Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands v1.3

Erratum & Clarifications

This supplemental document recognizes erratum and clarifications to the ACR *Improved Forest Management Methodology for Quantifying GHG Removals and Emission Reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands, V1.3.* Erratum and clarifications are effective as of date posted for all projects registered under the methodology version and are to be incorporated within version v1.4. Project developers and Verification Bodies shall adhere to the erratum and clarifications when conducting project implementation and verification activities.

1.1 Erratum (In bold)

Section Reference / Effective date	Change

A.2 Applicability Conditions / July 27, 2020	▪ Private or non-governmental organization ownerships subject to commercial 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
	▪ All Tribal Lands in the United States, except those lands that are managed or administered by the Bureau of Indian Affairs, are eligible under this methodology, provided that they meet ACR requirements for Tribal lands
	▪ Public non-federal ownerships currently 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; or
	  ▪ Have its forest management plan sanctioned by a senior government official within a state, or a state agency, or a federal agency.
	    ▪ Please note that any such forest management plans must be updated at minimum every 10 years
	  ▪ If there are no ongoing harvests on a public non-federal ownership at the project start date, but harvests occur later in the project life cycle, the project area must become certified by FSC, SFI, or ATFS, or develop a sanctioned management plan before any commercial timber harvesting can occur

	To
	
	▪ **All projects must adhere to the following sustainable management requirements:**
	  ▪ **Private, non-governmental organization and public non-federal project areas subject to commercial harvesting at the project Start Date in the with-project scenario must adhere to one or a combination of the following requirements:**
	    ▪ **Be certified by FSC, SFI, or ATFS or become certified within one year of the project Start date;**
	    ▪ **Adhere to a long-term forest management plan or program incorporating all their forested landholdings, prescribing the principals of sustained yield and natural forest management (plan and program criteria subject to ACR approval)**
	  ▪ **If the project is not subject to commercial harvest activities within the project area as of the project Start Date, but harvests occur later in the project life cycle, the project area must meet the requirements outlined above before commercial timber harvesting may occur**

A.2 Applicability Conditions / July 27, 2020	▪ All Tribal Lands in the United States, except those lands that are managed or administered by the Bureau of Indian Affairs, are eligible under this methodology, provided that they meet ACR requirements for Tribal lands *To* ▪ Tribal lands in the United States **meeting applicability conditions of this methodology and requirements of the relevant ACR Standard are eligible (also see American Carbon Registry 2017. The American Carbon Registry Guidance for Carbon Project Development on Tribal lands, version 1.0.)**

C3. Baseline Net Reductions and Removals / July 27, 2020	▪ The following equations are used to construct the baseline stocking levels using models described in section 3.1 and wood products calculations described in section 3.2: $\Delta C_{BSL,TREE,t} = (C_{BSL,TREE,t} - C_{BSL,TREE,t-1})$ (1) Where: t Time in years $\Delta C_{BSL,TREE,t}$ Change in baseline carbon stock in above and belowground live trees (in metric tons CO_2) for year *t*. $C_{BSL,TREE,t}$ Change in baseline value of carbon stored in above and belowground live trees at the beginning of the year (in metric tons CO_2) and *t-1* signifies the value in the prior year. $\Delta C_{BSL,DEAD,t} = (C_{BSL,DEAD,t} - C_{BSL,DEAD,t-1})$ (2) t Time in years $\Delta C_{BSL,DEAD,t}$ Change in baseline carbon stock stored in dead wood (in metric tons CO_2) for year *t*. $C_{BSL,DEAD,t}$ Change in baseline value of carbon stored in dead wood at the beginning of the year *t* (in metric tons CO_2) and *t-1* signifies the value in the prior year. *To* ▪ The following equations are used to construct the baseline stocking levels using models described in section 3.1 and wood products calculations described in section 3.2: $\Delta C_{BSL,TREE,t} = (C_{BSL,TREE,t} - C_{BSL,TREE,t-1})$ (1) Where: t Time in years $\Delta C_{BSL,TREE,t}$ Change in baseline carbon stock in above and belowground live trees (in metric tons CO_2) for year *t*.

