Australian Government

Department of the Environment and Energy

FullCAM Guidelines

Requirements for using the Full Carbon Accounting Model (FullCAM) in the Emissions Reduction Fund (ERF) methodology determination:

Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013

Version 2.1

(published and in force from xx Apr 2017)

Disclaimer

This document has been developed to assist project proponents to calculate abatement in FullCAM as required by the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013.* This document is incorporated by reference in sections 1.3, 4.8, 4.9, 4.12, 4.14, 4.16, 4.18, 4.19, 4.30 and 5.3 of that determination. Project proponents should not use this document as a substitute for complying with the requirements in the Methodology Determination.

Before relying on any material contained in this document, project proponents should familiarise themselves with the requirements of the following legal documents: Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013, Carbon Credits (Carbon Farming Initiative) Act 2011, Carbon Credits (Carbon Farming Initiative) Rule 2015 and Carbon Credits (Carbon Farming Initiative) Regulations 2011. Project proponents are also advises to obtain professional advice suitable to their particular circumstances.

This document does not displace relevant legislative provisions or other laws. All users are encouraged to read this document in conjunction with the relevant legislation, including the methodology determinations, referenced throughout this document. Where any inconsistencies are apparent, please be aware that the legislative provisions will take precedence.

This document will be updated periodically and users should note that some inputs and values may change over time. It is the user's responsibility to ensure that they are using the version of this document and any tool/s required in association as in force at the applicable offsets report submission date (consistent with the definitions in section 1.3 of the Methodology Determination).

The Department of the Environment and Energy and the Commonwealth of Australia will not be liable for any direct, indirect or consequential loss arising out of, or in connection with, or reliance on, information on, or produced by, using this document.

Contents

1. Introduction

1.1 Use of FullCAM with the Native Forest from Managed Regrowth Methodology Determination 2013

The calculation of carbon abatement under the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* (the Determination) is dependent upon the use of the Full Carbon Accounting Model (FullCAM) consistently with the requirements of this document. In particular, sections 4.8, 4.9, 4.12, 4.14, 4.16, 4.18 and 4.19 of the Determination require that the materiality test, baseline scenario and project scenario for each carbon estimation area must be modelled in FullCAM in accordance with the requirements in both the Determination and this document.

Section 4.18 of the Determination requires that any project specific inputs specified in this document must be used to determine the project carbon stocks for a carbon estimation area. Note that each of the simulations and modelling events detailed in this document have specific inputs that must be used. In effect, proponents are required to model project carbon stocks reflecting actual management events for the entirety of the simulation period.

Section 4.30 and 4.31 of the Determination also requires key input and output data to be produced using FullCAM in accordance with the requirements in the Determination and this document. Where content of this document relates to provisions of the Determination, references are given to the location of those provisions.

Project proponents must only change FullCAM default settings as indicated in this document, and all other settings must not be changed. This is to ensure that defaults will apply where relevant.

The latest version of FullCAM is available for download from www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector. You should check the Determination to determine which version of FullCAM you are required to use for your applicable offsets report. If you determine that you must use a version of FullCAM that is unavailable on the website, please contact the Department at erfforests@environment.gov.au to obtain a copy.

1.2 Format of this document

This document provides:

- an overview of FullCAM relevant to the Determination;
- an overview of the simulations you must run in FullCAM as per the Determination;
- a step-by-step walkthrough of using FullCAM to run the simulations correctly; and
- an overview of the FullCAM outputs as they relate to equations within the Determination.

Section 1 of this document provides an overview of FullCAM, its features relevant to users and important requirements for using this document. Section 2 outlines the process used to determine which type of baseline proponents must use in accord with the Determination. Section 3 provides a step-by-step walkthrough of how to run FullCAM 'simulations' for the materiality test, baselines, and project reporting.

Section 2 includes tables summarising the simulations that users may be required to run in FullCAM. These tables summarise the objective, time period and outputs for each simulation, as well as the project activities that may need to be simulated. Where settings differ between different simulation types for the step-by-step process, section 3 outlines the separate parameters required. Users should familiarise themselves with the simulations in section 2 before following the steps in section 3 to run the simulations. Section 4 provides an overview of the FullCAM outputs needed to complete the equations within the Determination.

1.3 FullCAM background

FullCAM is used in Australia's National Greenhouse Gas Accounts for the land sector. FullCAM provides fully integrated estimates of carbon pools in forest and agricultural systems for Australia's land sector reporting. In addition, it accounts for human-induced changes in emission and sequestration of major greenhouse gases. FullCAM was developed under the National Carbon Accounting System (NCAS) at the then Australian Greenhouse Office to provide a dynamic account of the changing stocks of carbon in Australia's land systems since 1970 by integrating data on land cover change, land use and management, climate, plant productivity, and soil carbon over time. FullCAM estimates carbon stock change and greenhouse gas emissions at fine spatial and temporal scales, and uses a wide range of spatially referenced data.

Users of FullCAM can determine estimates of carbon stock change and greenhouse gas emissions for ERF projects on a similar basis to that used for land use and land use change in Australia's National Greenhouse Gas Inventory.

1.4 FullCAM plots and running simulations

FullCAM can run simulations on a 'plot'. A plot, for modelling purposes, is defined as a piece of land for which the event history, when modelled in FullCAM, is the same across that area of land. Separate plot files are created for each CEA.

In FullCAM, there are several types of plots that can be selected. Only 'forest system' is relevant to this Determination. This document provides overviews of the simulations that users may be required in Section 2, and the steps to run these simulations in Section 3.

FullCAM models using a single 'model point' location. Proponents do not need to define plot boundaries within FullCAM, rather proponents must input the coordinates for a single location within the plot boundaries that is at the approximate centre of the plot (the model point – see paragraph 3.3(1)(c) of the Determination). The latest spatial data for a plot must be downloaded using the 'Data Builder' tab each time the software is run. This process is described in section 3.5 of this document.

Separate plot files must be created for each carbon estimation area (CEA) (see section 3.3 of the Determination). In order to ensure all settings are correct, including defaults, we recommend creating new plot files each time a new version of FullCAM or these Guidelines is used. Plot files created under previous versions may contain different settings that will affect outputs and users are responsible for any inconsistencies.

For each CEA, separate plot files must be created for:

- determining whether a zero baseline or non-zero baseline must be used (initial reporting period only);
- estimating carbon stocks under a non-zero baseline (if a zero baseline is not appropriate); which may be either a 'default' baseline, an 'historic' baseline or an 'hybrid' baseline;
- estimating carbon stocks for the current reporting period; and
- determining if a disturbance event must be reported prior to the next reporting period.

1.5 Overview of the FullCAM interface

The FullCAM software user interface displays menus and a series of tabs. Each tab has a suite of fields in which information may either be required to complete as instructed in section 3 or left unchanged. The program is designed so that certain tabs in a plot file are made available only if required fields have valid information entered in earlier tabs. If the text of a tab or field is red, then FullCAM requires information in that tab or field before a simulation can be run. When all the required fields within a tab have valid information entered, the tab text will become blue. Help is provided within FullCAM by clicking on the  symbol available in most windows. A general overview of each tab follows.

There are only three tabs users see when they create a new FullCAM plot:

Tab	Explanation
About	Includes a free text field where users can enter information about the plot file that they have created. This is a good space to keep track of changes that have been made or editing of event parameters.
Configuration	Users select the system (e.g. forest, agricultural) they want to simulate in the plot.
Timing	Enter the timing for starting and ending the simulation and the time steps required for output data.

Once fields in the above three tabs are populated users can access the following additional tabs:

Tab	Explanation
Data Builder	In this tab users enter the latitude and longitude of the 'Model Point Location' where they wish to simulate a plot file. Internet access is required to complete this tab. By choosing to 'Download Spatial Data' the associated soil and climate data for that latitude and longitude are automatically loaded into relevant parts of the remaining tabs. In the tab users can then download tree and/or crop species information and management regimes as appropriate. This information is also automatically loaded into relevant parts of the remaining tabs.
Site	Specific parameters (e.g. water [rainfall], temperature, productivity) are described.
Trees	Description of the properties of the tree species.
Crops	Description of the properties of crop or pasture species (only displays if agricultural system selected).
Soil	Description of soil properties.
Initial Conditions	In this tab the values for carbon at the start of the simulation are described. Values will automatically be populated by **Data Builder** using data downloaded from the FullCAM server.
Events	All of the events for the entire simulation period are listed in this tab. Users can add or remove events. Care must be taken not to violate requirements for modelling 'management events' within the Determination. The names on the event list are

	colour-coded to indicate whether they are ready, whether they are simulating or not, and what system they affect. The colour codes are: Red: Event not ready (renders event queue not ready); Grey: Event non-simulating (outside simulation period, will not affect simulation); Green: Forest; Yellow: Agricultural; and Brown: Mixed. Finally, the events users select with the cursor are coloured in the usual highlight colour.
Output Window	Defines what outputs are presented in output windows.
Explorer	Display of the parameter settings for each tab.
Log	This tab records changes made to the file to assist with analysis and error tracking.

2. Simulations overview

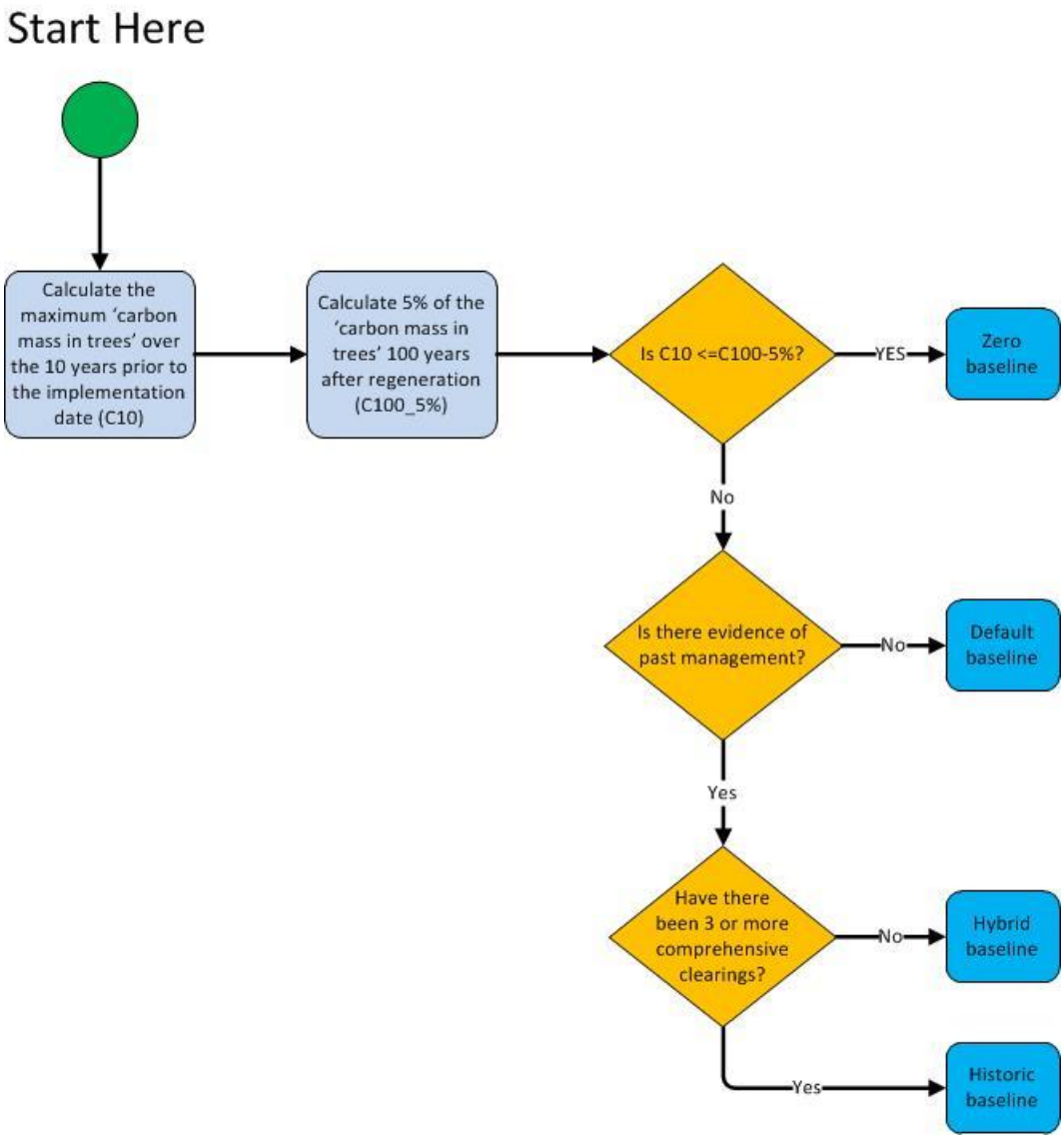
Sections 4.8, 4.9, 4.12, 4.14, 4.18 and 4.19 of the Determination require that the materiality test, baseline scenario and project scenario for each carbon estimation area must be modelled in FullCAM in accordance with the requirements in both the Determination and this document.

