Reponses to Comments on "Improved Forest Management Methodology for Quantifying Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands"

Item	Reviewer Comment	Response
A1. Forestland definition: Forest land is defined as land at least 10 percent stocked by trees of any size, or land formerly having such tree cover, and not currently developed for non-forest uses. The minimum area for classification as forest land is 1 acre	This makes the definition congruent with the U.S. definition in the Standard. As written, though, the definition of "stocking" is vague – purposefully so? What is the reference – maximum SDI? A-line stocking on applicable stocking charts? Stocking using the complicated FIA stocking algorithms in Arner et al. 2003? The latter would seem to make the most sense since the definition is tied to the national agency definition in which the project is located, but this algorithm is extremely complicated to apply. I'm not sure of a work-around for this, as it probably depends on what the original intent was. I might suggest more standard terminology for area, like "minimum mapping unit". Features smaller than the minimum mapping unit cannot (based on technology)/need not be identified, and features larger than the minimum mapping unit shall be identified. Was the intent to avoid small slivers of project area? Could this be clarified by stating "The smallest discrete, non-contiguous area considered for inclusion in the project area shall be no smaller than 1 acre."? As written, it would seem like one interpretation of this would be that each individual acre of a proposed project area must be at least 10% stocked by trees. Is that the intent? Or should there be another sentence that says, "Land proposed for inclusion in this project area shall meet the stocking requirement in aggregate over the entire area." Taken with the change in §B.1 that "Proponents must demonstrate that the project area, on average, meets the definition of Forestland provided in Section A1 above", the minimum area/MMU issue may be moot.	The purpose of this change is to avoid a situation where a harvest causes the entire project to temporarily not meet the definition of forestland, which would cause it to violate the project eligibility requirement that "Proponents must demonstrate that the project area, on average, meets the definition of Forestland provided in Section A1 above." We propose striking "The minimum area for classification as forest land is 1 acre," and adding "Land proposed for inclusion in this project area shall meet the stocking requirement, in aggregate, over the entire area."

A1. Tree Definition: A perennial woody plant with a diameter at breast height (4.5') greater than or equal to 1" and a height of greater than 4.5'	I appreciate the change in lower bound and the switch to English units. As written, this definition would not seem to exclude mountain laurel, witch-hazel…things typically thought of as shrubs. Is this intentional? Thus all trees sampled, live or dead, must be ≥1.0 in. dbh and ≥4.5 ft. in actual height (i.e., to the point of the break). Correct?	It was not our intention to include shrub species. We have changed the definition to the following: "A perennial woody plant with a diameter at breast height (4.5') greater than or equal to 1" and a height of greater than 4.5', with the capacity to attain a minimum diameter at breast height of 5" and a minimum height of 15' (shrub species are not eligible).
A1. Unmanaged stands Definition: Areas greater than 20 acres in size demonstrating mature stand characteristics that have not been subjected to timber harvesting activities within the last 50 years	Should these areas be contiguous, but allowed to be separated by roads, natural features such as streams, etc.? Also, in searching the rest of the protocol, it isn't clear that the "managed/unmanaged" distinction is actually an important criterion, but just used to highlight how important the dead pool might be likely to be in a given project. Is a definition really necessary?	The definition is not used in the protocol, so it has been stricken from the methodology.
A2. Applicability Conditions: ownerships subject to commercial timber harvesting in the with-project scenario must be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date.	I could envision a situation where a project commences with no plans for timber harvesting and so does not have a plan at or within one year of project commencement. Fifteen years later the landowners would like to cut. Are they out of compliance since they didn't have a plan? Also, how come the FSC/SFI/ATFS plan has to be completed in the first year, but not a state/federally-sanctioned plan? Perhaps some kind of circuit breaker could be applied such that: If commercial timber harvesting is underway in the first reporting period of the with-project scenario on public non-federal ownerships, the property must: -be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date; or -have its forest management plan sanctioned by a unit of elected government officials within a state, or a state agency, or a federal agency within one year of the project start date; -and have its forest management plan updated at a minimum every 10 years.	Changed the language to read: "Private or non-governmental organization ownerships subject to commercial timber harvesting at the project Start Date in the with-project scenario must be certified by FSC, SFI, or ATFS or become certified within one year of the project Start Date. If there are no ongoing harvests at the project Start Date, but harvests occur later in the project life cycle, the project area must become certified before any commercial timber harvesting can occur" The language for public non-federal ownerships has been similarly changed. Also, we added a bullet saying "Please note that any such forest management plans must be updated at minimum every 10 years"

