DETERMINATION OF JURISDICTIONAL ACTIVITY DATA BASELINE FOR UNPLANNED DEFORESTATION (J-ADB-UD)

Document Prepared by Climate Focus

Title	Determination of Jurisdictional Activity Data Baseline for Unplanned Deforestation (J-ADB-UD)
Version	1.0
Date of Issue	30 March 2022
Type	Module
Sectoral Scope	14. Agriculture Forestry and Other Land Use (AFOLU)
Prepared By	Climate Focus
Contact	Verra: Manuel Estrada, Director, REDD+ Technical Innovation, mestrada@verra.org

CONTENTS

1 SOURCES

This module uses the latest version of the following modules and tools:

- JNR Allocation Tool Guidance, Version 4.0
- JNR Allocation Tool, Version 4.0
- VT0007 JNR Risk Mapping Tool, Version 0.1 or later

2 SUMMARY DESCRIPTION OF THE MODULE

This module outlines the methodology for developing and periodically updating for subsequent Validity Periods:

1. The Jurisdictional Activity Data Baseline for Unplanned Deforestation (J-ADB-UD)
2. The Forest Cover Benchmark Maps (FCBM) required for the application of the JNR Risk Mapping Tool
3. The process for applying the JNR Allocation Tool and JNR Risk Mapping Tool to allocate J-ADB-UD to project areas and leakage belts.
4. The allocation of this Baseline Activity Data to VCS projects avoiding unplanned deforestation (AUD) using the JNR Allocation Tool

3 DEFINITIONS

3.1 Definitions

In addition to the definitions set out in the VCS Program document Program Definitions, the following definitions apply:

Activity Data (AD)
The area of deforested or degraded forest registered in a specific area over a given period

Forest (For)
The definition of “forest” used to construct the Jurisdictional Activity Data Baseline for

Unplanned Deforestation (J-ADB-UD) shall be consistent with the forest definition used for reporting under the UNFCCC[1] and in line with that of the *VCS Program Definitions*[2].

Deforestation (Def)

"Deforestation" is the direct human-induced conversion of forest land to non-forest land.

The definition used by the country for UNFCCC reporting shall be applied if it is in line with the VCS Program AFOLU categories as set out in the VCS Program document VCS Methodology Requirements (see Appendix 1 of JNR Scenario 1: Comparison of IPCC, UNFCCC, and VCS Program Components of REDD+ for a full classification of activities).

If the country definition is not in line with VCS, elements of the country definition that do conform with VCS shall be adopted, while other elements shall be modified to conform to VCS.

Deforestation shall always be "gross". This has the following implications:

- Areas that are Forest at the beginning of the historical reference period and cleared at some later date should be considered "deforested" from the moment they are cleared, even if they are covered by trees again at the end of the period
- Areas that are not Forest at the beginning and end of the historical reference period should be classified as "stable non-Forest" even if between the start and end dates of the period there are years during which they are covered by trees.
- Areas meeting the definition of "Forest" according to the criteria of minimum area, minimum tree height, and minimum canopy cover but where the trees at the beginning of the historical reference period are not yet 10 years old will be considered "non-Forest". If they reach an age of 10 years during the historical reference, period they will be classified as "forest regrowth" from the moment they reach the age of 10 years and as "Forest" at the beginning of the subsequent historical reference period.
- The loss of trees in areas of forest regrowth shall not be classified as deforestation.

Forest Regrowth (FR)

The conversion of non-Forest to Forest is an AD Category that includes "Afforestation and Reforestation" (AR) and the development of secondary forests on previously deforested lands. According to the VCS Standard v4.1 "*The project area shall meet an internationally*

---

1 UNFCCC Decision 12/CP.17

2 According to the VCS program definitions (V4.1), "Forest" is "*Land with woody vegetation that meets an internationally accepted definition (e.g., UNFCCC, FAO or IPCC) of what constitutes a forest, which includes threshold parameters, such as minimum forest area, tree height and level of crown cover, and may include mature, secondary, degraded and wetland forests*". The VCS Standard (V4.1) further specifies that "*The project area shall meet an internationally accepted definition of forest, such as those based on UNFCCC host country thresholds or FAO definitions, and shall qualify as forest for a minimum of 10 years before the project start date. The definition of forest may include mature forests, secondary forests, and degraded forests. Under the VCS Program, secondary forests are considered to be forests that have been cleared and have recovered naturally and that are at least 10-years-old*".

accepted definition of forest, such as those based on UNFCCC host country thresholds or FAO definitions, and shall qualify as forest for a minimum of 10 years before the project start date." In practical terms, this implies that any natural regeneration, afforestation or reforestation occurring on lands that are non-forest at the beginning of a period (HRP or Baseline Validity Period (VP)) cannot be converted to a "forest" during that same period. These areas will be classified as "Forest Regrowth" (FR) from the year in which the three parameters of the definitions of forest have been met for a minimum of 10 consecutive years, and as "Forest" from the beginning of the subsequent period.

Unplanned Deforestation (UD)
Refer to the most recent VCS Standard.

Planned Deforestation (PD)
Refer to the most recent VCS Standard.

Historical Reference Period (HRP)
The Historical Reference Period for J-ADB-UD will be defined for each Jurisdictional Baseline Activity Data for Unplanned Deforestation Validity Period (JBVP) according to the latest version of the VCS Standard. The HRP equates to the temporal dates from which historical Activity Data for deforestation will be assessed within the Jurisdiction. The start and end dates of the HRP shall be specified by indicating the day, month, and year.

Jurisdictional Baseline Activity Data for Unplanned Deforestation Validity Period (JBVP)
The JBVP is the period of time during which the Jurisdictional Activity Data Baseline shall be considered valid. The length of the Validity Period shall be 6 years and shall be delineated with explicit references to the start and end dates (day, month, and year).

Jurisdiction
The Jurisdiction is the spatial extent for which AD are estimated and Forest Cover Benchmark Maps (FCBMs) are created. It encompasses all project and non-project areas.

Land Cover Transition (LCT)
Land Cover Transition (LCT) classes are categories for which Activity Data are estimated from the Historical Reference Period (HRP) and projected for JBVP to construct the Jurisdictional Activity data baseline for unplanned Deforestation. LCTs are subdivisions of Activity Data Categories (AD-C). Land Cover Transition classes may differentiate between drivers of land cover change such as planned vs. unplanned, or natural vs. anthropogenic, or other sub-categorizations.

Activity Data Category (AD-C)
The Activity Data Category (AD-C) are the overarching groupings of Land Cover Transition classes for which Activity Data are estimated and maps created for the Historical Reference Period, and for which sample-derived uncertainty is assessed. Historical Deforestation;

Stable Forest; Stable Non-Forest; and Forest Regrowth are AD-Cs that must be estimated in every application of this module. Each AD-C may be subdivided into multiple Land Cover Transition (LTC) classes to differentiate such as planned vs unplanned, natural vs anthropogenic, or other sub-categorizations.

3.2 Acronyms

AD	Activity Data
AD-C	Activity Data Category
AUD	Avoided Unplanned Deforestation
Def	Deforestation
DF	Discount Factor
FCBMj	Jurisdictional Forest Cover Benchmark Map
FCBMp	Project-specific Forest Cover Benchmark Map
For	Forest
FR	Forest Regrowth
FREL	Forest Reference Emissions Level
HRP	Historical Reference Period
IPCC	Intergovernmental Panel on Climate Change
JNR	Verra's Jurisdictional Nested REDD+
JNR-AT	Jurisdictional and Nested REDD+ Allocation Tool
JNR-RMT	Jurisdictional and Nested REDD+ Risk Mapping Tool
JBVP	Jurisdictional Activity Data Baseline for Unplanned Deforestation Validity Period
LCT	Land Cover Transition
NonFor	Non-forest
REDD	Reduced Emissions from Deforestation and Forest Degradation

ss	Sampling strata
UD	Unplanned Deforestation
UNFCCC	United Nations Framework Convention on Climate Change

4 APPLICABILITY CONDITIONS

This module is applicable for developing the Jurisdictional Activity Data Baseline (AD) for Unplanned Deforestation (UD) and its allocation to VCS AUD projects.

This module is applicable only to Jurisdictions for which a VCS JNR Program or JNR compliant Forest Reference Emissions Level (FREL) has not been registered.