	$C_{BSL,TREE,t}$ Baseline value of carbon stored in above and belowground live trees at the beginning of the year t (in metric tons CO_2) and $t\text{-}1$ signifies the value in the prior year. $\Delta C_{BSL,DEAD,t} = (C_{BSL,DEAD,t} - C_{BSL,DEAD,t-1})$ (2) t Time in years $\Delta C_{BSL,DEAD,t}$ Change in baseline carbon stock stored in dead wood (in metric tons CO_2) for year t. $C_{BSL,DEAD,t}$ Baseline value of carbon stored in dead wood at the beginning of the year t (in metric tons CO_2) and $t\text{-}1$ signifies the value in the prior year.
C3 Baseline Net Reductions and Removals / July 27, 2020	▪ Prior to year T (T = year projected stocking reaches the long-term baseline average) the value of ΔCBSL,t will most likely be negative for projects with initial stocking levels higher than CBSL,AVE or positive for projects with initial stocking levels lower than CBSL,AVE. If years elapsed since the start of the IFM project activity (t) is ≥T to compute long-term average stock change use: $\Delta C_{BSL,t} = 0$ *To* ▪ Prior to year T (T = year projected stocking reaches the long-term baseline average) the value of ΔCBSL,t will most likely be negative for projects with initial stocking levels higher than CBSL,AVE or positive for projects with initial stocking levels lower than CBSL,AVE. If years elapsed since the start of the IFM project activity **(t) is >T** to compute long-term average stock change use: $\Delta C_{BSL,t} = 0$
C3 Baseline Net Reductions and Removals / September 30, 2021	▪ If the output for the tree is the volume, then this must be converted to biomass and carbon using equations in Section 3.1.1. If processing of alternative data on dead wood is necessary, equations in section 3.1.2 may be used. Where models do not predict dead wood dynamics, the baseline harvesting scenario may not decrease dead wood more than 50% through the Crediting Period. *To*

	▪ If the output for the tree is the volume, then this must be converted to biomass and carbon using equations in Section 3.1.1. If processing of alternative data on dead wood is necessary, equations in section 3.1.2 may be used. Where models do not predict dead wood dynamics, the baseline harvesting scenario may not decrease dead wood more than 50% through the Crediting Period. **If included, standing dead wood must be calculated using the same set of equations as live trees with adjustments for decay and structural loss.**
C3 Baseline Net Reductions and Removals / September 30, 2021	▪ Note: The FVS Fire and Fuels Extension volume-based default estimates of Live Carbon are compliant with the above, but do not include bark and stump components *To* ▪ Note: The FVS Fire and Fuels Extension volume-based default estimates of Live Carbon are compliant with the above, but do not include bark and stump components. **The FVS Fire and Fuels Extension Jenkins estimates of Live Carbon are compliant with the above.**
C3 Baseline Net Reductions and Removals / August 17, 2021	▪ Dead wood included in the methodology comprises two components only – standing dead wood and lying dead wood. Below-ground dead wood is conservatively neglected. *To* ▪ Dead wood included in the methodology comprises two components – standing dead wood and lying dead wood. **Inclusion of b**elow-ground dead wood is **considered optional and where included must be quantified using the same procedures as below-ground live with adjustments for decay and structural loss**
D5. Estimation of Project Emission Reductions or Enhanced Removals / July 27, 2020	▪ This section describes the steps required to calculate $\Delta C_{P,t}$ (net annual carbon stock change under the project scenario; tons CO_2e). This methodology requires 1) carbon stock levels to be determined in each time period, t, for which a valid verification report is submitted, and 2) the change in project carbon stock to be computed from the prior verification time period, *t-1*.

	The following equations are used to construct the project stocking levels using models described in section 3.1 and wood products calculations described in section 3.2: $\Delta C_{P,TREE,t} = (C_{P,TREE,t} - C_{P,TREE,t-1})$ (11) Where: t Time in years $\Delta C_{P,TREE,t}$ Change in project carbon stock in above and belowground live trees (in metric tons CO_2) for year *t*. $C_{P,TREE,t}$ Change in project value of carbon stored in above and belowground live trees at the beginning of the year *t* (in metric tons CO_2) and *t-1* signifies the value in the prior year. $\Delta C_{P,DEAD,t} = (C_{P,DEAD,t} - C_{P,DEAD,t-1})$ (12) t Time in years $\Delta C_{P,DEAD,t}$ Change in project carbon stock (in metric tons CO_2) for year *t*. $C_{P,DEAD,t}$ Change in project value of carbon stored in dead wood at the beginning of the year *t* (in metric tons CO_2) and *t-1* signifies the value in the prior year. *To* ▪ This section describes the steps required to calculate $\Delta C_{P,t}$ (carbon stock change under the project scenario; tons CO_2e). This methodology requires 1) carbon stock levels to be determined in each time period, *t*, for which a valid verification report is submitted, and 2) the change in project carbon stock to be computed from the prior verification time period, *t-1*. The following equations are used to construct the project stocking levels using models described in section 3.1 and wood products calculations described in section 3.2: $\Delta C_{P,TREE,t} = (C_{P,TREE,t} - C_{P,TREE,t-1})$ (11)