2.1 Baseline scenarios

The baseline for each CEA will be either of two categories depending on the materiality test below (Section 2.2) – a zero baseline or a non-zero baseline.

Within the non-zero baseline category there are three possible baselines depending on the extent of historical information available regarding the clearing history – default, hybrid or historic. The decision flowchart below gives an overview of the process for determining which baseline to use.

Figure 1: Decision tree for determining the type of baseline to be used for each Carbon Estimation Area (CEA). See section 4.12 of the Determination for the relevant provisions.



2.2 Baseline materiality test

To determine whether a zero baseline may apply in a CEA, project proponents must complete the materiality test explained by this section and to be undertaken by following Section 3 of this document. Proponents must also comply with the provisions given for the materiality test in sections 4.7-4.9 of the Determination.

Completing the materiality test involves calculating two factors:

Factor	Explanation	Process for Calculating
C100_5%	5 per cent of the 'carbon mass of trees' at 100 years after the implementation date	see (a) below for how to calculate
C10	the maximum 'carbon mass of trees' over the ten years prior to the implementation date	see (b) below for how to calculate

Note: 'Implementation date' is defined in section 1.3 of the Determination. It is the date when the project mechanism (a change in land management enabling native vegetation to achieve forest cover) was implemented in a CEA. Each CEA may have a different implementation date.

The values calculated for these factors will allow you to determine which baseline to use:

Result	Baseline to use
C10 is less than or equal to C100_5%	Zero baseline
C10 is greater than C100_5%	Non-zero baseline (default, hybrid or historic)

Overview of simulation for calculating C100_5%

Table 1: Overview of simulation for calculating C100_5%

Objective	Calculate 5 per cent of the 'C mass of trees' at 100 years after the implementation date.
Simulation period	From the implementation date to 100 years after the implementation date.
Events permitted	Regeneration
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees)

Overview of simulation for calculating C10

Note: When calculating C10, project proponents must have documentary evidence for each event that is entered into the FullCAM event queue.

Table 2: Overview of simulation for calculating C10

Objective	Calculate the maximum carbon mass of trees reached during the 10 years before the implementation date.
Simulation period	From the day after the last comprehensive clearing before the 10 year period that ends on the implementation date to the implementation date.
Events permitted	Regeneration Clearing Thinning Growth Pause Management Fire Windrow and Burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees)

Note: 'comprehensive clearing' is defined in section 1.3 of the Determination. It means the destruction of trees or saplings, or both, by mechanical or chemical means that may be accompanied by use of fire, leaving the land in a non-forested state for pastoral land use.

2.3 Non-zero baselines

Non-zero baselines must be calculated if, according to the materiality test under the previous section, the maximum carbon stock during the ten years prior to the implementation date has reached a material level (i.e. C10 > C100_5%).

Overview of simulation for calculating a Default Baseline

A default non-zero baseline is suitable for project proponents whose records are not sufficient to model either an historic or a hybrid baseline. For further information about default non-zero baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the Explanatory Statement for the original Determination. A default non-zero baseline is modelled in FullCAM by repeating the default baseline management event scenario over the baseline forecast period. This scenario consists of a sequence of comprehensive clearings that occur at 15 year intervals (refer to Table 3).

If project proponents can demonstrate that fire was used to suppress regrowth on land that is part of the same pastoral property as the CEA then:

- a management fire event may be included in each 15 year interval; and
- a 'Windrow and Burn' fire event may be added 6 months after a comprehensive clearing event.

Table 3: Overview of simulation for calculating a Default Baseline

Objective	Calculate the default baseline which estimates average carbon stocks in a carbon estimation area in the absence of an eligible offsets project.
Simulation period	From one day after the last comprehensive clearing event that occurred before the implementation date. Simulations end 100 years after the implementation date (the baseline forecast period).
Events permitted	Cycled every 15 years: • Regeneration; • Clearing; • Management fire 7 years after Regeneration event – where sufficient evidence; and • Windrow and Burn – where sufficient evidence.
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris)

Overview of simulation for calculating a Hybrid Baseline

A hybrid baseline is suitable for project proponents who have evidence of two comprehensive clearings that occurred less than 15 years apart and before the implementation date. For further

information about hybrid baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the Explanatory Statement for the original Determination.

A hybrid baseline is modelled in FullCAM by repeating the hybrid baseline management event scenario over the baseline forecast period. This scenario consists of a sequence of comprehensive clearings that occur at two alternating intervals, one default interval of 15 years, and one historic interval matching the interval between the last two clearings before the implementation date (refer to Table 4).

If project proponents can demonstrate that fire was used to suppress regrowth on land that is part of the same pastoral property as the CEA, then:

- a management fire event may be included in the 15 year *default* interval; and
- a 'Windrow and Burn' fire event may be included 6 months after the comprehensive clearing event at the beginning of the 15 year *default* interval.

If project proponents can demonstrate that fire was used in the second *historic* interval, then that fire event may be included in that interval.

Overview of simulation for calculating a Historic Baseline

Project proponents wishing to model an historic baseline must have evidence for at least three comprehensive clearings that occurred in the carbon estimation area before the implementation date. For further information about historic baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the original Explanatory Statement.

A historic non-zero baseline is modelled in FullCAM by repeating the historic baseline management event scenario over the baseline forecast period. There are stringent evidentiary requirements for modelling an historic baseline. Project proponents must have documentary evidence for each event modelled in the scenario (refer Table 4).

Table 4: Overview of simulation for calculating a Historic or Hybrid Baseline

Objective	Calculate historic and hybrid non-zero baselines which estimate average carbon stocks in a carbon estimation area in the absence of an eligible offsets project.
Simulation period	One day after the most recent comprehensive clearing event. Simulations end 100 years after the implementation date (the baseline forecast period).
Events permitted	Regeneration Clearing Thinning Management fire Windrow and Burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris)

2.4 Overview of simulation for calculating project carbon stocks

To determine the project carbon stocks, project proponents must model all events listed in the table below that reflect the actual management events that occurred in the CEA during the entirety of the simulation period (from one day after the last comprehensive clearing before the implementation date until the end of the current reporting period).

Table 5 Overview of simulation for calculating project carbon stocks

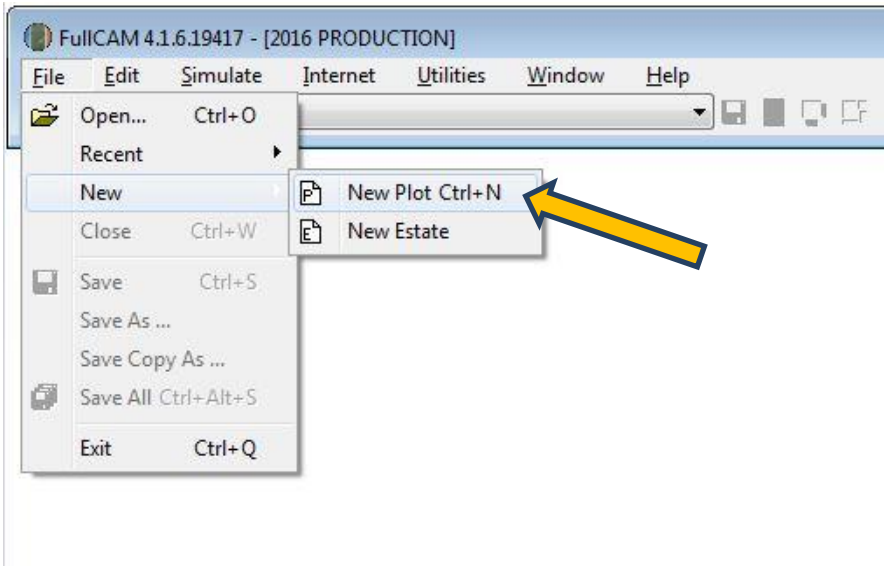
Objective	Calculate total carbon stocks in each CEA at the end of each reporting period. These carbon stocks will reflect the age of the regrowth within the CEA, observed climate, and activities and disturbance subsequent to the establishment of the offsets project.
Simulation period	From one day after the last comprehensive clearing before the implementation date. Simulations end at the end of the current reporting period.
Events permitted	Regeneration Clearing Thinning Growth pause Prescribed fire – to reduce fire risk Wildfires – trees not killed Wildfires – trees killed Management fire Windrow and burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris) Monthly totals for emissions of CH_4 from fire (FullCAM Output = Whole / Emissions / CH_4 emitted due to fire) Monthly totals for emissions of N_2O from fire (FullCAM Output = Nitrogen / Whole / Emissions / N_2O emitted due to fire)

3. Setting up simulations for carbon estimation areas

The following steps must be followed for entering data into each tab in a FullCAM plot file. Each table provides a sequential list of steps in the right hand column. The left hand column indicates the Simulation Type that the steps are relevant to. Screenshots relevant to each set of steps, directly follow each table.

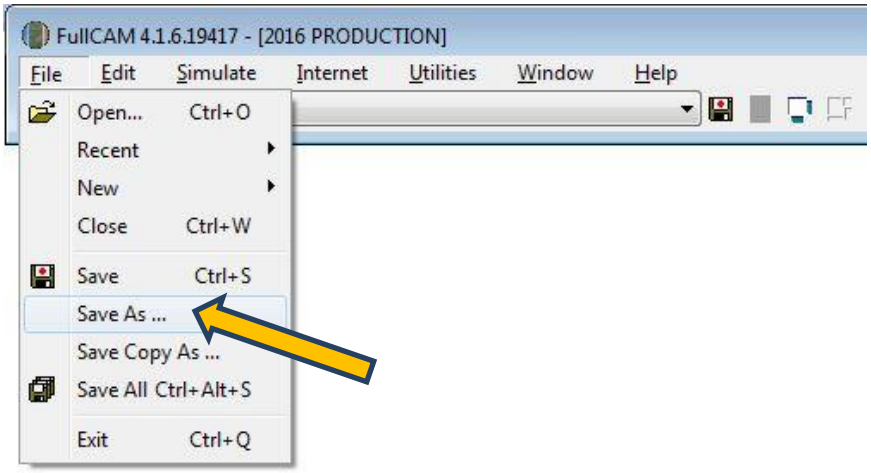
3.1 Opening a file

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Open a new plot under the 'File' menu. Enter a name for the plot that reflects the identifier for the CEA and model scenario, e.g. 'CEA1_baseline'.


FullCAM 4.1.6.19417 - [2016 PRODUCTION]
File
Edit
Simulate
Internet
Utilities
Window
Help
Open... Ctrl+O
Recent
New
Close Ctrl+W
Save Ctrl+S
Save As ...
Save Copy As ...
Save All Ctrl+Alt+S
Exit Ctrl+Q
New Plot Ctrl+N
New Estate

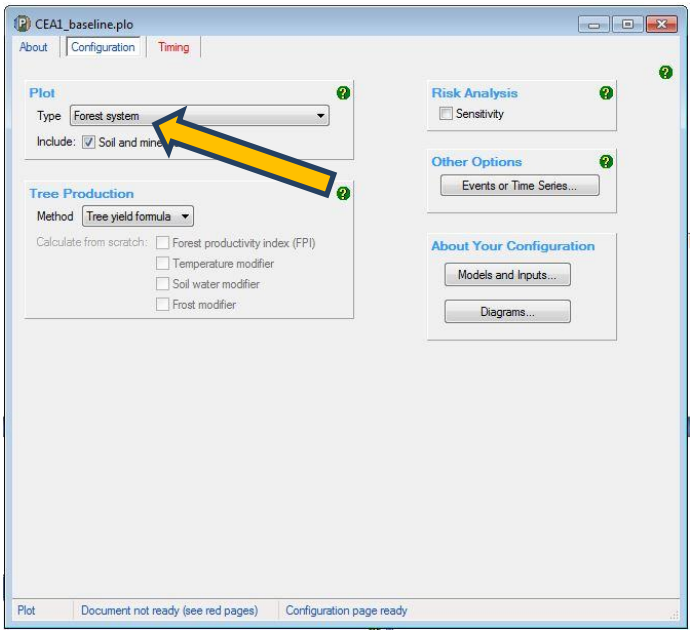
3.2 Saving a plot file

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Save the plot file using the 'File' menu on the FullCAM toolbar. • Save the plot file regularly when setting up and running simulations.