This module shall be applied exclusively by Verra or Verra-selected providers for the purpose of developing and allocating the Jurisdictional Activity Data Baseline for AUD projects. Project Proponents may utilize this module for informational purposes only.

5 PROCEDURES

5.1 General

The Jurisdictional average annual deforestation Activity Data for Unplanned Deforestation as estimated for the Historical Reference Period will be used to define the activity data baseline for unplanned deforestation within the spatial extent of the Jurisdiction for the JBVP.

The Jurisdictional Baseline Activity Data must be updated every six years, at the end of each JBVP.

The J-ADB-UD Description Report shall identify the spatial boundaries of any registered AFOLU carbon Projects[3] and associated Leakage Belts, proposed VCS projects in the VCS Project Pipeline, and any additional forthcoming (where known) VCS AUD projects. The J-ADB-UD Description Report must include a description of the definition of Forest that is used in the construction of the Forest Cover Benchmark Maps (FCBMs) and of the definition of

[3] Defined as a Project registered on a carbon market standard, this shall include at least VCS, Verra JNR, Plan Vivo, Gold Standard, and ART-TREES. kml files can be obtained from the VCS Registry https://registry.verra.org/app/search/VCS.

Deforestation that is used in the estimation of Activity Data. The application of this module shall further employ activity-based accounting[4].

5.2 Activity Data Categories for which historical AD estimates are required

The Land Cover Transition (LCT) classes within each Activity Data Category (AD-C) used shall be explicitly defined in the J-ADB-UD Description Report.

The minimum set of AD Categories for which historical AD estimates are required are the following:

- Forest to non-forest (Deforestation).
- Stable Forest.
- Non-forest to forest[5] (= Forest regrowth, which includes Afforestation, Reforestation, and natural regeneration of forests).
- Stable non-forest.

The Deforestation AD-C must be disaggregated into a minimum of two LCTs defined as Planned and Unplanned deforestation. Other activities do not require AD-C disaggregation (see Table 1).

Table 1 Activity Data Category inclusion criteria

Required Activity Data Category	Required Land Cover Transitions
Deforestation	Unplanned Deforestation, Planned Deforestation
Forest Regrowth	Forest Regrowth
Stable Forest	Stable Forest
Stable Non-Forest	Stable Non-Forest

5.3 Temporal Boundaries

[4] The activity-based approach to emissions estimation consists of identifying specific activities occurring on the land that influence GHG fluxes and focusing on the intervention, allowing for differentiation between activities. See Iversen P., Lee D., and Rocha M. (2014). Understanding Land Use in the UNFCCC, Chapter 2.2.3. for more information.

[5] If trees meeting the threshold parameters of the definition of "forest" appear on lands that were not "forests" in previous years, then these lands should be considered "temporarily stocked" (i.e., not "forests"). It takes at least 10 consecutive years for such lands to become "forests" and therefore they cannot be deforested earlier.

The start date and end date of the JBVP shall be defined as the earliest date and latest date, respectively, in which projects within the Jurisdiction may calculate their baselines using the unplanned deforestation Activity Data baseline produced and allocated for such period.

This start and end date shall specify the day, month, and year. The start date must be aligned with the average collection dates of the images used to generate AD estimates for the end of the Historical Reference Period. The Start Date of the JBVP shall not differ by more than six months from the average dates of images associated with the end of the Historical Reference Period (HRP).

The HRP for each JBVP shall be defined according to the latest version of the VCS Standard, ending within one year of the start date of each JBVP. The start date of the HRP shall specify the day, month, and year and must be consistent with the average collection dates of the images used to generate AD estimates.

5.4 Geographic Boundaries

The geographic boundaries of the Jurisdiction shall be specified in terms of its geographic area coverage. The location description of the Jurisdiction shall include the following information:

1) Name of the jurisdiction;
2) Vectorized map (e.g., shapefile) of the area covered by the Jurisdiction;
3) Geodetic coordinates of the jurisdiction area boundary, provided in the format specified in the VCS Standard;
4) Total area covered by the jurisdiction.

The national boundaries may always be used as the Jurisdiction.

If the area of the country is smaller than 2.5 million hectares, the national boundary must be selected as the Jurisdiction.

If the country is larger than 2.5 million hectares and the second-level administrative Jurisdiction (i.e., one administrative level below the national level) is smaller than 5 million hectares, the boundary of the second-level administrative Jurisdiction may be selected.

If the second-level administrative Jurisdiction is larger than 5 million hectares, the third-level administrative Jurisdiction may be selected.

Multiple contiguous subnational administrative Jurisdictions of the same level may be combined into a single Jurisdiction.

The jurisdiction may include both forest and non-forest lands and shall include the full spatial extent of the selected administrative unit. The boundaries of a Jurisdiction must not spatially

overlap with any other Jurisdiction for which valid Jurisdictional activity data baseline exists module or with any registered JNR Jurisdictional FREL or program.

If, due to the existence of other Jurisdictions for which valid Jurisdictional activity data baseline exists or JNR programs and FRELs, the above criteria cannot be met, the jurisdiction shall be defined as the remaining area within the national boundary.

Where an existing project area or leakage belt intersects more than one administrative Jurisdiction, an approved J-ADB-UD Description Report must be developed by Verra for the portion of the project areas or leakage belts outside the selected Jurisdiction in case no valid JADB exists for such Jurisdiction. Activity Data shall be allocated to respective portion of the AUD project area from each Jurisdiction.

5.5 Development and allocation of Deforestation Activity Data

The following procedures shall be followed to develop the Deforestation Activity Data and allocate future land cover transition activity data to project areas and leakage belts, disaggregated by Jurisdictional risk class.

Historical land cover change is estimated using a sample of high-resolution imagery. Uncertainty of the estimate is assessed and used to determine whether the allocated activity data must be conservatively discounted.

Application of the steps following the estimate of historical land cover transitions requires use of the JNR Allocation Tool and the JNR Risk Mapping Tool.

Estimate areas of Land Cover Transitions for the Historical Reference Period within the Jurisdiction using the Sample-Based Approach

- Step 1 Develop a historical land cover / land cover change dataset for each included Activity Data Category and LCT using a sample-based approach
- Step 2 Calculate total historical area of each AD Category
- Step 3 Calculate the uncertainty for estimates of historical areas of change
- Step 4 Disaggregate Standard Error and Activity Data by LCT
- Step 5 Calculate Start and End Dates of the Historical Reference Period

Calculate projected Activity Data for JBVP within Jurisdiction

- Step 1 Assess precision target of historical area estimate
- Step 2 Enter data into JNR Allocation Tool

Allocate portions of the Jurisdicitonal Activity Data Baseline to Project Areas and Leakage Belts

- Develop Forest Cover Benchmark Maps
- Develop a Land Cover Transition Risk Map within the Jurisdiction
- Allocate J-ADB-UD to risk classes within project and leakage belts

5.5.1 Estimate areas of Land Cover Transitions for the Historical Reference Period within the Jurisdiction

Historical activity data are estimated for each LCT individually. Uncertainty is assessed at the aggregate AD-C level. For an AD-C with only one associated LCT, the name of the Activity Data Category and LCT will be synonymous (i.e., forest regrowth LCT within forest regrowth AD-C).

Historical estimates of the area of each Land Cover Transition and AD Category are developed for the Historical Reference Period within the Jurisdiction´s geographic boundary. Historical Activity Data refers to the total area of the Jurisdiction that experiences an LCT over the Historical Reference Period.

Historical Activity Data are estimated through a sample-based approach that utilizes human-interpreted high-resolution imagery within sample plots distributed in a representative manner over the Jurisdiction. Other spatial data may be used to increase the efficiency of the sampling design or to aid the analyst´s interpretation of the images.

To develop the Jurisdictional Activity Data Baseline for Unplanned Deforestation, the historical Activity Data estimated for the LCT Unplanned Deforestation must be conservatively discounted based on estimated statistical uncertainty and then annualized. The uncertainty-discounted average annual historical AD estimate will be used to project future Activity Data over the JBVP.

When an AD Category is separated into multiple LCTs (e.g., Planned and Unplanned Deforestation), historical observations of sample units must differentiate between each LCT. The proportion of the landscape classified as each LCT within an AD Category is used to segment Activity Data for the JBVP.