	Where: t — Time in years $\Delta C_{P,TREE,t}$ — Change in project carbon stock in above and belowground live trees (in metric tons CO_2) for year t. $C_{P,TREE,t}$ — **P**roject value of carbon stored in above and belowground live trees at the beginning of the year t (in metric tons CO_2) and $t-1$ signifies the value in the prior year. $\Delta C_{P,DEAD,t} = (C_{P,DEAD,t} - C_{P,DEAD,t-1})$ (12) t — Time in years $\Delta C_{P,DEAD,t}$ — Change in project carbon stock **stored in dead wood** (in metric tons CO_2) for year t. $C_{P,DEAD,t}$ — **P**roject value of carbon stored in dead wood at the beginning of the year t (in metric tons CO_2) and $t-1$ signifies the value in the prior year.
D6. Monitoring of Activity-Shifting Leakage / July 27, 2020	▪ There may be no leakage beyond *de minimis* levels through activity shifting to other lands owned, or under management control, by the timber rights owner. If the project decreases wood product production by >5% relative to the baseline then the Project Proponent and all associated land owners must demonstrate that there is no leakage within their operations – i.e., on other lands they manage/operate outside the bounds of the ACR carbon project. Such a demonstration must include one of the following: • Historical records covering all Project Proponent ownership trends in harvest volumes paired with records from the with-project time period showing no deviation from historical trends over most recent 10-year average; *or* • Forest management plans prepared ≥24 months prior to the start of the project showing harvest plans on all owned/managed lands paired with records from the with-project time period showing no deviation from management plans; *or*

	• Entity-wide management certification that requires sustainable practices (programs can include FSC, SFI, or ATFS). Management certification must cover *all* entity owned lands with active timber management programs. *To* ▪ There may be no leakage beyond *de minimis* levels through activity shifting to other lands owned, or under management control, by the timber rights owner. If the project decreases wood product production by >5% relative to the baseline then the Project Proponent and all associated land owners must demonstrate that there is no leakage within their operations – i.e., on other lands they manage/operate outside the bounds of the ACR carbon project. **This demonstration is not applicable if Project Proponent and associated landowners enroll all of their forested landholdings, owned and under management control, within the ACR carbon project.** Such a demonstration must include one **or more** of the following: • Entity-wide management certification that requires sustainable practices (programs can include FSC, SFI, or ATFS). Management certification must cover *all* entity owned lands with active timber management programs; • **Adherence to an ACR approved long-term forest management plan or program as specified in section A.2;** ▪ Forest management plans prepared ≥24 months prior to the start of the project showing harvest plans on all owned/managed lands paired with records from the with-project time period showing no deviation from management plans; or • Historical records covering all Project Proponent ownership trends in harvest volumes paired with records from the with-project time period showing no deviation from historical trends over most recent 10-year average
F3. Calculation of Total Project Uncertainty / September 30, 2021	▪ The following equation must be applied: $$UNC_t = \frac{\sqrt{\left(\Delta C_{BSL,t} \cdot UNC_{BSL}\right)^2 + \left(\Delta C_{P,t} \cdot UNC_{P,t}\right)^2}}{\Delta C_{BSL,t} + \Delta C_{P,t}} \quad (19)$$ where:

	UNC_t — Total project uncertainty in year *t*, in % $\Delta C_{BSL,t}$ — Change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section C3) UNC_{BSL} — Baseline uncertainty, in % (Section C5) $\Delta C_{P,t}$ — Change in the project carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section D5) $UNC_{P,t}$ — With-project uncertainty in year *t*, in % (Section D8) *To* ▪ The following equation must be applied: $UNC_t = \frac{\sqrt{(\Delta C_{BSL,t} \cdot UNC_{BSL})^2 + (\Delta C_{P,t} \cdot UNC_{P,t})^2}}{\Delta C_{BSL,t} + \Delta C_{P,t}}$ (19) where: UNC_t — Total project uncertainty in year *t*, in % $\Delta C_{BSL,t}$ — **Absolute** change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section C3) UNC_{BSL} — Baseline uncertainty, in % (Section C5) $\Delta C_{P,t}$ — **Absolute** change in the project carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section D5) $UNC_{P,t}$ — With-project uncertainty in year *t*, in % (Section D8)
G. Calculation of ERTs / July 27, 2020	▪ This section describes the process of determining additional annual net greenhouse gas emission reductions and Emission Reduction Tons (ERTs) issued for a time period for which a valid verification report has been filed with ACR. Annual net greenhouse gas emission reductions ($C_{ACR,t}$) are calculated using equation 20 by adjusting the difference between the project and baseline carbon stock changes for leakage and uncertainty then multiplying by a non-permanence buffer deduction.

