longer necessary. How can ACR verify that all credited carbon stocks remain standing if verification teams are not required to go onsite? ACR would have to rely on self-reporting from the project developer.	Monitoring procedures of crediting and non-crediting sites must be described in the Monitoring Plan section of the GHG Project Plan. This includes parameters, data sources, methods, frequency and QA/QC procedures. Monitoring Plans will be validated by the VVB. We have also added change detection procedures to the methodology as an additional systematic check to identify divergence from project activities (see comment 3).

		If a single project developer were to use this methodology to enroll tens, hundreds, or even thousands of landowners, how could that single developer be able to monitor harvesting activities across all landowners? Especially considering these areas would no longer be generating revenue for the developer.	
32	Forest Carbon Works	What is preventing a non-crediting cohort from experiencing activity shifting leakage?	Non-crediting sites are those which do not renew participation/seek additional crediting after the first crediting period. These sites may harvest but are required to demonstrate permanence (retention of stocks above previously issued levels) for the duration of the project term. These sites do not have potential for activity shifting leakage because they are no longer subject to harvest deferral requirements. Essentially, these lands would be entering the wood product market with eligibility to harvest any stocks in excess of previously issued levels.
33	Forest Carbon Works	Stratification • The methodology allows for the with-project and baseline scenarios to use separate stratifications. What is the rationale for allowing this? Please provide an example of when this would be appropriate.	We have added clarity in the text (Section 3) that "The stratification must be the same for the baseline and with-project scenarios for the estimates of initial stocking levels. However, the number and boundaries of strata may change during the crediting period (ex post) as baseline and with-project management practices diverge".
34	Forest Carbon Works	For the regional inventory approach, the strata delineation will be a major driver of project carbon stocks.	See responses for comments 1, 2, 3, 11, 12 and 13

		What prevents a developer from cherry picking the most advantageous stratification from a carbon stock, rather than statistical, perspective? Ex. What if location and management regime are used to stratify a project, but the FIA area is known (publicly available) to have a higher SI than the project area, thus resulting in greater crediting from carbon accretion for the project area over reality?	
35	Forest Carbon Works	Uncertainty • How would a project combine cohort-level uncertainty, into project-level uncertainty? What procedure should be used?	We have clarified the method of determining uncertainty in sections 4.2.2., 4.3 and 5.8 of the methodology. This process is further described in section 3.3.1 of the ACR "Aggregation and programmatic development approach guidance for improved forest management".
36	Forest Carbon Works	Other • Why are voluntary BMPs excluded? The CARB requires these BMPs to be followed as they provide important protections to streams, rivers, and waterbodies. How does this methodology ensure protections for water and wildlife?	As described in section 2.3.1 and response 8, all legally binding constraints to forest management must be considered in determining whether the project activity exceeds regulatory surplus. Voluntary commitments and optional guidelines (such as BMP's) without enforcement mechanism are not considered legally binding in the Regulatory Surplus Test or baseline modeling.
37	EP Carbon	Start Date for the Reduction of GHG Emissions The American Carbon Registry defines the start date as the date by which the project began to reduce GHG emissions against the project's baseline. The project's baseline is "legally and financially feasible harvesting scenario that seeks to maximize NPV" as defined in section 4.1. Therefore,	This methodology defines additionality as "…in addition to reductions and/or removals that would have occurred in the absence of the project activity and without carbon market incentives". Additional projects invoke either a management

		the start date must be the date on which the project avoided legally and financially feasible harvesting to reduce GHG emissions relative to this scenario. The methodology provides for four possible events to establish start date: 1. The date that the Project Proponent initiated a forest carbon inventory (project-level inventory only) 2. The date that the Project Proponent or landowner entered into a contractual relationship to implement a carbon project 3. The date the project was submitted to ACR for listing review (only applicable for sites identified in the listing application) 4. Other dates may be approved by ACR case-by-case on the basis of verifiable evidence of reasonable intent to engage in a carbon project Our concern is that none of these events avoid legally and financially feasible harvesting as of the dates of these events. In order to reduce emissions on day one of the project, there must be a corresponding emissions event in the baseline of the project on day one otherwise there cannot be a reduction of GHG emissions on day one. To protect the environmental integrity of the stated emissions reductions first reported by the project, the American Carbon Registry should consider requiring evidence of a planned or eminent harvest as of the start date. Evidence for this could be provided in a documented management plan, harvest contract or cession of harvest presently underway.	or policy change resulting in more carbon sequestration than would've occurred in its absence. The 3 options presented for determining start date demarcate initiation of a policy change to sequester carbon with the start date for each site representing a legally binding commitment to sequester more carbon than would've occurred in the project absence. The alternate start dates you suggest (evidence of planned or imminent harvest) would likely be eligible under option 4 (case-by-case approval by ACR). In this methodology, the basis of landowner decision to harvest in the baseline is determined by the principles of NPV maximization. Baseline harvests (and associated emissions reductions) only occur on sites/forest conditions demonstrating profitability above the NPV maximization threshold (determined by discount rate). As such, any harvest that occurs in the baseline (day 1 or later) can reasonably be expected to have occurred in the absence of the project.