	If commercial timber harvesting is to occur later in the project life cycle, one of the above plans must be in place and approved prior to the commencement of harvesting. Or, simply clarify the language in bullet points A.2-3 and A.2-5 to distinguish between lands where commercial timber harvesting is forbidden through deed or other legal mechanism, and lands where commercial harvesting could occur. For example, for bullet point A.2-3, "Private or non-governmental organization ownerships that could be subject to commercial timber harvesting..."	
A2. Applicability Conditions:	Is there a way to group these bullet points to have the applicability of the Boolean operators be a bit more clear? For example, can you use either of the first two bullet points, but no matter which option, have the plan must always be updated at a minimum every 10 years?	The bullets have been edited to make it more clear that any such forest management plans must be updated at minimum every 10 years
C2. Baseline Stratification: Age Class	Agree with this, but if this list is non-exhaustive, and Blue Source was concerned that not having an item in this list would mean that it might not be able to be used as a stratification criterion, would it be simpler to just explicitly state this list is non-exhaustive?	We have added a footnote saying "Please note this list is not exhaustive and only includes examples of some common stratification parameters.
C3. Baseline Net Removals and Reductions	I think I understand the intent with changing the number of observations for the stocking calculations. The first observation, time of project start, was included, then there were 20 years of estimates after that, so 1+20=21. But for HWPs, since these are actually periods, would just be 20?	There should only be 20 periods for HWPs, as year "0" in the calculation worksheet would be a zero value. The ERT calculation worksheet has been updated to reflect this change. Formula 3 was corrected to state 20 rather than 21 in the numerator. In addition, formula 4 was corrected so the numerator is the change between year 1 and year 20 (average of 20 years of annual values). Logging slash is an annual value akin to HWPs.
C3. Baseline Net Removals and Reductions	I think I understand the intent here – with the stocking calculations, we would want to take into account the starting stocks then 20 years of estimates; so that would mean 21 observations. But, should the denominator be 21 as well so it's a true average?	The denominator should be 20 as we are averaging 20 periods of change… you need 21 observations to determine 20 periods of change. Also, formula 5 was revised to: 1) Address the time periods in the numerator – now t=o to 20 – to represent the 21 observations needed to determine the change over 20 years. The denominator remains 20 because there are 20

		values in the numerator (note: it takes 21 observations to obtain 20 values); and 2) Properly address the $C_{BSL, HWP}$ component of the equation – the formula now uses the twenty-year average value of annual carbon remaining in stored wood products 100 years after harvest that is calculated in equation 3.
3.1.1 Tree Carbon Stock Calculation	This is important and agree. A slightly separate concern is what happens inside the FVS "black box" through regular software updates - see my general comment/concern about FVS's algorithms being changed partway through a 20 year crediting period in my summary memo. Is there anything that can, or even should, be done to hedge against this?	I think we can leave the language as is. If FVS makes a major update sometime in the future, project proponents will have to use a version of FVS that uses the same calculations.
3.1.1 Tree Carbon Stock Calculation. Step 1	green volume, oven-dry	Changed to green volume inside bark, oven-dry
3.1.1 Tree Carbon Stock Calculation. Step 2	I appreciate some of the changes here. However, the explicit link between a volumetric estimate of bole (not bark, as bark is not mentioned in step 1 biomass and the Jenkins-estimated bole biomass is now missing. Was the intent here to use the component ratio method described in the FIA Users Manual appendices and Heath et al., 2009, "Investigation into calculating tree biomass and carbon in the FIADB using a biomass expansion factor approach."? Looking at the steps as written, we calculate the bole wood biomass volumetrically in Step 1. Then, in step 2, we get the components from Jenkins et al 2003…but what do we do with them? I can understand you may not want to force the quantification of all components, but perhaps you could clarify this a bit.	We have provided further clarity in operations in 3.1.1 to address the finding. No ratio of volumetric estimate of bole biomass (Step 1) to Jenkins bole biomass should be needed. Procedures now specify that "biomass of each component is calculated as its component ratio * merchantable stem biomass from Step 1 * (1 / stem wood component ratio)." So all of these are scaled to the volumetric estimate of bole biomass (now specified as inside bark), which should be the most accurate, being species-specific and with the additional independent variable of height. We've also now specified in Step 3 that all selected biomass components are then summed.