Development of wall-to-wall forest, land cover, or land cover change maps is not a requirement for estimating Activity Data. However, wall-to-wall maps from any source may be used to develop efficient stratified sampling strategies for the estimation of historical Activity Data. In many landscapes, stratifying the sampling design based on predicted (mapped) AD Categories or LCT classes will significantly reduce analyst´s effort needed to meet precision targets. Any sampling strategy that is spatially representative of the Jurisdiction and supported by current best practices may be used as long as it can produce estimates meeting per-AD Category precision requirements.

Step 1 Develop a historical land cover / land cover change dataset for each included LCT using a sample-based approach

As noted above, historical Activity Data for each included LCT shall be developed using a sample-based approach. The sample-based approach generates an estimate of the areas of each LCT and associated AD-C, for the Historical Reference Period and allows for the reporting of statistical uncertainty as expressed by a confidence interval around the estimate of AD-C.

Standard Operating Procedures (SOPs) must be developed and employed for the below workflow. These SOPs must include at a minimum: sample design, response design and data sources, data collection and data analysis. The SOPs should include detailed guidance also on quality management during all these steps. The SOPs shall be included as an annex to the J-ADB-UD Description Report.

Sampling Framer

Sampling shall take place within the entire Jurisdiction. Locations of irrefutably identified and clearly bounded land cover transitions, such as stable bodies of water, infrequent large[6] scale natural disturbances that caused deforestation, and large-scale infrastructure that caused deforestation, may be spatially delineated and excluded from the Jurisdictional

sampling frame. For infrequent large-scale[7] natural disturbances, the exclusion from the sampling frame is required.

The spatially delineated areas excluded from sampling within the Jurisdiction shall be provided as a map - **Digital Map of Excluded Known LCT.** The area of these excluded locations, in hectares, is assigned to the parameter $A_{J\text{-}excluded}$.

Sample Design

The sampling design shall ensure that sample plots will be distributed across the entire Jurisdiction, (with exception of excluded areas), and will generate a representative sample of the landscape, considering the spatial patterns inherent to the AD Category. Sampling designs may be systematic, random, stratified random sampling, or any other design currently supported by best practices. The design of the sampling strategy should anticipate the requirement that the final estimate for the AD Category "Deforestation" should meet an uncertainty threshold of a half-width confidence interval that is within 10% ± the estimate at the 90% confidence level, otherwise be subject to conservative discounting.

Areas excluded from the sampling frame (areas mapped as Excluded Known LCT) should not be included in any sampling stratum, or factor into the calculations of area (ha) of any sampling stratum.

When multiple Land Cover Transitions are evaluated for an AD-C (e.g. planned and unplanned), the sampling strategy should be designed to minimize bias in their estimation. However, individual LCTs are not held to a separate uncertainty requirement beyond that of the AD Category to which they belong. The Land Cover at the Start and End date of the sample shall be assessed within a plot that is the same size as the Forest Definition area.

Response Design

AD Categories and associated LCTs are identified through the comparison of land cover/land use class from the beginning to the end of the Historical Reference Period, taking into consideration that land classified as "forest" must verifiably comply with the definition of "forest" (i.e., meet the thresholds of the definition of "forest" for at least the 10 previous consecutive years prior to the date observed. The term "land cover" used here should be understood to encompass both land cover and land use. Change AD Categories (Deforestation, Forest Regrowth) and non-change AD Categories (Stable Forest, Stable Non-Forest) are evaluated.

Collected sample data are used to identify the land cover conditions at the Start Date and the End Date of the Historical Reference Period within the Jurisdiction spatial boundary and assign a change or no-change AD Category to each observation. Evidence of intermediary

[7] Large (exceeding 1000 contiguous hectares within the HRP) natural disturbance causing forest loss due to geological (e.g., volcano or landslide) or weather-related (e.g., hurricane) impacts that have a return interval of more than 10 years.

land cover changes occurring between the Start Date and End Date of the Historical Reference Period should be used to inform the classification of a sample unit, but only one AD Category and LCT may be identified per location per Historical Reference Period.

For each sample unit where change is observed, the date of change shall be identified and recorded using the timeseries of imagery.

Data Sources

Sample data is developed through the interpretation of a timeseries of high-resolution imagery spanning a period within +/- 365 days of the start and end date of the Historical Reference Period and may be supplemented with imagery from a wider time range to help interpret observations . Maps may be employed in the design of efficient sampling strategies. Other data products may also be used to supplement interpreter observation of high-resolution imagery.

It is expected that most efforts will utilize high resolution satellite imagery as the primary source data for estimating areas of LCTs. In cases where ground data is also used in making primary observations, it must be shown that ground and imagery-based observations produce reliably similar results. Where available, remote sensing or field dataset of demonstrably higher accuracy than normal satellite data can be used: for example, aircraft-based LiDAR data would be highly suitable for creating sample data for all AD-Categories.

Where imagery is used as the primary data source for a sample plot, resolution of 5m or less must be prioritized for use and is essential for the most recent time point. Assessment of land cover for years after 2020 is expected to always use 5m or better resolution, unless it can be demonstrated why this standard is not feasible for the study area and time period. Ground observations are only permissible if collected within twelve months of the End Date of the Historical Reference Period.

Planned vs Unplanned Deforestation

Analysts must attempt to differentiate between planned and unplanned deforestation observations in the sample plots.

Note that some planned events may have already been excluded from the sample frame, and these excluded areas would thus produce no observations of the planned deforestation LCT.

While it is not possible to irrefutably demonstrate whether deforestation was in fact planned based solely on imagery, analysts should identify lands that are deforested in a manner or by a driver than is highly suggestive of it having been designated and documented for deforestation prior to clearing. Examples of what would be considered planned deforestation include:

- Infrastructure projects such as reservoirs and transportation projects;

- Government allocations of state forests for conversion to industrial agricultural land use including tree crops (e.g., oil palm, wood pulp, rubber, sugar, rice);
- Clearings of land for large scale commodity agriculture on private land.

There is no single approach through which planned deforestation can be unambiguously identified for all sample plots in all Jurisdictions, but it will be possible to develop a decision tree that leverages both imagery as well as ancillary spatial and non-spatial data to make a correct determination.

Illustrative criteria that should be considered in developing Jurisdiction-specific SOP for planned deforestation:

1) **Imagery**
    a. Deforested parcels follow regular geometric shapes over distances that would be challenging to reproduce without professional land survey.
    b. Construction of new infrastructure accompanies clearing (e.g., new roads or canals built to access cleared land).
    c. Within parcels, deforestation progresses in a regularized manner from one end to another (as might be apparent in ancillary annualized land cover change map), or through regularly spaced geometric patches such as would suggest professional land surveying.
    d. Parcels are quickly planted with a monoculture after clearing.
2) **Geographic Context**
    a. Land management category precludes planned deforestation (e.g., a strictly protected area).
    b. Located within or near government-identified agricultural concession areas (note that unplanned deforestation can also take place in these areas, so concession maps aren't a guarantee that it is 'planned').
    c. Proximity to rural settlements or existing infrastructure.
    d. Region known to be a major producer of a commercial agricultural commodity that is implicated in planned deforestation in Jurisdiction.
3) **Economic Context**
    a. Certain commodities are generally recognized as drivers of planned deforestation in the Jurisdiction.

The analyst should consider the local Jurisdictional context and apply a Jurisdiction-specific decision tree to aid in identifying planned and unplanned deforestation.

Data Collection

The response design needs to be set up in a publicly available data collection software.

Detailed procedures shall be implemented for quality management during the interpretation process, to be laid down within the SOPs developed. Typically, these will include cross

validation between interpreters, at least for a subset of sample units assessed by all interpreters.

Data Analysis

Sample units are classified by AD-C and Land Cover Transition (LCT) (and are recorded with reference to sampling stratum if a stratified sampling design is used).

This sample-based approach results in a series of tallies of sample unit observations, which correspond to the combinations of observed AD Category, Land Cover Transition, and associated Sampling Strata.

The tallies of sample units are denominated as $Count_{J,AD\text{-}C,LCT,ss}$ for 1, 2, … AD-Cs, 1, 2, 3, …, SS sampling strata and 1, 2, 3, …,LCT* LCTs. The counts of sample units and their classification into AD-Cs and LCTs shall be summarized using the following tabular format.