		A carbon inventory or a contractual relationship to implement a carbon project or the listing of the project do not sufficiently demonstrate the date on which the project began to reduce GHG emissions because they fail to acknowledge the baseline of the project. None of these events reduce emissions.	
36	EP Carbon	"A real offset yields after-the-fact." As quantified by equation 4, the methodology is proposing to average baseline carbon stocks over the first twenty years of the project. As quantified by equation 8 and illustrated by figure 1, the project baseline becomes this average. While the figure appears to reflect a *gradual* change in the baseline to this average, the mathematics of equation 8 do not necessarily reflect this same gradual change. In the application of equation 8, the methodology fails to prevent the case where ΔC_{BSL} is greater than or equal to the average in year one to ensure the gradual change depicted in figure 1. Landowners need only model a significant harvest in year one to immediately arrive at the 20-year average. Nothing prevents the project from modeling a fabricated harvest in year one to arrive at this "before-the-fact" scenario as the methodology does not require documented evidence for such a harvest as of the start date. Projects for landowners who have no intention of harvesting in year one of the baseline will immediately receive credit for the difference between the twenty-year average and initial carbon stocks.	As explained in response to comment #35, optimal rotation (magnitude, type and timing) of the baseline regime is constrained by the principals of NPV maximization. The baseline scenario cannot be "fabricated". Rather, its timing, rate and choice of harvest removals must be justified as a function of current forest conditions and acceptable rate of return. As stated above figure 1, "Prior to time T, the projected stocking levels are used for the baseline stock change calculation…" and "…thereafter, the long-term average stocking level is used in the baseline stock change calculation…". These steps are modeled on an annual basis over the crediting period duration, consistent with ACR's IFM methodology v1.3. You're correct this methodology differs from IFM v1.3 when calculating ERT issuance (equation 23). Rather than crediting stock change prior to year t=T we equally distribute credit issuances across all years, resulting in a greater proportion of credits being awarded in later years of the project. This change is conservative and was purposely incorporated to

		In addition to requiring documented evidence of avoided emissions as of the start date, the methodology should establish criteria for baseline modeling to prevent the before-the-fact gaming of the project baseline. These criteria should consider the prescriptions and timing of harvests determined by an independent forester, state or government agency. Projects should be prohibited from modeling timber liquidation events in the first ten years of the baseline unless the prescribed criteria are meet and sufficient evidence has been provided to support such a planned or eminent liquidation event. Alternatively, as a conservative approach, ACR should consider using a linear baseline to arrive at the 20-year average over the course of the project lifetime to avoid the forward crediting event. We are highly concerned about the present lack of clear requirements and criteria to ensure the environmental integrity of the project baseline, and the potential for the exploitation of equation 8 to artificially credit before-the-fact emissions reductions. It is paramount that the American Carbon Registry justify and transparently document the methodical creditability in the establishment of the project baseline, especially with respect to the likely magnitude and timing of baseline harvests at the outset of the project activity.	prevent a "front-loaded" ERT issuance under the premise of modeling a simultaneous timber liquidation event across the diverse set of landowners eligible for this methodology.
37	EP Carbon	The methodology proposes using a performance standard to demonstrate additionality using adoption rates and penetration levels. While we support this approach to project additionally, we have concerns about the definition	We agree that the project activity is deferred harvest, but disagree that penetration rate is based on certification or easement enrollment. Rather, penetration rate is based on harvest deferral rates and carbon market (and associated