	$ERT_t = C_{ACR,t} = (\Delta C_{P,t} - \Delta C_{BSL,t}) \cdot (1 - LK) \cdot (1 - UNCt) \cdot (1 - BUF)$ (20) where: ERT_t Emission Reduction Tons with vintage year *t*. $C_{ACR,t}$ Annual net greenhouse gas emission reductions (in metric tons CO_2e) at time *t.* $\Delta C_{P,t}$ Change in the project carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section D5) $\Delta C_{BSL,t}$ Change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section C3) *LK* Leakage discount (Section D7) $UNC_{,t}$ Total Project Uncertainty, (in %) for year *t* (Section F3). UNC_t will be set to zero if the project meets ACR's precision requirement of within ±10% of the mean with 90% confidence. If the project does not meet this precision target, *UNCt* should be the half-width of the confidence interval of calculated net GHG emission reductions. *BUF* The non-permanence buffer deduction as calculated in Section B5. BUF will be set to zero if an ACR approved insurance product is used. *To* ▪ This section describes the process of determining greenhouse gas emission reductions and Emission Reduction Tons (ERTs) issued for a **Reporting P**eriod for which a valid verification report has been filed with ACR. **Total** greenhouse gas emission reductions ($C_{ACR,t}$) are calculated using equation 20 by adjusting the difference between the project and baseline carbon stock changes for leakage and uncertainty. $\boldsymbol{ERT_{RP,t}} = C_{ACR,t} = (\Delta C_{P,t} - \Delta C_{BSL,t}) \cdot (1 - LK) \cdot (1 - UNC_t)$ **(20)** where:

	$ERT_{RP,t}$ **Total emission Reduction Tons in Reporting Period *t*.** $C_{ACR,t}$ **Total g**reenhouse gas emission reductions (in metric tons) CO_2e) at time *t.* $\Delta C_{P,t}$ Change in the project carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section D5) $\Delta C_{BSL,t}$ Change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section C3) *LK* Leakage discount (Section D7) $UNC_{,t}$ Total Project Uncertainty, (in %) for year *t* (Section F3). UNC_t will be set to zero if the project meets ACR's precision requirement of within ±10% of the mean with 90% confidence. If the project does not meet this precision target, *UNCt* should be the half-width of the confidence interval of calculated net GHG emission reductions. **ERT's by vintage shall then be determined by prorating Reporting Period calendar days within vintage year *t* (21), applying the non-permanence buffer deduction (Equation 22) and subtracting ERT's by vintage year from the non-permanence buffer deduction (Equation 23). Buffer pool ERTs will be deposited by vintage, if this is the risk management option the Project Proponent has chosen.** $ERT_{VIN,t} = ERT_{RP,t} \cdot (CAL_t / RP_{CAL,t})$ (21) **where:** $ERT_{VIN,t}$ ***Total* Emission Reduction Tons issued in vintage year *t*** $ERT_{RP,t}$ **Total Emission Reduction Tons issued in RP *t*** **CAL_t** **Reporting Period calendar days within vintage year *t*** **$RP_{CAL,t}$** **Total calendar days within Reporting Period *t*** $BUF_{VIN,t} = ERT_{VIN,t} \cdot BUF$ (22) **where:**