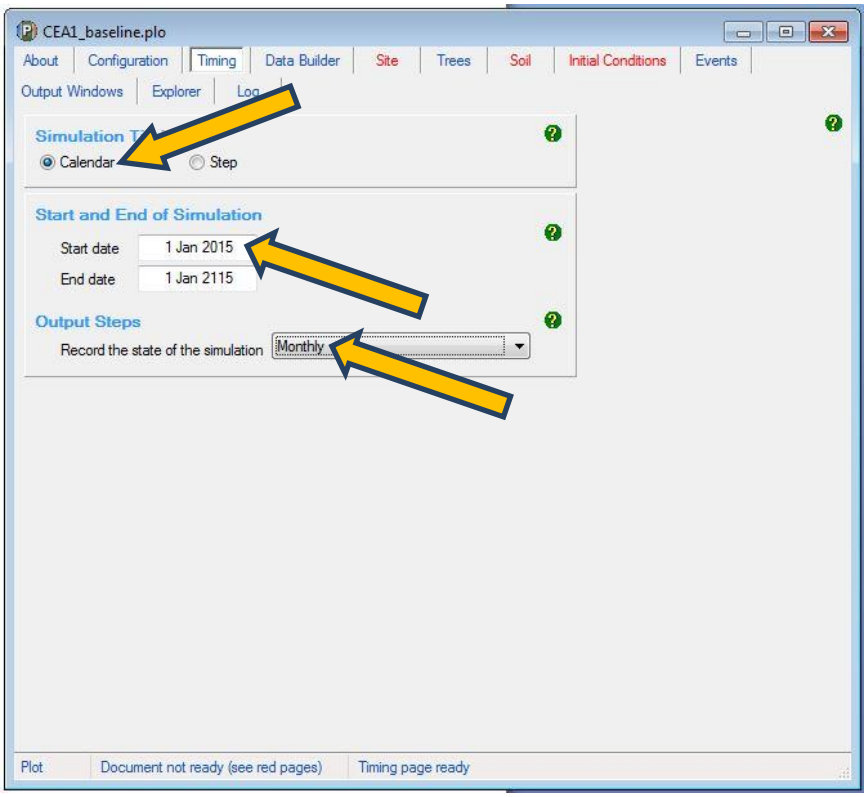
3.3 The Configuration Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• From the 'Plot' drop down menu, select 'Forest system'. • Do NOT change any other settings.



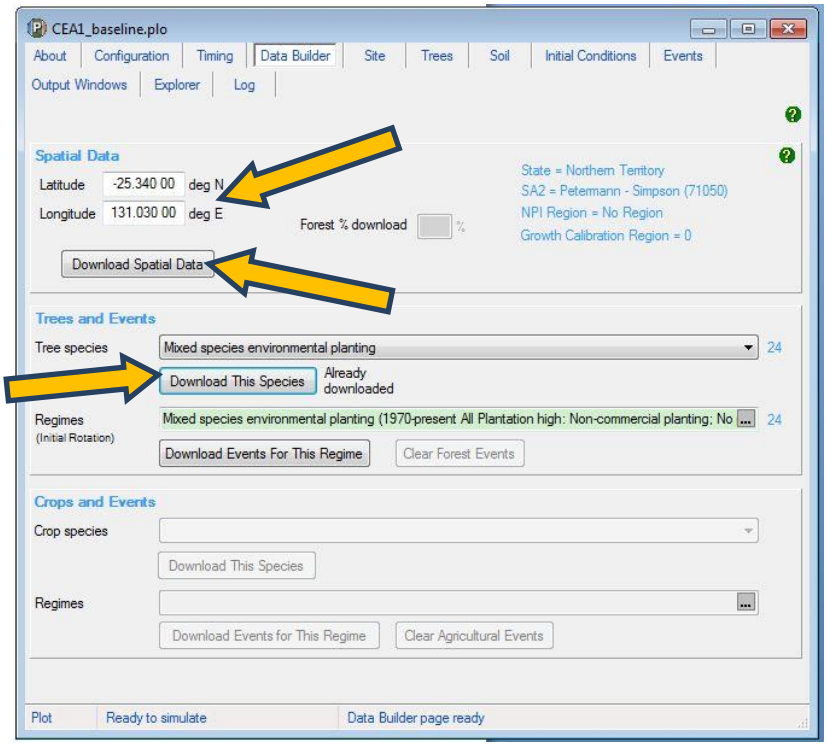
3.4 The Timing Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Set the Simulation Timing to 'calendar'. • Set the Output Steps to 'months'.
C100_5%	• Enter the date to start simulations as the implementation date. • Enter the date to end the simulation as 100 years after the implementation date.
C10	• Enter the date to start simulations as the day after the last comprehensive clearing that occurred before the 10 year period that ends on the implementation date. Enter the date to end the simulation as the implementation date.
Default baseline Historic baseline Hybrid baseline Project carbon	• Enter the date to start simulations as one day after the last comprehensive clearing before the implementation date. • Enter the date to end the simulation as 100 years after the implementation date.
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any other settings. • New tabs will appear once this tab has been completed.



3.5 The Data Builder Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Check the box to turn on the Data Builder (this requires an internet connection). • Enter the latitude and longitude (in decimal degrees) of the model point location central to the CEA being modelled and not in an exclusion area. • Click the button to 'Download Spatial Data' and click 'OK' on the information box that pops up. • Select 'Mixed species environmental plantings' from the dropdown box for 'Tree species' and then click the button to 'Download This Species' and 'Yes' to 'Make mixed species environmental plantings the initial tree species'. NB: Do NOT use the 'Mixed species environmental plantings temperate' setting. • Do NOT download a regime (and therefore the events associated with the regime) for this species. • Do NOT change any other settings.



3.6 The Site Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any settings.

3.7 The Tree Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any settings.

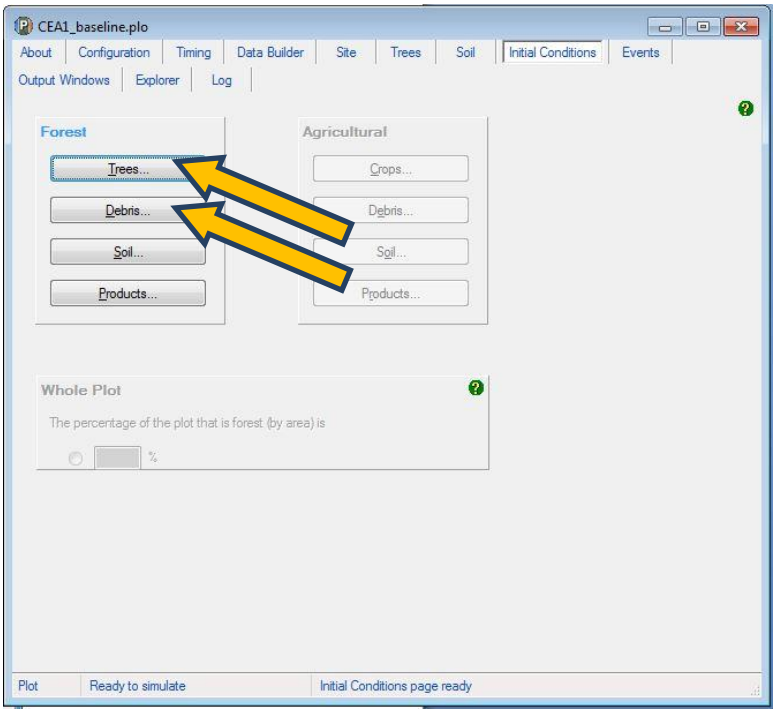
3.8 The Soil Tab

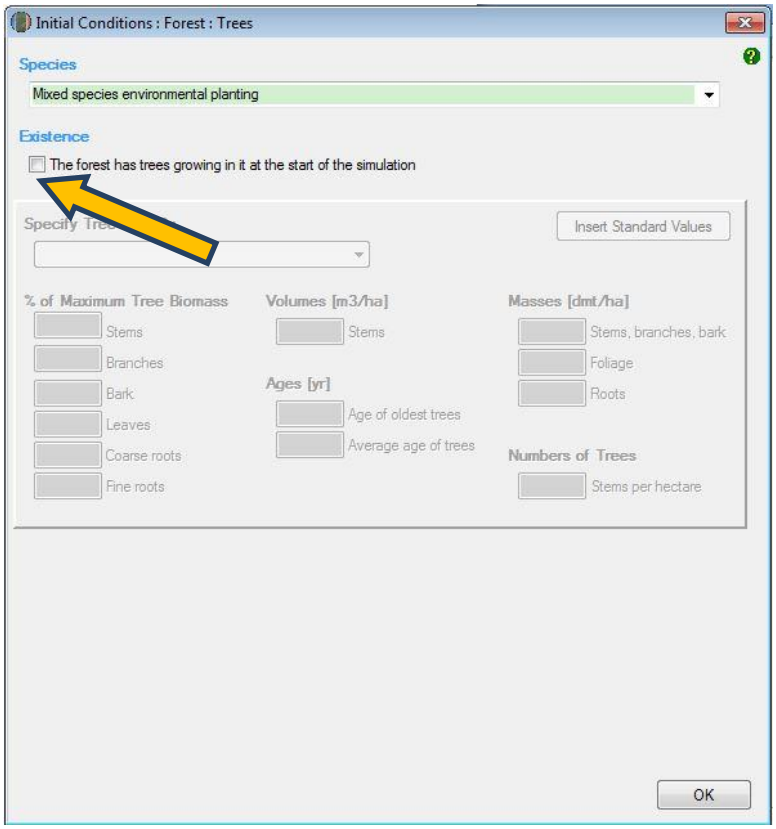
Simulation Type	Steps required
C100_5% C10 Default baseline	• Do NOT change any settings.

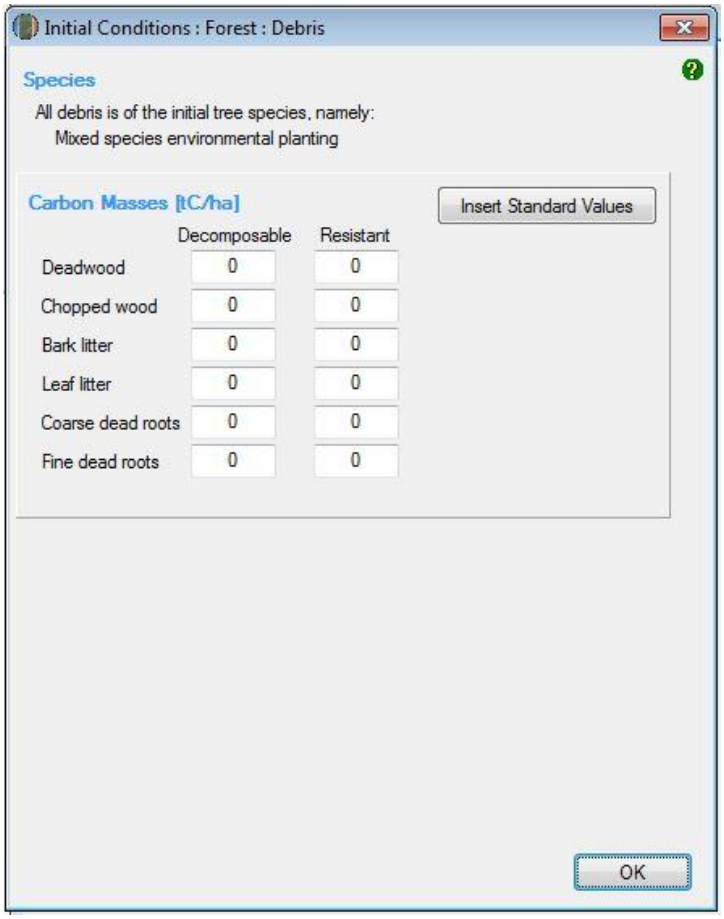
Historic baseline Hybrid baseline Project carbon	

3.9 The Initial Conditions Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Click the button labelled 'Trees' and uncheck the box under 'Existence' to show that the site did not have trees growing on it at the start of the simulation. Click 'OK'. • Click the button labelled 'Debris' and change all the default settings for each debris pool to zero. • Do NOT change any other settings.