	Activity Data Categories (AD-C), Land cover transitions (LCT)							
	AD-C 1			*AD-C 2*		*AD-C Activities*		*SS Total*
Sampling Stratum (SS)	*LCT 1*	*LCT 2*	*LCT …*	*LCT LCT*-2*	*LCT LCT*-1*	*LCT LCT**	…	
Stratum 1	$Count_{J,\ AD\text{-}C=1,\ LCT=1,ss=1}$	$Count_{J,\ AD\text{-}C=1,\ LCT=2,ss=1}$	$Count_{J,\ AD\text{-}C=1,\ LCT=M,ss=1}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}2,ss=1}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}1,ss=1}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*,ss=1}$	…	$Count_{J,ss=1}$
Stratum 2	$Count_{J,\ AD\text{-}C=1,\ LCT=1,ss=2}$	$Count_{J,\ AD\text{-}C=1,\ LCT=2,ss=2}$	$Count_{J,\ AD\text{-}C=1,\ LCT=M,ss=2}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}2,ss=2}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}1,ss=2}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*,ss=2}$	…	$Count_{J,ss=2}$
Stratum SS	$Count_{J,\ AD\text{-}C=1,\ LCT=1,ss=SS}$	$Count_{J,\ AD\text{-}C=1,\ LCT=2,ss=SS}$	$Count_{J,\ AD\text{-}C=1,\ LCT=M,ss=SS}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}2,ss=SS}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}1,ss=SS}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*,ss=SS}$	…	$Count_{J,ss=SS}$
LCT Total	$Count_{J,\ AD\text{-}C=1,\ LCT=1,}$	$Count_{J,\ AD\text{-}C=1,\ LCT=2,}$	$Count_{J,\ AD\text{-}C=1,\ LCT=M,}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}2,}$	$Count_{J,\ AD\text{-}C=2,\ LCT=LCT*\text{-}1,}$	$Count_{J,\ AD\text{-}C=2,\ LCT=\ LCT*,}$	…	[*table total*] $Count_J$
AD-C Total	$Count_{J,AD\text{-}C=1}$			$Count_{J,AD\text{-}C=2}$			…	

The tallies of sample units classified as AD Category and LCTs are denominated as $Count_{J,AD\text{-}C,LCT,ss}$ for AD-Cs Deforestation, Forest Regrowth, Stable Forest, Stable-Non Forest, *LCT** LCTs, and *SS* sampling strata.

Sampling stratum weights ws_{ss} shall be calculated for the 1, 2, 3, …, SS strata by dividing the mapped area of each sampling stratum ($A_{J,ss}$) by the total reporting area A_J.

Sampling Stratum (SS)	Sampling Stratum area (hectares)	Strata weight (ratio)
Stratum 1	$A_{J,ss=1}$	$ws_{ss=1} = A_{J,ss=1} / A_J$
Stratum 2	$A_{J,ss=2}$	$ws_{ss=2} = A_{J,ss=2} / A_J$
Stratum SS	$A_{J,ss=SS}$	$ws_{ss=SS} = A_{J,ss=SS} / A_J$
Total	$A_J - A_{J\text{-excluded}}$	$1 - (A_{J\text{-excluded}} / A_J)$

The counts of sample units, counts of sample units classified as AD Category, and the strata weights will be the basis for calculating area proportions ($Prop_{J,AD\text{-}C,LCT,ss}$). For each AD Category, the proportions $Prop_{J,LCT,ss}$ sum over *ss* to equal the sample-based estimate of the proportion of the Jurisdiction classified as AD Category ($Prop_{J,AD\text{-}C}$). The sum of all cells must be equal to the proportion of A_j not identified as Excluded Known LCT, representing 100% of the Jurisdiction. For each cell, the area proportions shall be calculated by multiplying by the weight of the stratum and by dividing by the total count for the respective stratum, as follows:

$$Prop_{J,AD\text{-}C,LCT,ss} = ws_{ss} * Count_{J,AD\text{-}C,LCT,ss} / Count_{J,ss} \quad (1)$$

Where:

$Prop_{J,AD\text{-}C,LCT,ss}$	Weighted proportion of A_J that falls into sampling stratum *ss* and is classified as AD Category *AD-C* and Land Cover Transition *LCT*; dimensionless
ws_{ss}	Weight of the stratum *ss*; dimensionless
$Count_{J,AD\text{-}C,LCT,ss}$	Count of the sample units within the Jurisdiction that fall into sampling stratum *ss* and are classified as AD Category *AD-C* and Land Cover Transition *LCT*; dimensionless
$Count_{J,ss}$	Total count of sample units for the stratum *ss*
J	Defined Jurisdiction of interest
AD-C	Activities Deforestation, Stable Forest, Stable Non-Forest
LCT	1,2,3…LCT* Land Cover Transition classes
ss	1,2,3…SS Sampling Strata

The resulting proportions shall be summarized as follows:

	Activity Data Categories (AD-C) and Land cover Transitions (LCT)							
	AD Category 1			*AD Category 2*			*AD Category*	*Stratum Total*
Strata (ss)	*LCT 1*	*LCT 2*	*LCT M*	*LCT 1*	*LCT 2*	*LCT M*	…	
Stratum 1	$Prop_{J,}$ *ADC=1, LCT=1,ss=1*	$Prop_{J,}$ *AD-C=1, LCT=2,ss=1*	$Prop_{J,}$ *AD-C=1, LCT=M,ss=1*	$Prop_{J,}$ *AD-C=2, LCT=1,ss=1*	$Prop_{J,}$ *AD-C=2, LCT=2,ss=1*	$Prop_{J,}$ *AD-C=2, LCT=M,ss=1*	…	$Prop_{J,}$ *AD-C,ss=1*
Stratum 2	$Prop_{J,}$ *AD-C=1, LCT=1,ss=2*	$Prop_{J,}$ *AD-C=1, LCT=2,ss=2*	$Prop_{J,}$ *AD-C=1, LCT=M,ss=2*	$Prop_{J,}$ *AD-C=2, LCT=1,ss=2*	$Prop_{J,}$ *AD-C=2, LCT=2,ss=2*	$Prop_{J,}$ *AD-C=2, LCT=M,ss=2*	…	$Prop_{J}$ *,AD-C,ss=2*
Stratum SS	$Prop_{J,}$ *AD-C=1, LCT=1,ss=SS*	$Prop_{J,}$ *AD-C=1, LCT=2,ss=SS*	$Prop_{J,}$ *AD-C=1, LCT=M,ss=SS*	$Prop_{J,}$ *AD-C=2, LCT=1,ss=SS*	$Prop_{J,}$ *AD-C=2, LCT=2,ss=SS*	$Prop_{J,}$ *AD-C=2, LCT=M,ss=SS*	…	$Prop_{J,}$ *AD-C,ss=SS*
LCT Total	$Prop_{J,}$ *AD-C=1,LCT=1*	$Prop_{J,}$ *AD-C=1,LCT=2*	$Prop_{J,}$ *AD-C=1,LCT=M*	$Prop_{J,}$ *AD-C=2,LCT=1*	$Prop_{J,}$ *AD-C=2,LCT=2*	$Prop_{J,}$ *AD-C=2,LCT=M*	…	*[table total] =1*
AD-C total	*PropJ,AD-C=1*			*PropJ,AD-C=2*			…	

Step 2 Calculate total historical area of each AD Category

Estimate the area within the Jurisdiction classified as each AD Category and Land Cover Transition using the column totals for the proportions estimated above, summing across sampling strata and Land Cover Transition classes, as follows:

$$A_{J,AD-C,LCT} = \sum_{ss=1}^{SS} Prop_{J,AD-C,LCT,ss} \times A_J \quad (2)$$

$A_{J,AD-C,LCT}$	Area of the Jurisdiction classified as AD Category *AD-C* and Land Cover Transition *LCT* over the Historical Reference Period; ha
$Prop_{J,AD-C,LCT,ss}$	Weighted proportion of A_J that falls into sampling stratum *ss* and classified as AD Category *AD-C* and Land Cover Transition LCT; dimensionless
A_J	Area of the Jurisdiction; ha
J	Defined Jurisdiction of interest
AD-C	Activities Deforestation, Stable Forest, Stable Non-Forest, Forest Regrowth
LCT	1,2,3…LCT* Land Cover Transition classes
ss	1,2,3…SS Sampling Strata