		The intent here for allowing a variable combination of components is to ensure that the FVS FFE carbon reports (that can be used in the baseline) exactly match quantification in the actual/with-project case – it is our understanding that the FVS FEE default does not currently include bark and stump biomass, but does include foliage. Note that FVS FFE carbon calculations can only be used for baseline projections (the only application of G&Y modeling in accounting in the methodology) and are fixed at project start for each baseline period, thus subsequent updates to FVS will not affect the baseline (until the next 20-year baseline period). Also added that "If stump, top, and branch components are included, please use the quantification methodology found in Woodall et al. 2011"
3.1.1 Tree Carbon Stock Calculation. Note on FVS Fire and Fuels	I agree that this should be a valid alternative. But, what if the program is changed during a crediting period so that more or less carbon is calculated as a result?	I think we can leave the language as is. If FVS makes a major update sometime in the future, project proponents will have to use a version of FVS that uses the same calculations.
3.1.2.1 Standing Dead Wood (if included)	It would seem that FFE outputs are not deemed to be allowed by default here – was this intentional?	Since FFE does model standing dead, I've added in a note at the bottom of this section that says "The FVS Fire and Fuels Extension estimates of Standing Dead Carbon are compliant with this methodology, but do not include bark and stump components."
3.2 Wood Products Calculations. Step 1.1	Perhaps keep it more general and just say "quantities"; and allow for both baseline and actual harvested wood volumes to use the conversion factors in the table below?	"Volumes" has been changed to quantities.
3.2 Wood Products Calculations. Step 1.1	…actual or baseline…?	Changed to say "If actual or baseline"

	I didn't see that it was a requirement that models produce outputs in terms of cubic feet or green weight…	
3.2 Wood Products Calculations. Step 1.2	I would suggest adding that any substitutions are to be consistently applied across the baseline and with-project calculations. For example, if many trees in the inventory are identified as other hardwoods without a match in the Wood Handbook, those same species cannot then be identified to species with matches in the Handbook in actual harvests to "game" extra carbon in the project scenario.	Added "Any substitute species must be consistently applied across the baseline and with-project calculations."
3.2 Wood Products Calculations. Step 1.5	How closely do you want this to align with the 1605(b) method since you're using values derived in part from that methodology? Since you're removing references to the 1605(b) methodology, Would it make sense to specify the product categories? I.e., Sum the CO2 for each species into four categories aligning with the mill efficiency data: softwood sawlogs (>=9" dbh), softwood pulpwood (5" >= dbh > 9"), hardwood sawlogs (>=11" dbh), and hardwood pulpwood (5" >= dbh > 11"). If not, it may be worth specifying that the categorization criteria are to remain the same between the baseline and project scenario.	We would like to maintain flexibility for the exact softwood/hardwood sawlog/pulpwood specifications to allow for regional differences. We have added "Please note that the categorization criteria (upper and lower DBH limits) for hardwood/softwood saw log and pulp volumes are to remain the same between the baseline and project scenario."