Initial Conditions : Forest : Trees
Species
Mixed species environmental planting
Existence
The forest has trees growing in it at the start of the simulation
Insert Standard Values
% of Maximum Tree Biomass
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Volumes [m3/ha]
Stems
Ages [yr]
Age of oldest trees
Average age of trees
Masses [dmt/ha]
Stems, branches, bark
Foliage
Roots
Numbers of Trees
Stems per hectare
OK

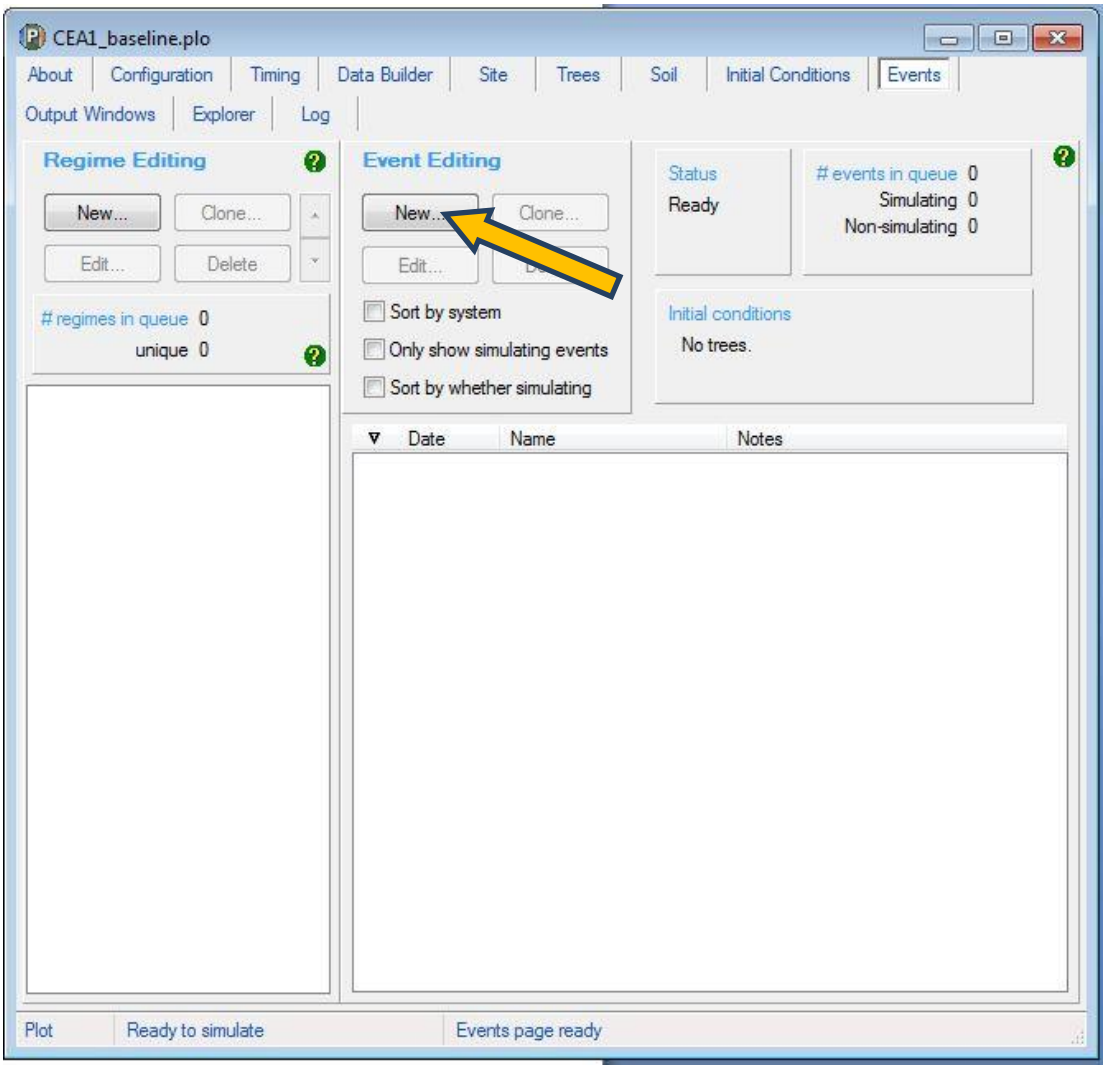

Initial Conditions : Forest : Debris
Species
All debris is of the initial tree species, namely:
Mixed species environmental planting
Carbon Masses [tC/ha]
Insert Standard Values
Decomposable
Resistant
Deadwood 0 0
Chopped wood 0 0
Bark litter 0 0
Leaf litter 0 0
Coarse dead roots 0 0
Fine dead roots 0 0
OK

3.10 The Events Tab

The Events Tab is where events for a simulation can be added and displayed in sequence.

Table 6: Permitted Events for each Simulation Type

Simulation Type	Permitted Events
C100_5%	Regeneration
C10	Regeneration Clearing Thinning Management fire Windrow and burn fire
Default baseline	Regeneration Clearing Management fire – where sufficient evidence (see s 4.12 of the Determination) Windrow and burn fire – where sufficient evidence (s 4.12 of the Determination)
Historic baseline Hybrid baseline	Regeneration Clearing Thinning Management fire – where sufficient evidence (see s 4.12 of the Determination) Windrow and burn fire – where sufficient evidence (s 4.12 of the Determination)
Project carbon	Regeneration Clearing Thinning Growth pause Management fire Windrow and burn fire Prescribed fire – to reduce fire risk Wildfire – trees not killed Wildfire – trees killed



3.10.1 Adding a regeneration event

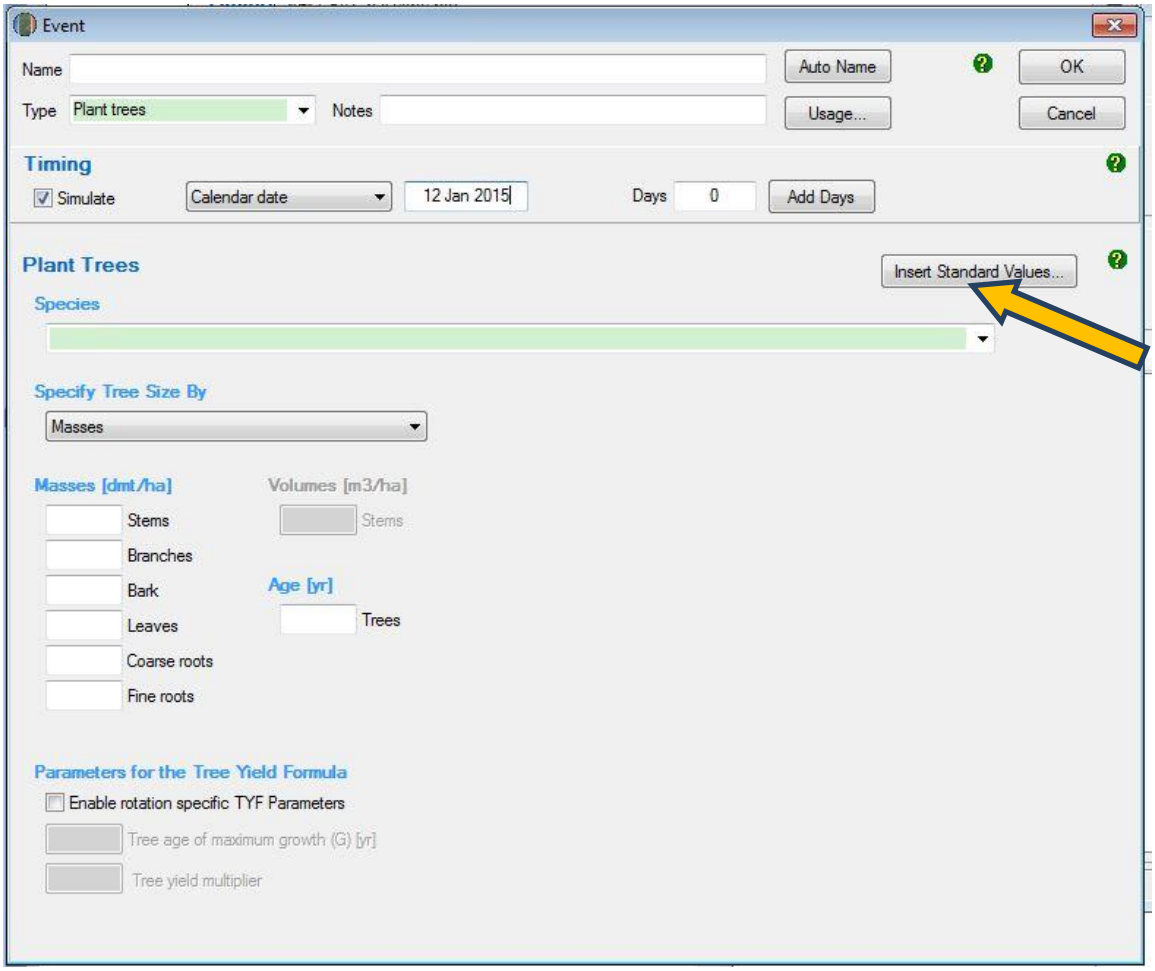
Regeneration events must be added to the FullCAM event queue for each CEA to model the establishment of forest potential after each comprehensive clearing. In the absence of evidence to the contrary, the timing of attainment of forest potential is deemed to occur one year after each comprehensive clearing event. Evidence is required to set the date of regeneration to any other time after clearing. See section 4.6 of the Determination for details.

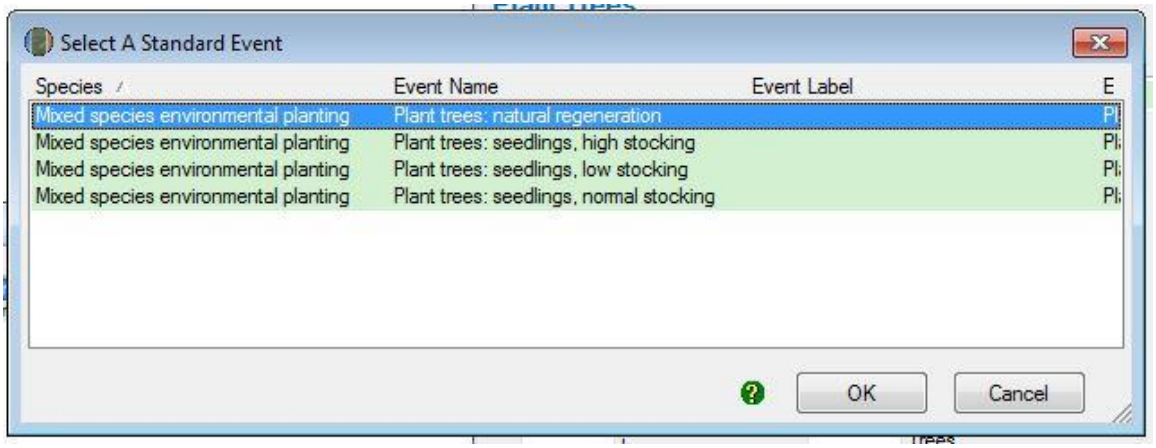
For the default baseline, regeneration events and clearing events should recur on a 15 year cycle for the duration of the simulation (i.e. 12 months from clearing to regeneration plus 14 years of growth prior to re-clearing).