The total area of each AD Category shall then be calculated by summing over the LCTs.

$$A_{J,Def} = \sum_{LCT=1}^{LCT*} A_{J,AD-C=Deforestation,LCT} \quad (3)$$

$$A_{J,StFor} = \sum_{LCT=1}^{LCT*} A_{J,AD-C=Stable\ Forest,LCT} \quad (4)$$

$$A_{J,StNonFor} = \sum_{LCT=1}^{LCT*} A_{J,AD-C=Stable\ Non-Forest,LCT} \quad (5)$$

$$A_{J,Regrow} = \sum_{LCT=1}^{LCT*} A_{J,AD-C=Forest\ Regrowth,LCT} \quad (6)$$

Where:

$A_{J,Def}$	Area of Deforestation within the Jurisdiction over the Historical Reference Period; ha
$A_{J,StFor}$	Area of Stable Forest within the Jurisdiction over the Historical Reference Period; ha
$A_{J,StNonFor}$	Area of Stable Non-Forest within the Jurisdiction over the Historical Reference Period; ha
$A_{J,Regrow}$	Area of Forest Regrowth within the Jurisdiction over the Historical Reference Period; ha
$A_{J,AD-C,LCT}$	Area classified as AD Category *AD-C* and Land Cover Transition Class *LCT* within the Jurisdiction over the Historical Reference Period; ha
AD-C	AD Category: Deforestation, Stable Forest, Stable Non-Forest, Forest Regrowth
LCT	1,2,3…LCT* Land Cover Transition classes
J	Defined Jurisdiction of interest

For the historical areas of deforestation conservative discounting may be necessary based on assessed uncertainty (see Steps 3-4 Below).

Step 3 Calculate the uncertainty for estimates of historical areas of each AD Category

A standard error shall be calculated for the proportions and areas of Activity Data Categories and Land Cover Transitions:

$$S(Prop_{J,AD-C,LCT}) = \sqrt{\sum_{SS=1}^{SS} \frac{ws_{SS}{}^2 \times \frac{Count_{J,AD-C,LCT,SS}}{Count_{J,SS}} \times \left(1 - \frac{Count_{J,AD-C,LCT,SS}}{Count_{J,SS}}\right)}{Count_{J,SS} - 1}} \quad (7)$$

$$S(A_{J,AD-C,LCT}) = S(Prop_{J,AD-C,LCT}) \times A_J \quad (8)$$

Where:

$S(Prop_{J,AD-C,LCT})$	Standard error of the proportion of A_J with AD Category *AD-C* and Land Cover Transition *LCT*; dimensionless
$Prop_{J,AD-C,LCT}$	Proportion of A_J with AD Category *AD-C* and Land Cover Transition *LCT*; dimensionless

ws_{ss}	Weight of the stratum ss; dimensionless
$Count_{J,AD\text{-}C,LCT,ss}$	Total count of sample units that fall into sampling stratum *ss* and with AD Category *AD-C* and Land Cover Transition *LCT* dimensionless
$Count_{J,ss}$	Total count of sample units for the stratum ss
$A_{J,AD\text{-}C,LCT}$	Area of Jurisdiction with AD Category *AD-C* and Land Cover Transition *LCT*; ha
$S(A_{J,AD\text{-}C,LCT})$	Standard error of the area with AD Category *AD-C* and Land Cover Transition *LCT,* ha
A_J	Area of the Jurisdiction; ha
AD-C	AD Category: Deforestation, Stable Forest, Stable Non-Forest
LCT	1,2,3…LCT* Land Cover Transition classes
J	Defined Jurisdiction of interest

Uncertainty shall be aggregated using error aggregation techniques to derive the standard error for the estimates of deforestation area.

$$S(A_{J,Def}) = \sqrt{\sum_{LCT=1}^{LCT*} S(A_{J,AD-C=defo,LCT})^2} \quad (9)$$

$$S(A_{J,StFor}) = \sqrt{\sum_{LCT=1}^{LCT*} S(A_{J,AD-C=StFor,LCT})^2} \quad (10)$$

$$S(A_{J,StNonFor}) = \sqrt{\sum_{LCT=1}^{LCT*} S(A_{J,AD-C=StNonFor,LCT})^2} \quad (11)$$

$$S(A_{J,Regrow}) = \sqrt{\sum_{LCT=1}^{LCT*} S(A_{J,AD-C=Regrow,LCT})^2} \quad (12)$$

Where:

$S(A_{J,Def})$	Standard error of the area of Deforestation within the Jurisdiction over the Historical Reference Period; ha
$S(A_{J,StFor})$	Standard error of the area of Stable Forest within the Jurisdiction over the Historical Reference Period; ha
$S(A_{J,StNonFor})$	Standard error of the area of Stable Non-Forest within the Jurisdiction over the Historical Reference Period; ha
$S(A_{J,Regrow})$	Standard error of the area of Regrowth within the Jurisdiction over the Historical Reference Period; ha

$S(A_{J,AD\text{-}C,LCT})$	Standard error of the area of AD Category *AD-C* and Land Cover Transition *LCT*; ha
AD-C	AD Category: Deforestation, Stable Forest, Stable Non-Forest, Forest Regrowth
LCT	1,2,3…LCT* Land Cover Transition classes
J	Defined Jurisdiction of interest

Using this information, calculate for each estimated area its percentage uncertainty. The percentage uncertainty is the half width of the two-sided 90% confidence interval as percentage of the estimated area.

$$U\%(A_{J,Def}) = t \times \frac{S(A_{J,Def})}{A_{J,Def}} \quad (13)$$

Where:

$U\%(A_{J,Def})$	Percentage uncertainty of the undiscounted Area of Deforestation within the Jurisdiction over the Historical Reference Period; %
$S(A_{J,Def})$	Standard error of the undiscounted Area of Deforestation within the Jurisdiction over the Historical Reference Period; ha
$A_{J,Def}$	Undiscounted Area of Deforestation within the Jurisdiction over the Historical Reference Period; ha
t	Value of the t-distribution for a two-sided 90% confidence interval

Step 4 Assess JNR AT Precision targets for estimates of historical land cover transition area

Historical area estimates of unplanned deforestation need to be uncertainty discounted. This calculation is undertaken automatically in the allocation tool. However, it must be ensured that the percentage uncertainty meets precision standards before utilizing estimates of land cover transition in the JNR Allocation Tool. If the percentage uncertainty is less than or equal to 10%, the estimate can be used as is and the discount factor is 0%. If the percentage uncertainty exceeds 10%, the area estimate will be subject to uncertainty discounting in the JNR-AT. The percentage uncertainty may not exceed 20%.

The discount factors are calculated as follows within the JNR-AT:

$$DF_{Def} = U\%(A_{J,Def}) / t_{alpha=10\%} * t_{alpha=66.66\%} \quad (14)$$

Where:

DF_{Def}	Discount factor for deforestation; %
$U\%(A_{J,Def})$	Percentage uncertainty of the Area of Deforestation within the Jurisdiction over the Historical Reference Period; %

t	Values from the t-distribution ($t_{alpha=10\%}$ is the t-value for the two-sided 90% confidence interval, approximately 1.6449; $t_{alpha=66.6\%}$ is the t-value for a one-sided 66.66% confidence interval, approximately 0.4307); dimensionless

Using the area and the uncertainty discounts, calculate the activity data

$$A_{J,Def\text{-}discounted} = A_{J,Def} - (A_{J,Def} * DF_{Def}) \quad (15)$$

Where:

$A_{J,Def\text{-}discounted}$	Area of Deforestation within the Jurisdiction over the Historical Reference Period, discounted for Uncertainty; ha
$A_{J,Def}$	Undiscounted Area of Deforestation within the Jurisdiction over the Historical Reference Period; ha
DF_{Def}	Discount factor for deforestation; %

Step 5 Disaggregate Standard Error and Activity Data by LCT

Activity Data for each LCT to be allocated with the JNR-AT is derived from equation 2. For Unplanned deforestation:

$$A_{J,Def,unplanned} = A_{J,AD-C=deforestation,LCT=unplanned} \quad (16)$$

Where:

$A_{J,AD\text{-}C,LCT}$	Area of the Jurisdiction classified as AD Category *AD-C* and Land Cover Transition *LCT* over the Historical Reference Period; ha