		of the adoption rates and penetration levels. The project activity is to reduce emissions by extending rotation or deferring harvest, while the penetration rate is presently based on enrollment in certification programs and recording of conservation easements. The common practice analysis conflates harvest deferral and these largely unrelated activities. To demonstrate the additionality of projects -- which can vary widely in terms of landowner motivations -- projects should use a project-level assessment for additionality. The absence of landowner adoption in certification programs or conservation easements does not imply that landowners are not deferring harvests. To the contrary, landowners may have no intention of harvesting in their lifetimes and therefore harvests have already been deferred and the project is not really additional. To demonstrate the additionality of projects, Appendix A cites financial and institutional barriers to meet the performance standard. In this respect, the argument fails to relate the fundamental GHG emissions reduction activity of deferred harvesting to additionality. Financial and institutional barriers for project development, inventory and MRV procedures are not barriers to deferred harvest. Instead, these are barriers to carbon project development which has no bearing on whether the deferred harvesting activity would have happened in the absence of the project. The blanketed performance-based approach to determining additionality is not tied to the actual GHG emissions activity nor does it reflect landowner-specific intentions. Landowners may elect to enroll constrained riparian areas,	harvest restriction) participation. In referring to the 40-year stock commitment and conversion likelihood, our points demonstrate that NIPF enrollment in long-term management commitments (especially legally binding harvest restrictions that persist as land transfers ownership) is extremely rare and is not common practice. The financial and institutional barriers emphasize scale issues that have previously precluded NIPF's from enrolling in carbon projects and obtaining carbon finance in exchange for harvest deferral. Regarding the performance standard approach used in this methodology, we contend that it does adhere to a "project" (i.e., site) level determination of additionality. Each site must demonstrate they meet the applicability conditions (section 1.2) and site-level requirements (section 1.3) for which the performance standard was designed. Because baseline harvests are constrained by a legally permissible harvest scenario of NPV maximization, enrolling constrained riparian areas, areas under restricted harvesting easements or other areas where harvesting is not legally allowed/financially feasible would not lend itself to credit "gaming". Rather, these circumstances would be represented as baseline constraints to harvest and would not result in crediting as emissions reductions.

		areas under restricted-harvesting easements or landlocked areas in the carbon project where harvesting may not be allowed or financially feasible because the methodology lacks a project-level tool. The methodology should apply a project-level tool for additionality. As presently structured, the application of the performance standard does not demonstrate additionality of the underlying GHG emissions reductions activity. The American Carbon Registry must carefully consider the justification and appropriateness for the proposed application of the performance standard for additionality, and given the diverse set of possible landowner intentions, should strongly consider a project-level test for additionality tied directly to the underlying GHG emissions reductions activity.	
38	EP Carbon	The American Carbon Registry requires permanence in credited emissions reductions. The methodology proposes to meet this requirement using the project minimum term of 40 years during which time the project is subject to monitoring, reporting and verification (MRV). However, the methodology fails to provide criteria, frequencies and limits to measurement methods for MRV that may be validated as part of the Project Plan. For example, the methodology does not provide criteria for change detection from remotely sensed data, minimum accuracy thresholds for mapping or frequency of map updates. Nor does the methodology identify limits on inventory methods that may be unable to reasonably detect	This methodology falls under the scope of the ACR Standard, which states "…projects must commit to maintain, monitor, and verify project activity for the minimum project term of 40 years". Project Proponents are required to commit to legally-binding reversal risk mitigation mechanisms to assess and mitigate any losses of sequestration. The Project Proponent is required to monitor and report any divergence from the project activity – deferred harvest. Confirmation of deferred harvest is required to be assessed both in full and desk-based verification. We have also added change detection requirements to the methodology (see response 3).

		emissions from limited project-level inventory, the use of regional FIA averages or from remotely sensed data. As part of the scientific review process, the American Carbon Registry should engage a qualified biometrician and remote-sensing expert to further define the limits and criteria for applicable MRV procedures to help ensure the permanence of reported GHG emissions reductions by projects applying this methodology. As presently written, the MRV procedures provide little to no assurance for the accurate and consistent accounting of long-term atmospheric benefits.	
39	EP Carbon	The methodology does not require the quantification of activity-shifting leakage. Rather, it specifies the proponent shall meet one of three criteria to demonstrate no activity-shifting leakage: • Management certification on adjacent tracts or groupings that are 40 or more acres in total size. • Adherence to a long-term forest management plan or program. • Disclosure and professional review of harvests outside project boundaries. Consider a forest landowner that owns 80 acres. This landowner can enroll half of their ownership in the project and then immediately harvest the other half of their ownership without having any management plan, certification or professional review. As written, nothing in the methodology prevents this case of activity-shifting leakage.	This methodology operates under the assumption that 40 acres represents a parcel size that is commensurate with the minimum operable acreage for NIPF's, a break point below which small parcels are more likely to be managed for higher and better use rather than long term forest management, and a common small NIPF parcel size in regions where metes and bounds property descriptions are not common. In the example of an 80 acre ownership harvesting half (40 acres) of their ownership, they would be required to demonstrate lack of activity shifting leakage on all eligible non committed acres via one of the three methods currently listed in the methodology. We appreciate the suggestion to include more detail for the reporting of silvicultural status of harvests on non-committed lands. We have added further specifications related to qualified professional forester harvest inspection reporting in 5.6.1. We have also removed the "contiguous" specification for triggering professional forester review.