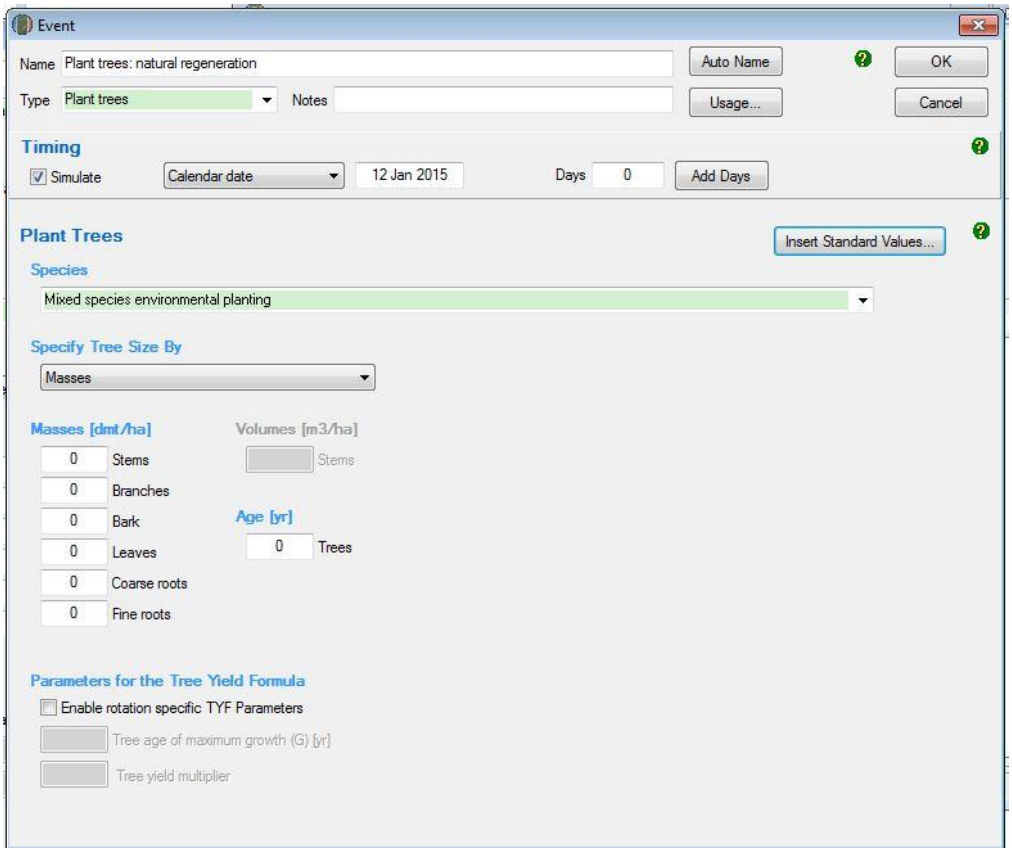
Note: Where there is evidence of regeneration following a wildfire where trees were killed, a regeneration event must be added to the events queue 12 months after each wildfire – trees killed event, unless there is specified evidence to set the date of regeneration to some other time after clearing (See section 4.6 of the Determination).

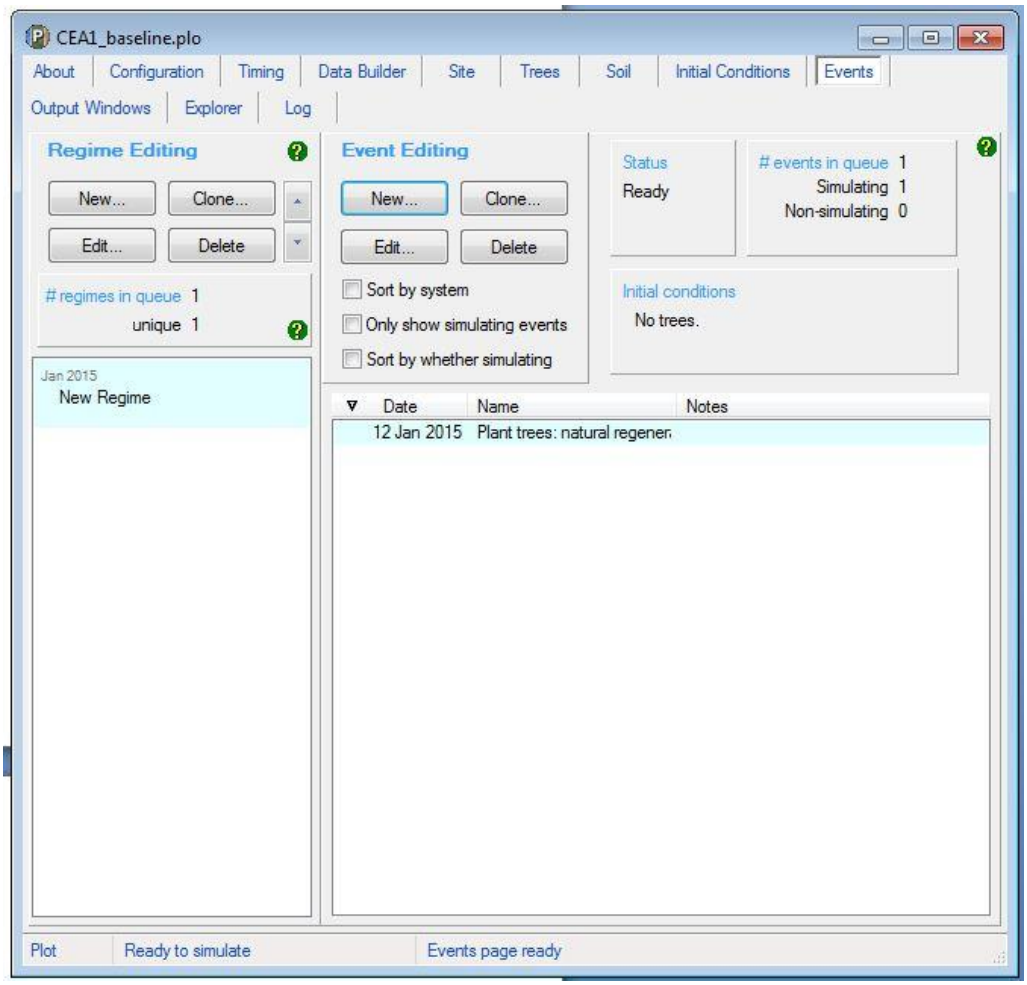
Note: Where there is evidence of regeneration following a windrow and burn following clearing, a regeneration event must be added to the events queue 6 months after each windrow and burn event.

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Click the 'New' button under 'Event Editing' to create a new event.
C100_5%	• Insert the simulation start date in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy.
Default baseline	• For the first regeneration event, insert the time when regeneration commenced following the most recent comprehensive clearing event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. For all other regeneration events insert the date 15 years after the previous regeneration event.
C10 Historic baseline Hybrid baseline Project carbon	• For the first regeneration event, insert the time when regeneration commenced following the most recent comprehensive clearing event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. For all subsequent regeneration events insert the date for each to represent the observed or default interval between regeneration events.
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• In the drop down menu next to 'Type', select 'Plant trees'. • Click 'Insert standard values'. Select the row with the 'Event Name' of 'Plant trees: natural regeneration' and then click 'OK' and 'Yes' to insert the name of the standard event. • Do NOT change any other setting. • Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Plant trees
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2015
Days
0
Add Days
Plant Trees
Insert Standard Values...
Species
Specify Tree Size By
Masses
Masses [dmt/ha]
Volumes [m3/ha]
Stems
Stems
Branches
Bark
Age [yr]
Leaves
Trees
Coarse roots
Fine roots
Parameters for the Tree Yield Formula
Enable rotation specific TYF Parameters
Tree age of maximum growth (G) [yr]
Tree yield multiplier


Select A Standard Event
Species
Event Name
Event Label
E
Mixed species environmental planting
Plant trees: natural regeneration
Mixed species environmental planting
Plant trees: seedlings, high stocking
Mixed species environmental planting
Plant trees: seedlings, low stocking
Mixed species environmental planting
Plant trees: seedlings, normal stocking
OK
Cancel

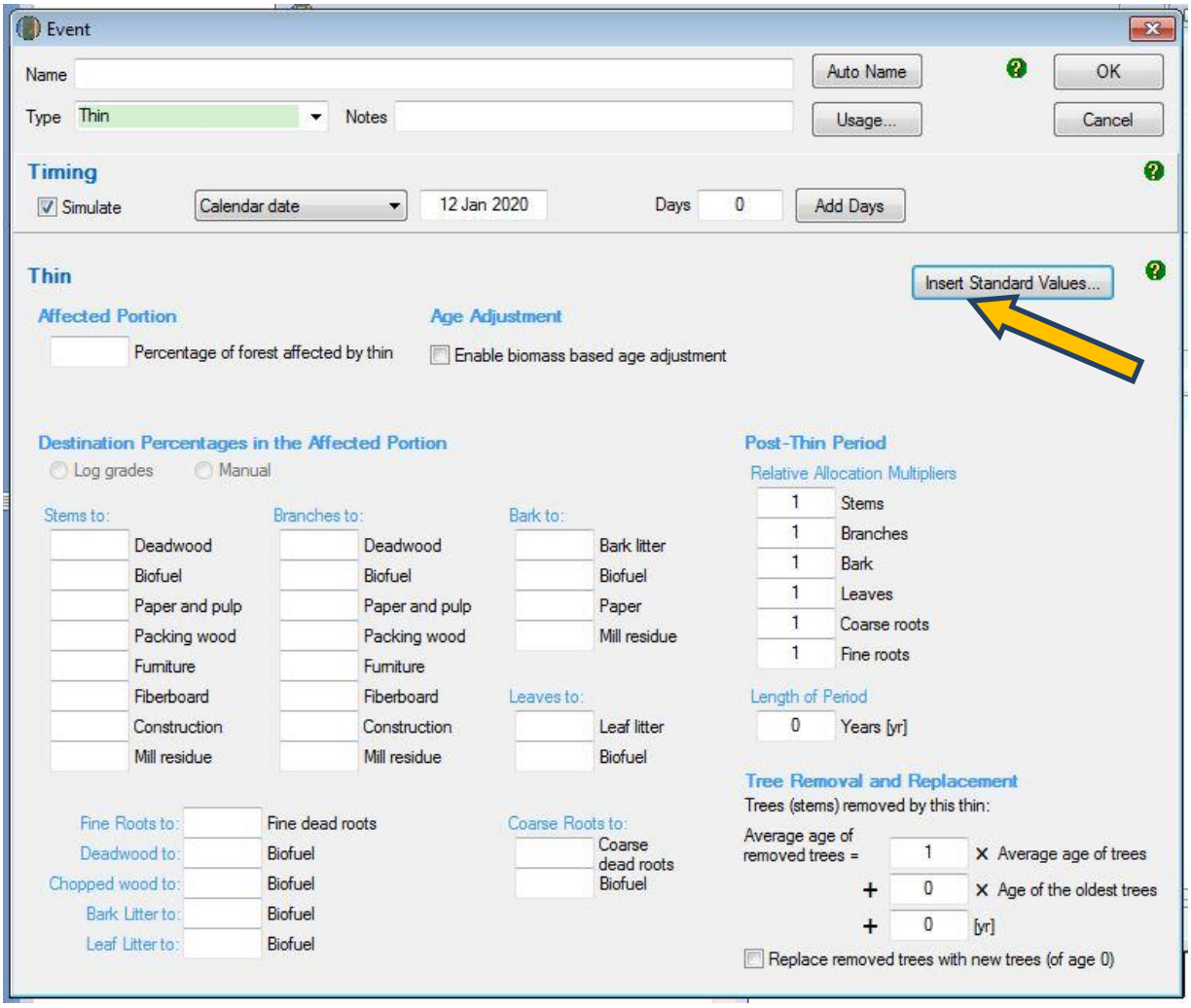

Event
Name Plant trees: natural regeneration
Auto Name
OK
Type Plant trees
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2015
Days 0
Add Days
Plant Trees
Insert Standard Values...
Species
Mixed species environmental planting
Specify Tree Size By
Masses
Masses [dmt/ha]
Volumes [m3/ha]
0 Stems
Stems
0 Branches
0 Bark
Age [yr]
0 Leaves
0 Trees
0 Coarse roots
0 Fine roots
Parameters for the Tree Yield Formula
Enable rotation specific TYF Parameters
Tree age of maximum growth (G) [yr]
Tree yield multiplier

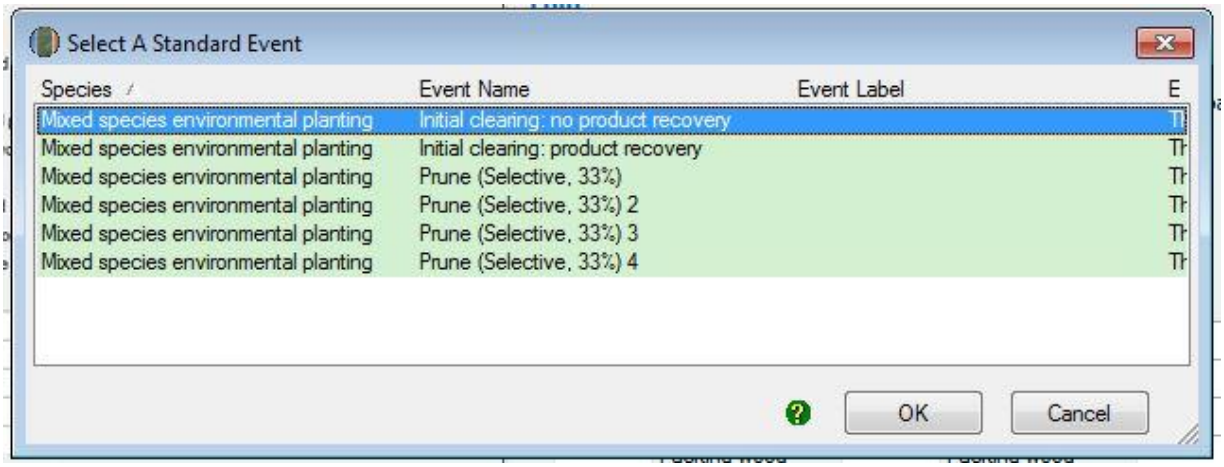

CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 1
unique 1
Jan 2015
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 1
Simulating 1
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
12 Jan 2015
Plant trees: natural regener
Plot
Ready to simulate
Events page ready