The standard error of the Unplanned Deforestation area estimate shall be derived using error propagation equations. In doing this, the fraction of Unplanned Deforestation may be treated as an exactly known coefficient.

$$S(A_{J,Def,unplanned}) = S(A_{J,def}) \times \frac{Prop_{J,AD-C=deforestation,LCT=unplanned}}{Prop_{J,AD-C=deforestation}} \quad (17)$$

$S(A_{J,Def,unplanned})$	Standard error of the Area of Unplanned Deforestation within the Jurisdiction over the Historical Reference Period; ha
$S(A_{J,Def})$	Standard error of the Area of Total Deforestation within the Jurisdiction over the Historical Reference Period; ha
$Prop_{J,AD\text{-}C,LCT}$	Weighted proportion of A_J classified as AD Category *AD-C* and Land Cover Transition LCT; dimensionless
$Prop_{J,AD\text{-}C}$	Weighted proportion of A_J classified as AD Category *AD-C,* dimensionless

5.5.2 Determine the Jurisdictional Baseline Activity Data for Unplanned Deforestation

Step 1 Calculate Start and End Dates of the Historical reference period

Areas of change AD-C are annualized by dividing the total area experiencing AD-C by the number of years between the Start and End Date of the Historical Reference Period. This timespan between the start and end of the Historical Reference Period shall be based on the average collection dates of the images used to generate observations (or dates of field observations) and must be consistent with the Start and End Date reported in the J-ADB-UD Description Report.

Alignment between the JBVP and the Historical Reference Period is ensured as follows:

- HRP_End should differ by no more than 6 months from the Start Date of the JBVP.
- The difference between HRP_Start and HRP_End should be between 5.5 and 6.5 years.

If either of these conditions cannot be met due to data availability, Verra shall determine what criterion will be modified.

$$HRP\_Start = \sum_1^{ss}\left(\frac{\sum_1^{s} t_{start,ss,s}}{Count_{J,ss}} \times Prop_{J,ss}\right) \quad (18)$$

$$HRP\_End = \sum_1^{ss}\left(\frac{\sum_1^{s} t_{end,ss,s}}{Count_{J,ss}} \times Prop_{J,ss}\right) \quad (19)$$

Where:

HRP_Start	Area-weighted average date of imagery used for interpretation of sample plots at the start of the Historical Reference Period; decimal year
HRP_End	Area-weighted average date of imagery used for interpretation of sample plots at the end of the Historical Reference Period; decimal year
$t_{start,ss,s}$	Date of image used to interpret the Start of a land cover transition for *sample* s in Sampling Stratum *ss*; decimal year
$t_{end,ss,s}$	Date of image used to interpret the End of a land cover transition for *sample* s classified in Sampling Stratum *ss*; decimal year
$Count_{J,ss}$	Count of the sample units within the Jurisdiction that fall into sampling stratum *ss*; dimensionless
$Prop_{J,ss}$	Weighted proportion of A_J that falls into sampling stratum *ss*; dimensionless

J	Defined Jurisdiction of interest
AD-C	AD Category: Deforestation, Stable Forest, Stable Non-Forest
SS	1,2,3…SS Sampling Strata
S	1,2,3…S Sample Units

Step 2 Enter data into the allocation tool

The JNR Allocation Tool is implemented with the following parameters:

AD-Category	Activity Data (ha)	Standard Error (ha)
Stable Forest	$A_{J,StFor}$	$S(A_{J,StFor})$
Deforestation	$A_{J,Def,unplanned}$	$S(A_{J,Def,unplanned})$
Forest Regrowth	$A_{J,Regrow}$	$S(A_{J,Regrow})$
Stable Non-Forest	$A_{J,StNonFor}$	$S(A_{J,StNonFor})$

5.5.3 Allocate portions of the Jurisdictional Baseline Activity Data for Unplanned Deforestation to Project and Leakage Belt areas

The developed Activity Data is spatially distributed within the Jurisdiction according to the risk of deforestation so that areas of high risk get a higher allocation than areas of low risk. A deforestation risk map must therefore be created using the JNR Risk Mapping Tool (JNR-RMT). The JNR-RMT requires three Forest Cover Benchmark Maps (FCBMs) as input. Once the Risk Map is created and the Activity Data is determined, the JNR Allocation Tool is used to allocate portions of the Activity Data to the project and leakage belt areas according to the risk classes that exist within these areas. The project developer can then further distribute the Activity Data portions allocated to each risk class across forest strata and multiply the per forest stratum activity data with their corresponding average emission factors to calculate the emission baseline for unplanned deforestation of the project and leakage belt areas.

This entire process is developed by applying the following steps. Step 1 is described in this module. Steps 2-3 are described in this module but require the application of the JNR RMT and JNR AT. Steps 4-7 are listed here merely completeness and are described in module BL-UD and are completed by the project proponent.

Step 1. Create three FCBMs representing areas of Forest at the Start Date of the HRP and areas of Stable Forest in the middle and End Dates of the HRP.

Step 2. Using the JNR-RMT, divide the areas of “Stable Forest” that exist at the End Date of the HRP in categorical risk classes.

Step 3. Using the JNR-AT, allocate portions of the JADB to the risk classes that exist in the areas of “Stable Forest” in the project and leakage belt areas.

Step 4. Stratify the area of Stable Forest that exist at the end of the HRP in the project and leakage belt areas.

Step 5. Distribute the Activity Data for the JBVP allocated to each risk class across forest strata proportionally to their area within the project and leakage belt.

Step 6. Estimate average emission factors per Forest Stratum within the project and leakage belt.

Step 7. Determine the baseline for unplanned deforestation of the project and leakage belt areas by multiplying the allocated portions of the activity data within the JBVP per forest stratum by their corresponding emission factors.

Step 1. Development of Jurisdictional Forest Cover Benchmark Maps

Carry out the Jurisdictional mapping

Three Jurisdictional FCBMs covering the Jurisdictional area, plus a buffer of at least 10 Km are needed for using the JNR-RMT and JNR-AT:

- FCBM-1 shall represent areas meeting the definition of "Forest" at the Start Date of the HRP.
- FCBM-2 shall represent areas of Stable Forest 3 years after the Start Date of the HRP (i.e., at a date in the middle of the HRP).
- FCBM-3 shall represent areas of Stable Forest at the End Date of the HRP.

The Jurisdictional FCBMs shall be raster files in which Forests and Stable Forests are represented by pixels with the value 1. The AD Categories "Non Forest", "Stable Non-Forest", "Deforestation" and "Forest Regrowth" must be represented with the pixel value 0 and areas outside the Jurisdiction and 10 km buffer shall be labelled "no data".

The spatial resolution of the raster file must be consistent with the minimum area threshold of the definition of "Forest" (see JNR-RMT for further guidance).

Standard Operating Procedures (SOPs) shall be developed to describe the workflow for mapping. The SOPs should cover, at least, collection of input data, processing and accuracy assessment. The SOPs should include detailed guidance also on quality management. These SOPs shall be included as an appendix in the J-ADB-UD Description Report.

Accuracy assessment of the Jurisdictional mapping Forest Cover Benchmark Map

The accuracy of maps shall be assessed by comparison against sample-based observations. Such sample-based observations may include observations collected for activity data development.

In most cases, mapping of forest cover should be feasible at high accuracy. The aggregate accuracy (overall agreement) for the binary forest-cover map shall amount to at least 90%.

Where relevant, integrate project Forest Cover Benchmark Maps into the jurisdictional Forest Cover Benchmark Maps

During the development of Jurisdictional Forest Cover Benchmark Maps (FCBMs) all proponents of projects either currently active or in the VCS pipeline and anticipating validation within the JBVP will be given the opportunity to submit Project-specific FCBMs ($FCBM_p$) covering Project Areas and Leakage Belts associated with the same time periods for which the Jurisdictional FCBMs are developed.

The accuracy of any $FCBM_p$ submitted by project proponents shall be assessed using a plot sample design using the same SOP as used to develop Jurisdictional Activity Data. A minimum of 300 sample plots shall be used per FCBMp. Simultaneously, the accuracy of the jurisdictional FCBM shall be assessed using the same sample within the spatial bounds of the $FCBM_p$. If the $FCBM_p$ is shown to be significantly more accurate than the jurisdictional FCBM, the $FCBM_j$ shall be used to replace the portions of the jurisdictional FCBM that it intersects with.