		With respect to management certification and adherence, the related criteria do prevent activity-shifting leakage as the proponent may simply amend their management plan to increase the intensity of harvesting in areas not enrolled in the project. With respect to professional review, the criterion is limited to harvests of 40 contiguous acres or greater. This requirement is easily gamed by implementing non-contiguous harvests less than 40 acres. Further, the methodology fails to specify the criteria or data sources that the Qualified Forestry Professional must apply in determining whether disclosed harvests are divergent from silvicultural or sustainable norms. Lastly, the methodology fails to provide any GHG accounting for projects where these criteria are not meet. The American Carbon Registry should strongly consider revising methods for activity-shifting leakage to prevent gaming and to ensure that leakage emissions are fully accounted for where harvesting may have occurred outside of the project boundaries. As presently proposed, the methodology fails to quantify leakage emissions and fails to establish any meaningful criteria to prevent activity-shifting leakage. Landowners mat elect to enroll the least merchantable or constrained areas in a carbon project, while harvesting intensively outside the project boundaries.	As the methodology states "There may be no leakage beyond de minimis…". Sites demonstrating activity shifting leakage are not eligible to enroll or continue participation under this methodology if they cannot continually demonstrate lack of activity shifting leakage.
40	EP Carbon	The methodology allows for the us regional FIA data to establish regional. This does not meet the Tier 3 requirements for IPCC GPG that require project-level	FIA data from the project region must be used to derive biomass and carbon estimates. Stratification is performed using FIA data with unknown plot locations. Carbon

		measurements. Regional averages may be applied to project areas that are not representative of the FIA data used to establish the regional average. In some cases, the actual project stocks will be lower than the regional average which is not conservative. At a minimum where FIA regional averages may be utilized, Tier 3 data at the project-level should be used to statistically infer the appropriateness of the application the FIA regional average. Alternatively, the methodology should prohibit the use of FIA regional averages in favor of Tier 3 project-level inventory in conformance with the IPCC GPG. Uncertainty calculations provided by equations 13, 20 and 21 fail to include substantial sources of uncertainty needed to meet the principle of conservativeness: • Equation 13: Baseline uncertainty is determined as the *sampling uncertainty* for the baseline carbon stocks based on the *initial* inventory. It fails to account for the *predictive uncertainty* for the baseline carbon stocks as a result of *modeling* over time. Not accounting for predictive uncertainty in the baseline grossly underestimates overall uncertainty. Further, as proposed, equation 21 effectively cancels out baseline uncertainty all together at the outset of the project by essentially averaging uncertainty in initial carbon stocks twice, the average of which is just simply the sampling uncertainty in the initial carbon stocks. Therefore, there baseline uncertainty is not effectively accounted for in equation 21 despite having equation 13. • Equation 20: Project uncertainty is determined as the sampling uncertainty for the project carbon stocks over	estimates at the site level are equally likely to come in over the strata average as they are to be below it, resulting in an outcome at the project level that is acceptable in its conservativeness and within known bounds. Please see other related comments (particularly 1, 11 and 13) for further explanation. We have added additional text in section 4.3 of the methodology to clarify that “Model uncertainty is not included in the assessment of baseline or project uncertainty. Standardization of models for baseline and project projections should minimize the impacts of model uncertainties on differences between baseline and project values”. We apply transparent, consistent and unbiased methods of estimating means and uncertainties, therefore reducing the risk of bias. Ultimately, credits are calculated based on differences between two estimates derived from the same model.

		time. It fails to account for the uncertainty related to remote-sensing error in mapping and map updates over time. Therefore, project uncertainty is underestimated, especially in later years of the project. The American Carbon Registry should consider all sources of uncertainty and require a monte carlo simulation to estimate uncertainty in the baseline model. As presently defined, equation 21 significantly underestimates uncertainty in quantified GHG emissions and simply equates to the sampling uncertainty in the initial in inventory.	
41	South pole	Suggestion to include the potential to apply the methodology outside of the US by indicating which parameters need to be aligned	Due to underlying data requirements (i.e., USFS FIA plot network) this methodology is currently only applicable within the U.S.
42	South pole	Include utilization of wood, which is not processed in sawmills but permanent wood storages, specifically biochar	Sections 1.3 and 4.2.4 define the eligible long-lived wood product classes in ACR accounting: in-use and landfill. Biochar is not an eligible long-lived storage pool in this methodology.
43	South pole	Is it possible to include non-mill processed products, which have stable wood character? Can a thoroughly peer reviewed document replace a mill-report?	Section 4.2.4 states that if a verifiable mill report cannot be obtained, the Project Proponent must assign weighted default wood product classes for the project's Assessment Area.
44	South pole	Can the decay of biomass in the forest be accounted for in the baseline for utilization of woody biomass?	Decay of biomass is accounted for eligible wood product classes listed in section 4.2.4 step 3.

45	South pole	Is sustainable harvest / felling for increasing tree growth (forest regeneration) possible with a certain offtake quota?	Harvesting is not a permissible under this methodology. However, a subset of management activities such as firewood harvesting, creating small clearings and cutting to mitigate pest and disease outbreaks is permitted. Section 5.5.1 also states other permitted management activities may be considered on a case-by-case basis with VB and ACR approval.