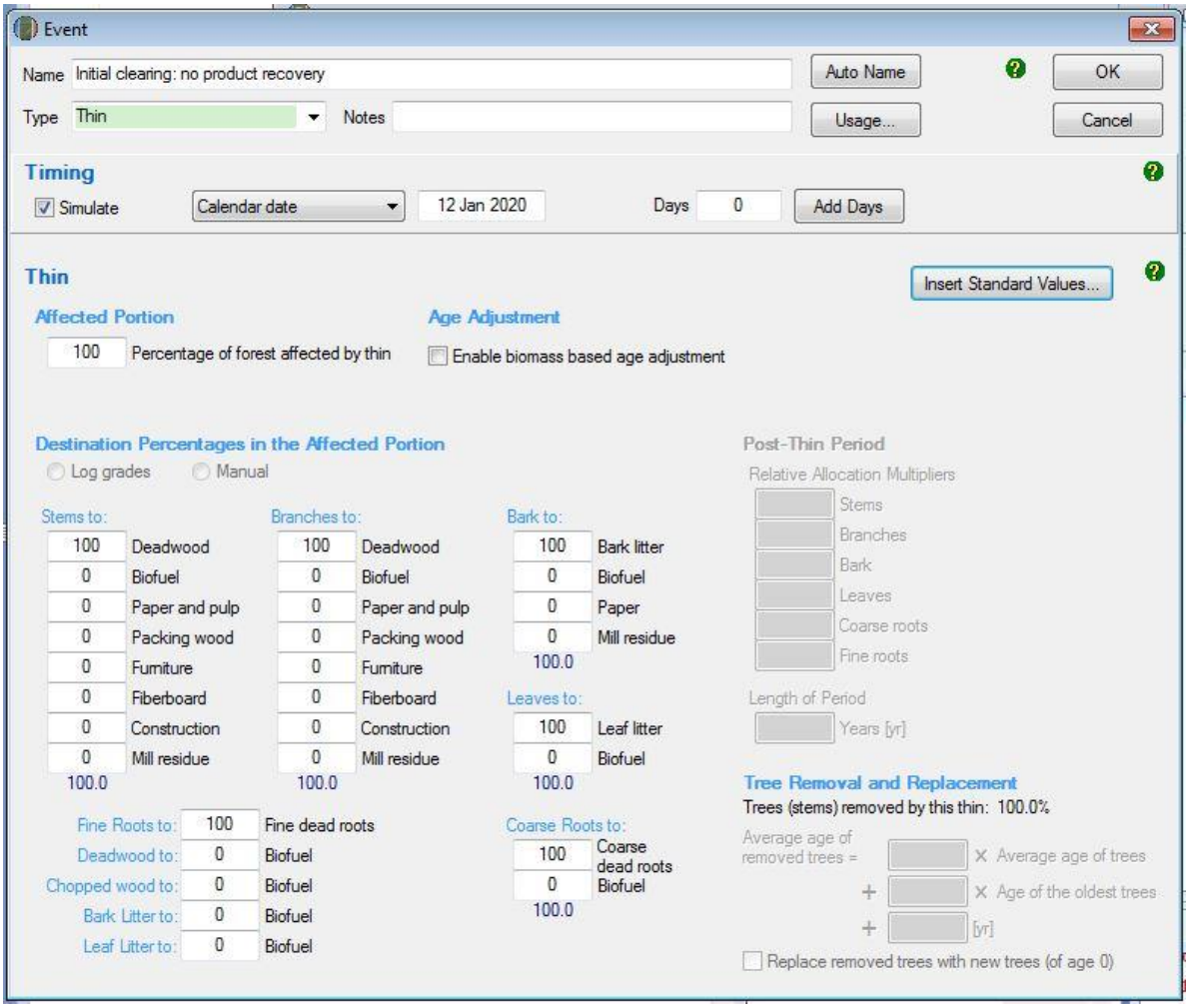
3.10.2 Adding a clearing event

These steps must be repeated for each clearing event that occurs in each CEA during the simulation period. For each clearing event the date must reflect the date of that clearing event.

Simulation Type	Steps required
C100_5%	• Not permitted
Project carbon	• Not permitted
C10 Default baseline Historic baseline Hybrid baseline	• Click the 'New' button under 'Event Editing' to create a new event.
C10 Historic baseline Hybrid baseline	• Insert the date of the clearing event in the blank field beside the 'Timing' section based on the interval observed historically. This will need to be entered in the format dd mmm yyyy. For subsequent clearing events, insert the date of clearing in this field to represent the observed or default interval between comprehensive clearings.
Default baseline	• Insert the date of the clearing event in the blank field beside the 'Timing' section. The intervals between events must reflect those that occurred historically. This will need to be entered in the format dd mmm yyyy. Each clearing event will be 14 years after the previous regeneration event.
C10 Default baseline Historic baseline Hybrid baseline	• In the drop down menu next to 'Type', select 'Thin'. • Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'Yes' to insert the name of the standard event. • Ensure that the box next to 'Affected portion' contains the value '100' to indicate a clearing event. • Do NOT change any other settings. • Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2020
Days
0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 × Average age of trees
+ 0 × Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)

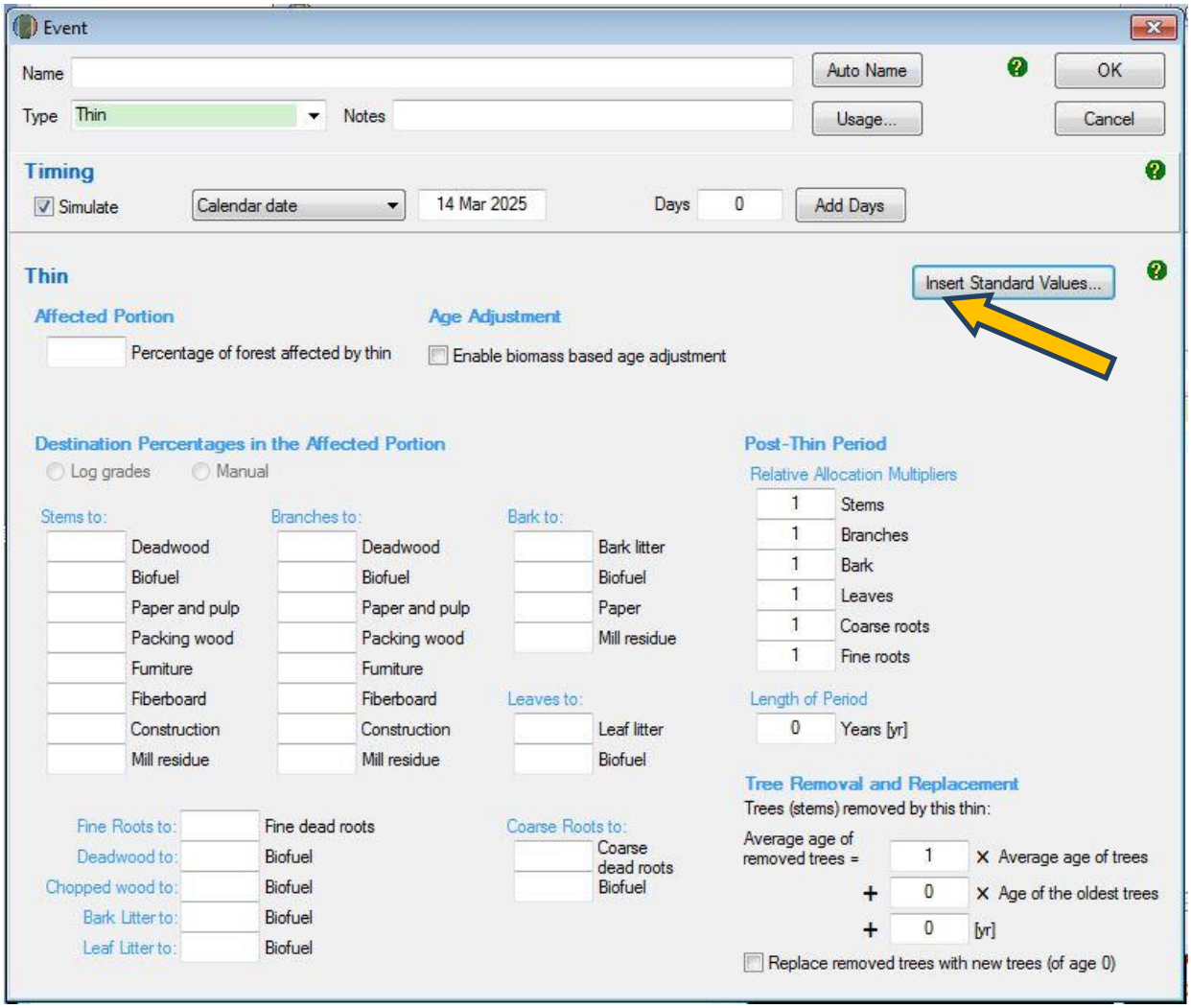

Select A Standard Event
Species
Event Name
Event Label
E
Mixed species environmental planting
Initial clearing: no product recovery
Mixed species environmental planting
Initial clearing: product recovery
Mixed species environmental planting
Prune (Selective, 33%)
Mixed species environmental planting
Prune (Selective, 33%) 2
Mixed species environmental planting
Prune (Selective, 33%) 3
Mixed species environmental planting
Prune (Selective, 33%) 4
OK
Cancel