“Significantly more accurate" shall be defined as meeting the following two requirements:

- The project map’s Kappa coefficient is higher by at least 5%.
- The sum of the project maps user and producer accuracy for the deforestation class is higher by at least 10%.

A coordinated sampling effort may be designed to both support AD development and accuracy assessment of $FCBM_p$.

Step 2. Development of a Deforestation Risk Map of the jurisdiction

A deforestation risk map shall be developed by employing the latest approved version of the JNR Risk Mapping Tool (JNR-RMT) utilizing the previously selected set of FCBMs.

The output of the JNR-RMT will be a spatially delineated Risk Map covering the entire area of Stable Forest existing within the jurisdiction at the End Date of the HRP. The Risk map will contain 31 categorical risk classes ordered from 0 (= no risk) to 30 (=highest risk).

Step 3: Allocate projected activity data to risk classes within project and leakage belt areas.

The latest approved version of the JNR Allocation Tool[8] shall be employed to allocate portions of the Activity Data within the JBVP to the project and leakage belt areas of all

[8] https://verra.org/project/Jurisdictional-and-nested-redd-framework/rules-requirements/

existing VCS Registered Projects[9], VCS Projects in the VCS Pipeline[10], and any other planned projects for which the proponent has applied for a baseline AD allocation for unplanned deforestation.

The application of the JNR-AT will require:

- Digital Map of Jurisdictional Boundaries
- Forest Cover Benchmark Maps (FCBMs), as described above
- Digital maps of Project Areas and Leakage Belts

Activity Data Baseline Allocation to AUD Project Areas and Leakage Belts

Application of the JNR Allocation Tool will generate a table containing Activity Data Baseline associated with each Risk Class intersecting each AUD Project Area and AUD Leakage Belt.

Allocations to project PA and LB are termed $AD_{PA,LCT,p,i}$ $AD_{LB,LCT,p,i.}$

Where:

$AD_{PA,LCT,p,i,}$	Portion of the Jurisdictional Activity Data Baseline allocated to AUD Project Area of project *p*, in Land Cover Transition class *LCT*, in risk class *i*, ha
$AD_{PA,LCT,p,i,}$	Portion of the Jurisdictional Activity Data Baseline allocated to AUD Leakage Belt of project *p*, in Land Cover Transition class *LCT*, in risk class *i*, ha
LCT	1,2,3…LCT* Land Cover Transition classes
p	1,2,3…P AUD projects requesting allocation of a portion of the Jurisdictional Activity Data
i	1,2,3…I Risk Class

Delivery of data to project proponents in Activity Data Baseline Allocation Report

Activity Data will be provided to project proponents by Verra, as a part of the Activity Data Baseline Allocation Report including:

- The table containing AD allocation to each risk class for the PA and LB for each year of the Jurisdictional Validity Period.
- The Jurisdictional FCBMs.

[9] https://registry.verra.org/app/search/VCS/Registered

[10] https://registry.verra.org/app/search/VCS/Pipeline

- The Jurisdictional Risk Map.

The AD values contained in the project-specific tables are assigned the parameter names $AD_{PA,LCT,r}$ and $AD_{LB,LCT,r}$

Where:

$AD_{PA\text{-}UD,LCT,r}$	Projected annual Activity Data Baseline allocated to AUD Project Area *pa* for land cover transition *LCT* in Risk Class *r* in the JBVP, ha
$AD_{LB\text{-}UD,LCT,r}$	Projected annual Activity Data Baseline allocated to AUD Leakage Belt *LB* for land cover transition *LCT* in Risk Class *r* in the JBVP; ha
LCT	1,2,3…LCT* Land Cover Transition classes
r	1,2,3…R Risk Class

5.6 Updating the J-ADB-UD

The J-ADB-UD Description Report shall be updated and revalidated every 6 years, as determined by Verra. Each updated J-ADB-UD Description Report will represent a new JBVP.

Whenever compatible with the most recent version of this module, the generation of an updated J-ADB-UD Description Report shall employ the same methods as used in the initial J-ADB-UD Description Report, updated where needed (for example to enable the use of new satellite data sources).

6 DATA AND PARAMETERS

6.1 Data and Parameters Available at Validation

Data / Parameter	Digital Map of Jurisdictional Boundaries
Data unit	Digital Map
Description	Digital raster or vector map depicting all areas included in the Jurisdiction.
Equations	n/a
Source of data	Verra
Value applied	n/a
Justification of choice of data or description of measurement methods and procedures applied	As delineated in Section 5.4.

Purpose of Data	Defines the historical reference area and carbon accounting area for all activities.
Comments	The projected coordinate system should be selected such that it minimizes bias in the estimation of area across the Jurisdiction, such as UTM in the zone that is most closely centered on the Jurisdiction. All spatial data generated by projects within the Jurisdiction must use the coordinate system selected for the Digital Map of Jurisdictional Boundaries.

Data / Parameter	A_J
Data unit	Ha
Description	Area of the Jurisdiction
Equations	2, 9
Source of data	Digital Map of Jurisdictional Boundaries
Value applied	Calculated within a GIS
Justification of choice of data or description of measurement methods and procedures applied	Must provide estimate of the total geographic area of the Jurisdiction
Purpose of Data	Calculation of Activity Data
Comments	Area should be calculated within coordinate system of *Digital Map of Jurisdictional Boundaries*

6.2 Data and Parameters Monitored

Data / Parameter:	Digital Map of Jurisdictional Boundaries
Data unit:	Digital Map
Description:	Digital raster or vector map depicting all areas included in the jurisdiction.
Equations	n/a
Source of data:	Verra
Description of measurement methods and procedures to be applied:	n/a
Frequency of monitoring/recording:	Annually, and prior to start of each JBVP
QA/QC procedures to be applied:	Within a JBVP, the boundary may only be changed based on the criteria presented in Section 5.4

Purpose of data:	Defines the historical reference area and carbon accounting area for all activities.
Calculation method:	n/a
Comments:	The projected coordinate system should be selected such that it minimizes bias in the estimation of area across the Jurisdiction, such as UTM in the zone that is most closely centered on the Jurisdiction. All spatial data generated by projects within the jurisdiction must use the coordinate system selected for the Digital Map of Jurisdictional Boundaries.

Data / Parameter:	Digital Map of Jurisdictional Sampling Stratification
Data unit:	Digital Map
Description:	Digital raster or vector map depicting all areas included in the Jurisdiction.
Equations	n/a
Source of data:	J-ADB-UD data developers
Description of measurement methods and procedures to be applied:	As delineated in Section 5.5.1
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	
Purpose of data:	Defines the areas within which sample plots are distributed to generate estimates of each Activity Data Category AD-C
Calculation method:	The combined extents of areas mapped as Sampling Strata and Excluded_LCT must encompass the entire Jurisdiction.
Comments:	Projected coordinate system must match that of *Digital Map of Jurisdictional Boundaries*

Data / Parameter:	Digital Map of Excluded Known LCT
Data unit:	Digital Map
Description:	Digital raster or vector map depicting all areas classified as known land cover transitions
Equations	n/a
Source of data:	J-ADB-UD data developers

Description of measurement methods and procedures to be applied	Includes only locations with known irrefutable land cover
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	
Purpose of data:	Defines the areas within the Jurisdiction that are excluded from the sampling design for sample-based activity data.
Calculation method:	
Comments:	Projected coordinate system must match that of *Digital Map of Jurisdictional Boundaries*

Data / Parameter:	Jurisdictional Forest Cover Benchmark Map (FCBMj)
Data unit:	Digital Map
Description:	Digital Maps of Forest/Non Forest Map covering the entire Jurisdiction and a buffer zones and representing time periods spanning the Historical Reference Period that meet the requirements of the latest JNR Risk Mapping Tool.
Equations	
Source of data:	JNR Risk Mapping Tool
Description of measurement methods and procedures to be applied:	As delineated in JNR Risk Mapping Tool
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	As delineated in JNR Risk Mapping Tool
Purpose of data:	Used to train and test the benchmark risk mapping approach described in the JNR Risk Mapping Tool
Calculation method:	As delineated in JNR Risk Mapping Tool
Comments:	

Data / Parameter:	Project-specific Forest Cover Benchmark Map (FCBMp)
Data unit:	Digital Map