	$BUF_{VIN,t}$ **Buffer tons deducted in vintage year *t*** $ERT_{VIN,t}$ **Emission Reduction Tons issued in vintage year *t*** ***BUF*** **The non-permanence buffer deduction percentage as calculated in Section B5. BUF will be set to zero if an ACR approved insurance product is used.** $$ERT_{NETVIN,t} = ERT_{VIN,t} - BUF_{VIN,t} \quad (23)$$ **Where:** $ERT_{VIN,t}$ **Net Emission Reduction Tons issued in vintage year *t*** $BUF_{VIN,t}$ **Buffer tons deducted in vintage year *t***
G. Calculation of ERTs / April 12, 2022	▪ Negative project stock change ($C_{ACR,t}$) before the first offset credit issuance is a negative balance of greenhouse gas emissions. After the first offset issuance, negative project stock change is a Reversal. AFOLU reversals must be reported and compensated following requirements detailed in the Reversal Risk Mitigation Agreement and the Buffer Pool Terms and Conditions, Exhibit 1 of the *ACR Standard, Version 5.0*. As outlined in Exhibit 1, sequestration projects will terminate automatically if a Reversal causes project stocks to decrease below baseline levels prior to the end of the Minimum Project Term. *To* ▪ **The Project Proponent may elect to calculate and generate removals ($REM_{RP,t}$) for a given reporting period with a positive ERT issuance. Removals are calculated by adjusting the with-project carbon stock change for leakage and uncertainty. Since removals may never exceed ERTs, the calculation of removals must account for baseline emissions when they negatively contribute to total ERTs. If calculated and generated, removals must be allocated to vintage years following the procedure outlined in Equations 21, 22, and 23.** $$\text{if } [\Delta C_{BSL,t} \leq 0] \text{ then } REM_{RP,t} = \Delta C_{P,t} \cdot (1 - LK) \cdot (1 - UNC_t) \quad (24)$$ or

	if $[\Delta C_{BSL,t} > 0]$ then $REM_{RP,t} = (\Delta C_{P,t} - \Delta C_{BSL,t}) \cdot (1 - LK) \cdot (1 - UNC_t)$ **where:** ***$REM_{RP,t}$*** **Total removals in reporting period *t*** **$\Delta C_{P,t}$** **Change in the project carbon stock and GHG emissions (in metric tons CO2e) for year *t*. (Section D5)** **$\Delta C_{BSL,t}$** **Change in the baseline carbon stock and GHG emissions (in metric tons CO_2e) for year *t*. (Section C3)** ***LK*** **Leakage discount (Section D7)** ***$UNC_{,t}$*** **Total Project Uncertainty, (in %) for year *t* (Section F3). *UNC_t* will be set to zero if the project meets ACR's precision requirement of within ±10% of the mean with 90% confidence. If the project does not meet this precision target, *UNCt* should be the half-width of the confidence interval of calculated net GHG emission reductions.** Negative project stock change ($C_{ACR,t}$) before the first offset credit issuance is a negative balance of greenhouse gas emissions. After the first offset issuance, negative project stock change is a Reversal. AFOLU reversals must be reported and compensated following requirements detailed in the Reversal Risk Mitigation Agreement and the Buffer Pool Terms and Conditions, Exhibit 1 of the *ACR Standard, Version 5.0*. As outlined in Exhibit 1, sequestration projects will terminate automatically if a Reversal causes project stocks to decrease below baseline levels prior to the end of the Minimum Project Term.

1.2 Clarifications (in bold)

Section Reference / Effective date	Clarifications
N/A; / July 27, 2020	▪ All references to "American Carbon Registry Standard, Version 5.0" shall pertain to the version of the American Carbon Registry

	Standard effective at project listing/crediting period renewal and requirements set out therein.
A1. Scope and Definitions / July 27, 2020	▪ A definition for "Reporting Period" has been added to the methodology (below). Project scenario carbon stock changes, harvested wood products, uncertainty and ERT's are quantified on a Reporting Period basis. Equations 11, 12, 13, 14, 18, 19 and 20 use the terms "year" and "Reporting Period" synonymously. Equation 21 partitions ERT's to a vintage year (corresponding to the calendar year the emissions reductions/removals occurred) basis for Registry reporting. **Reporting Period: The period of time covering a GHG assertion for a single verification and subsequent request for ERT issuance.**
A1. Scope and Definitions / July 27, 2020	▪ A definition for "Commercial Harvesting" has been added to the methodology (below). **Commercial Harvesting: Any type of harvest producing merchantable material at least equal to the value of the direct costs of harvesting. Harvesting of dead, dying or threatened trees is specifically excluded where a signed attestation from a registered professional forester in the relevant jurisdiction) is obtained (Society of American Foresters or Association of Consulting Foresters certification sufficient in states without professional forester requirements) confirming the harvests are in direct response to isolated forest health (insect/disease) or natural disaster event(s) that are not part of a long-term harvest regime.**
C.3.1 Stocking Level Projections in the Baseline / July 27, 2020	▪ Section C.3.1 states "If the output for the tree is volume, then this must be converted to biomass and carbon using equations in Section 3.1.1". ACR would like to clarify as a footnote that the steps prescribed in Section 3.1.1 are not relevant where models output projected total aboveground and belowground biomass or carbon.