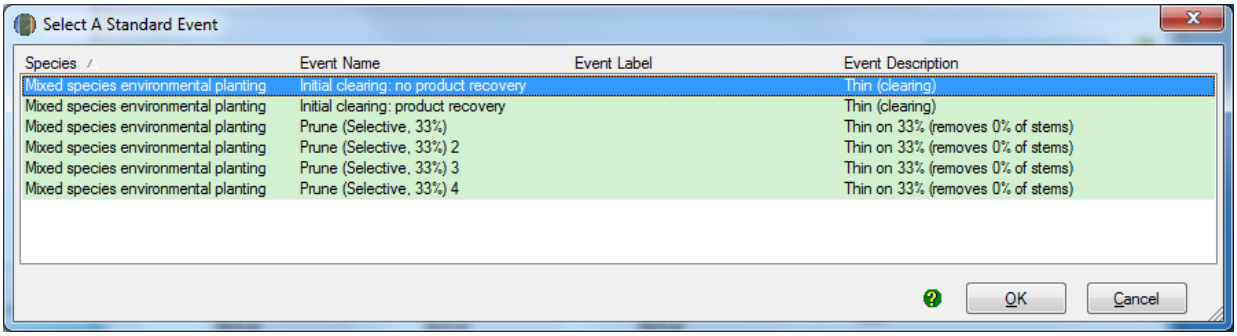


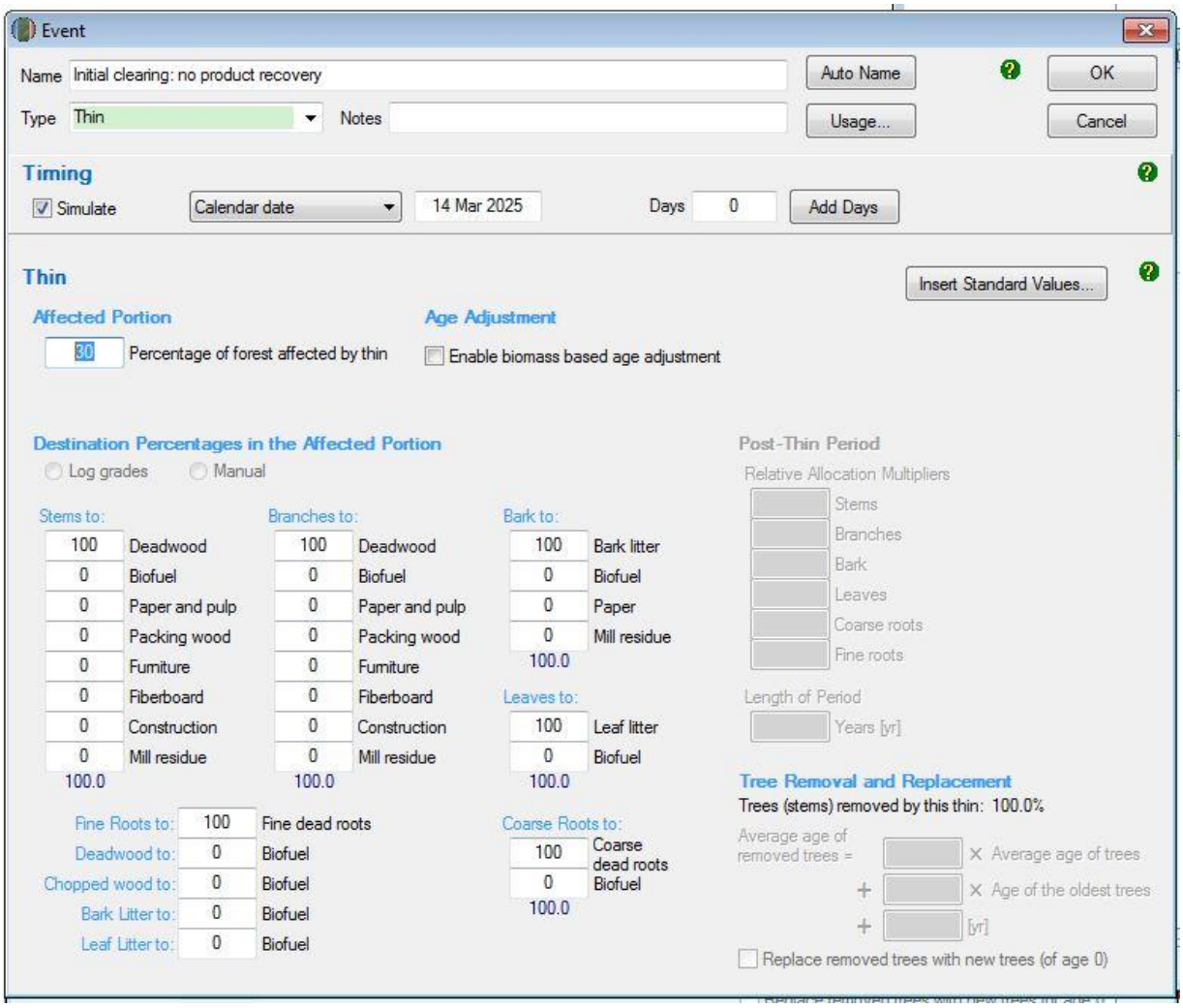
3.10.3 Adding a thinning event

These steps must be repeated for each thinning event that occurs in each CEA during the simulation period. For each thinning event the date must reflect the date of the thinning event.

Simulation Type	Steps required
C100_5%	• Not permitted
Default baseline	• Not permitted
C10 Historic baseline Hybrid baseline Project carbon	1. Click the 'New' button to create a new event. 2. Insert the date of the thinning event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. The intervals between events must reflect those that occurred historically. 3. In the drop down menu next to 'Type', select 'Thin'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. In the box next to 'Affected portion – the percentage of forest affected by thin' change the number to an estimate of the proportion of the stems that were killed in the thinning. You must report on how the estimate was derived in your project report. 6. Do NOT change any other settings. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
14 Mar 2025
Days
0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 × Average age of trees
+ 0 × Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Initial clearing: no product recovery
Thin (clearing)
Mixed species environmental planting
Initial clearing: product recovery
Thin (clearing)
Mixed species environmental planting
Prune (Selective, 33%)
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 2
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 3
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 4
Thin on 33% (removes 0% of stems)
OK
Cancel



3.10.4 Adding a growth pause event

A growth pause event occurs when growth slows, stops or reverses due to a growth suppression event, such as grazing by livestock or feral animals, mechanical or chemical destruction or suppression of regrowth and weeds, disease, pests or similar, or a combination of factors. Where other events in this section are more specific to the actual event that has occurred, such as thinning or fire, they are to be modelled and not a growth pause event. To avoid any doubt, for the project carbon stocks and C10 simulations, a growth pause event must be added for any growth suppression events whether occurring before or after the implementation date.

A growth pause event must run for at least the period of time that the suppression factor(s) was maintained. For example, if intermittent grazing slowed, stopped or reversed the vegetation growth over a period of three years, the corresponding growth pause event in FullCAM should cover at least the entire three year period. A growth pause event should also cover the time from when the vegetation was first affected by the suppression factor(s) to when it has recovered beyond its condition and mass prior to being affected.

Notes on grazing by livestock:

1. If the project activity undertaken for the CEA includes the exclusion of livestock from the CEA, then grazing by livestock cannot normally be modelled as this is not allowed under the Determination. However, if there is unintentional, short term grazing by livestock (e.g. due to

stock entering a CEA through a damaged fence), then the grazing must be modelled as described below for the length of time that the unintentional grazing occurred.

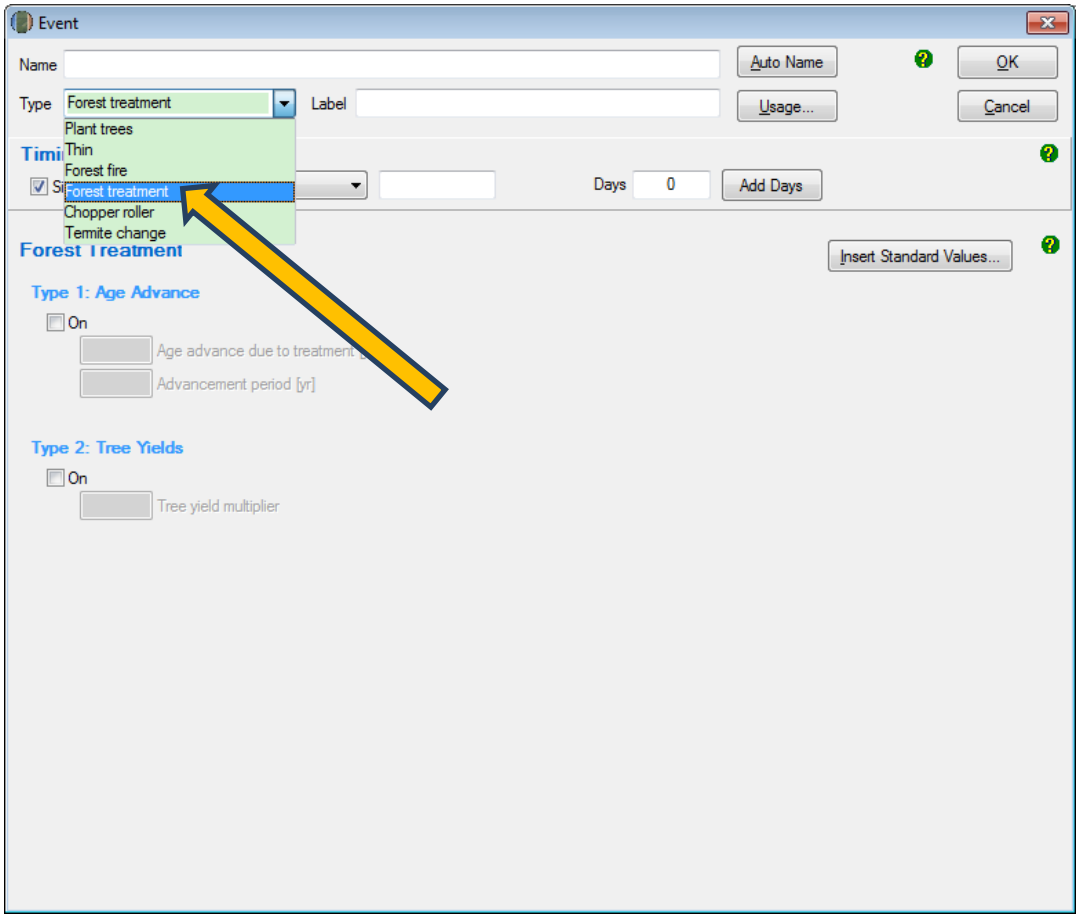
2. If the human-assisted regeneration activity undertaken as part of the project does not include the exclusion of livestock from the CEA, then the impact of grazing by livestock only must be modelled (as described below) if the carbon stock in the CEA becomes materially less than it would otherwise have been in the absence of grazing. Note that certain provisions apply to grazing under Division 3.3 of the Determination regarding restricted activities.