Description:	Digital Maps of Forest / NonForest Map covering AUD Project Areas and Leakage Belts and representing time periods spanning the Historical Reference Period that meet the requirements of the latest JNR Risk Mapping Tool.
Equations	
Source of data:	Provided by Project Proponents following JNR Risk Mapping Tool
Description of measurement methods and procedures to be applied:	As delineated in JNR Risk Mapping Tool
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	
Purpose of data:	Used to supplement the Jurisdictional Forest Cover Benchmark Map with project-generated data.
Calculation method:	As delineated in JNR Risk Mapping Tool
Comments:	

Data / Parameter:	Jurisdictional Risk Map LCT
Data unit:	Rasterized Digital Map
Description:	Digital map covering the extent of the Jurisdiction that indicates, for every location mapped as Forest, the annual probability of undergoing Land Cover Transition LCT in each year of the JBVP. One Jurisdictional Risk Map should be produced for each LCT for which a activity data baseline is developed.
Equations	
Source of data:	JNR Risk Mapping Tool
Description of measurement methods and procedures to be applied:	As described in JNR Risk Mapping Tool
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	Must follow all QA/QC procedures as described in the JNR Risk Mapping Tool. Risk maps must be segmented into no more than 30 discrete risk classes, with one of the classes must equal zero risk of LCT. All pixels in the Jurisdictional Risk Map LCT must sum to equal the annual number of pixels projected to undergo Land Cover Transition LCT each year of the JBVP.

	If risk maps for multiple LCTs are developed, the probability of all LCTs at a single location cannot sum to greater than 1/L, where L = the length of the JBVP in years.
Purpose of data:	Allocation of activity data baseline for LCT using the JNR Allocation Tool
Calculation method:	As described in JNR Risk Mapping Tool
Comments:	

Data / Parameter:	Digital Maps of AUD Project Area Boundaries and AUD Project Area Leakage Belts
Data unit:	Digital Map
Description:	Digital raster or vector map depicting locations of all AUD Project Areas and their associated Leakage Belts within the Jurisdiction, to which baseline Activity Data must be allocated in year t.
Equations	n/a
Source of data:	Verra
Description of measurement methods and procedures to be applied:	n/a
Frequency of monitoring/recording:	Continuously, triggered through Verra receiving information and associated digital maps from new projects; Prior to start of each JBVP
QA/QC procedures to be applied:	n/a
Purpose of data:	Used with the Jurisdictional Risk Map and the JNR Allocation Tool to allocate baseline Activity Data to each AUD Project Area within the coming crediting year.
Calculation method:	n/a
Comments:	

Data / Parameter:	Standard Operating Procedures for Sample Plot interpretation
Data unit:	
Description:	Document describing the methods and guidance provided to analysts in interpreting high resolution imagery and/or conducting field observations.
Equations	
Source of data:	Group responsible for developing $Count_{J,AD\text{-}C,LCT,ss}$

Description of measurement methods and procedures to be applied:	As delineated in JNR Risk Mapping Tool
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	As described in JNR Risk Mapping Tool
Purpose of data:	Defines methods and guidance in interpretation of imagery and/or observations
Calculation method:	n/a
Comments:	Must include reference to QA/QC procedures undertaken by $Count_{J,AD\text{-}C,LCT,ss}$ data developers

Data / Parameter:	A_J
Data unit:	ha
Description:	Area of the Jurisdiction
Equations	2, 9
Source of data:	*Digital Map of Jurisdictional Boundaries*
Description of measurement methods and procedures to be applied:	Calculated within a GIS
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	
Purpose of data:	Calculation of Activity Data
Calculation method:	Calculated within a GIS
Comments:	Area should be calculated within coordinate system of *Digital Map of Jurisdictional Boundaries*

Data / Parameter:	$A_{J,ss}$
Data unit:	ha
Description:	Area of the Jurisdiction that is mapped as Sampling Stratum *ss*
Equations	2, 9

Source of data:	Digital vector or raster map depicting the spatial extent of Sampling Stratum SS.
Description of measurement methods and procedures to be applied:	Calculated within a GIS
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	n/a
Purpose of data:	Calculation of Activity Data
Calculation method:	Calculated within a GIS
Comments:	Area should be calculated within coordinate system of *Digital Map of Jurisdictional Boundaries*

Data / Parameter:	$A_{J\text{-}excluded}$
Data unit:	ha
Description:	Area of the Jurisdiction classified an excluded known LCT
Equations	n/a
Source of data:	*Digital Map of Excluded LCT*
Description of measurement methods and procedures to be applied:	Calculated within a GIS
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	n/a
Purpose of data:	Calculation of Activity Data
Calculation method:	Calculated within a GIS
Comments:	Area should be calculated within coordinate system of *Digital Map of Jurisdictional Boundaries*

Data / Parameter:	Sample Plot Record Table
Data unit:	Sampling units
Description:	Table containing at least one entry per interpreted sample plot, indicating at a minimum: XY coordinate of centroid with a specified coordinate system, imagery source (sensor/platform), spatial resolution, collection

	date, records related to observation of physical or land-use criteria used in interpretation, and final determination of Activity Data Category AD-C Land Cover Transition LCT, notes including rationale for rejection
Equations	
Source of data:	J-ADB-UD data developers, interpretation of high resolution satellite imagery and ground measurements.
Description of measurement methods and procedures to be applied:	As described in *Standard Operating Procedures for Sample Plot interpretation*
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	As described in *Standard Operating Procedures for Sample Plot interpretation* All rejected plots must be retained as entries with a note describing the rationale for rejection.
Purpose of data:	Serves as the basis of estimation of areas for all Activity Data Categories AD-C and Land Cover Transitions LCT
Calculation method:	As described in *Standard Operating Procedures for Sample Plot interpretation*
Comments:	

Data / Parameter:	$Count_{J,AD\text{-}C,LCT,ss}$
Data unit:	*Sampling units*
Description:	Count of the sample units within the Jurisdiction that fall into sampling stratum *ss* and are classified as AD Category *AD-C* and Land Cover Transition *LCT*; dimensionless
Equations	
Source of data:	J-ADB-UD data developers, interpretation of high resolution satellite imagery and ground measurements.
Description of measurement methods and procedures to be applied:	
Frequency of monitoring/recording:	Prior to start of each JBVP
QA/QC procedures to be applied:	Imagery Interpretation Method The interpretation and recordkeeping approach must be clearly document through Standard Operating Procedures (SOPs) such as will allow the process to be reproduced by individuals not involved in the initial data

	generation. The methods employed must meet the following minimum characteristics: • The interpretation approach shall should provide sufficient objective criteria that interpreters are able to independently and consistently produce similar interpretations for the same samples. Interpretation criteria should relate to the physical definitions of land cover classes, as far as those criteria can be interpreted from high resolution imagery. • Multiple analysts should be employed to interpret each plot, whether through blind repeated observations or team-based interpretation. • Observation should focus on identifying the class of the sample at each of two single points in time, the beginning and end of the Historical Reference Period. Change shall be determined as a difference in the start and end class. • Where there is analyst disagreement over interpretation of a sample, an objective process must be put in place to either a) adjudicate the dispute and resolve the plot to a single class or b) reject the plot as unclear. Adjudication shall always be attempted before rejection. Information on all rejected plots must be retained and it must be demonstrated that the rejection of plots does not bias the results.
Purpose of data:	Serves as the basis of estimation of areas for all Activity Data Categories AD-C and Land Cover Transitions LCT
Calculation method:	See above
Comments:	

Data / Parameter:	t_{start},*AD-C,ss,s* t_{end},*AD-C,ss,s*
Data unit:	*date in days*
Description:	Date of image used to interpret the Start and End dates of a land cover transition for *sample* s classified as AD Category *AD-C* in Sampling Stratum *ss*
Equations	*22*
Source of data:	Metadata provided with high resolution imagery used in sample plot interpretation. For ground observations, date of field visit.
Description of measurement methods and procedures to be applied:	n/a
Frequency of monitoring/recording:	Prior to start of each JBVP

QA/QC procedures to be applied:	n/a
Purpose of data:	Calibration of Activity Data to timespan between imagery by imagery used in historical analysis.
Calculation method:	
Comments:	For images that are composites of multiple imaging dates, the midpoint of the time period represented in the composite shall be taken as the collection date.