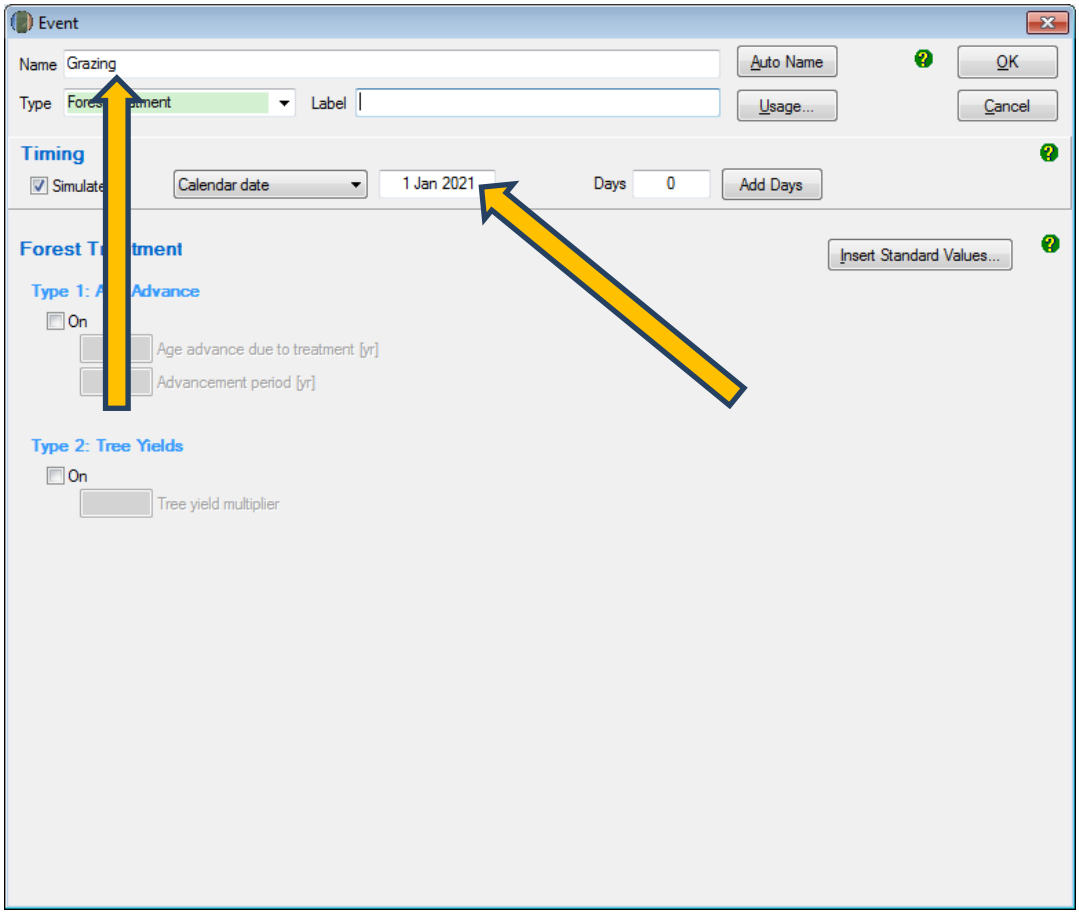
Notes on feral animal grazing

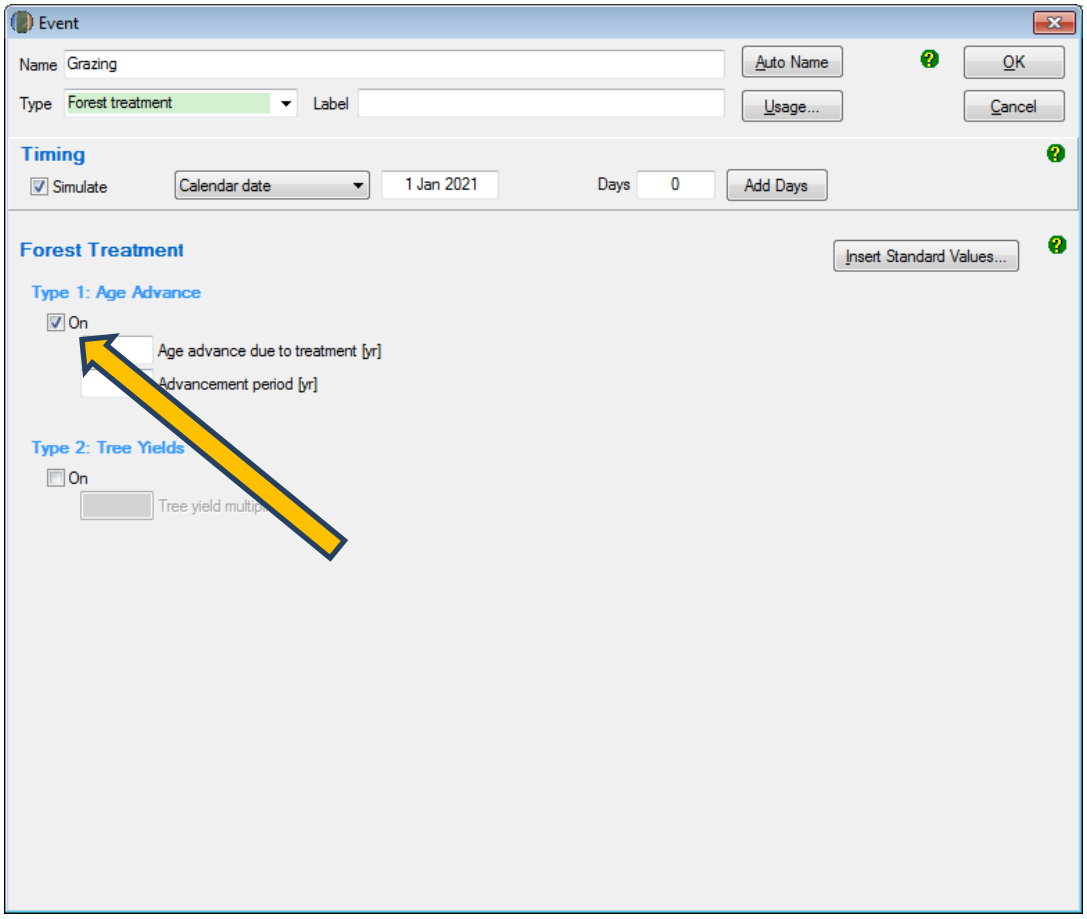
1. Prior to the attainment of forest cover: If there is grazing by feral animals within a CEA, and the impact of the grazing is such that the attainment of forest cover is being retarded compared with what would be expected in the absence of grazing by feral animals, then this is a suppression event, and must be modelled as described below.

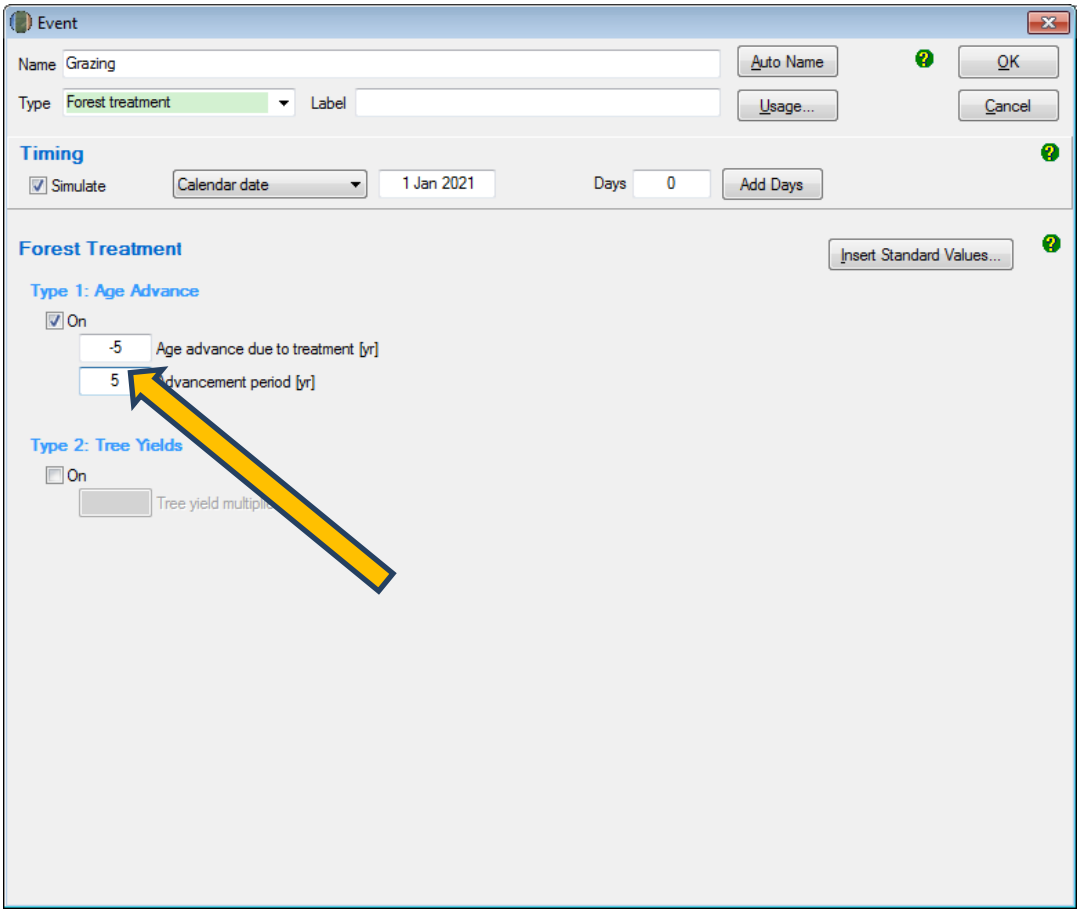
2. After the attainment of forest cover: If there is grazing by feral animals within a CEA, and the impact of the grazing is such that forest cover is threatened (or even removed), and/or due to the grazing, the carbon stock in the CEA becomes materially less, then this is a disturbance event and must be modelled as described below.

Simulation Type	**Steps required**
C100_5%	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
C10 Project carbon	1. Add a new *Forest treatment* event. 2. DO NOT select *Insert Standard Values* (Note: This differs from the directions for other events above). 3. Enter the calendar date of the start date of the disturbance event. This can be estimated if the actual date is not known. 4. Enter 'Growth Pause' as the event name (or a more specific name for the event, e.g. 'Grazing'). 5. Now check the *Type 1: Age Advance*, '*On*' box under *Forest Treatment*. 6. In the *Age advance due to treatment* box enter an estimate for how long the growth pause event should run according to the above notes as a decimal proportion in years, and as a negative number. For example, if the growth pause event occurred for 3 years and 9 months, then '-3.75' would be entered in this box. As another example, If the growth pause event occurred for 5 years, then '-5' would be entered in this box. 7. In the *Advancement period* box enter the absolute (aka positive) value of the number added in the 'Age advance due to treatment' box. For example, using the examples above in step 6, the value to add to this box would be: '3.75', or '5'. 8. Following these steps has the effect of 'pausing' growth in carbon stocks for the duration of the growth pause event. 9. DO NOT change any other values on this tab. 10. Press 'OK'.


Event
Name
Auto Name
OK
Type
Forest treatment
Label
Usage...
Cancel
Plant trees
Thin
Forest fire
Forest treatment
Chopper roller
Termite change
Days
0
Add Days
Insert Standard Values...
Type 1: Age Advance
On
Age advance due to treatment
Advancement period [yr]
Type 2: Tree Yields
On
Tree yield multiplier


Event
Name
Grazing
Auto Name
OK
Type
Label
Usage...
Cancel
Timing
Calendar date
1 Jan 2021
Days
0
Add Days
Insert Standard Values...
On
Age advance due to treatment [yr]
Advancement period [yr]
Type 2: Tree Yields
On
Tree yield multiplier


Event
Name Grazing
Auto Name
OK
Type Forest treatment
Label
Usage...
Cancel
Timing
Simulate
Calendar date
1 Jan 2021
Days 0
Add Days
Forest Treatment
Insert Standard Values...
Type 1: Age Advance
On
Age advance due to treatment [yr]
Advancement period [yr]
Type 2: Tree Yields
On

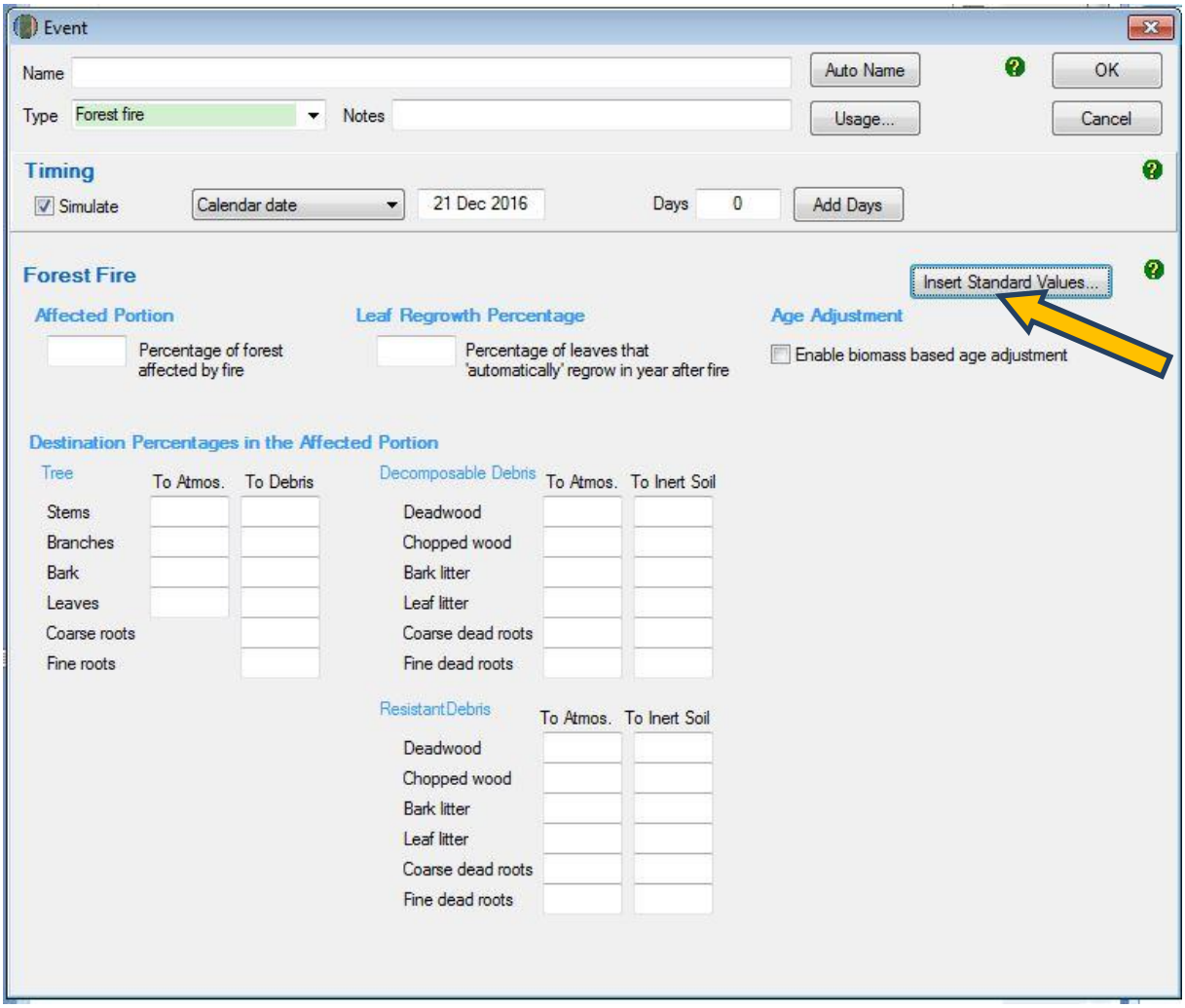

Event
Name Grazing
Auto Name
OK
Type Forest treatment
Label
Usage...
Cancel
Timing
Simulate
Calendar date
1 Jan 2021
Days 0
Add Days
Forest Treatment
Insert Standard Values...
Type 1: Age Advance
On
-5
Age advance due to treatment [yr]
5
Type 2: Tree Yields
On

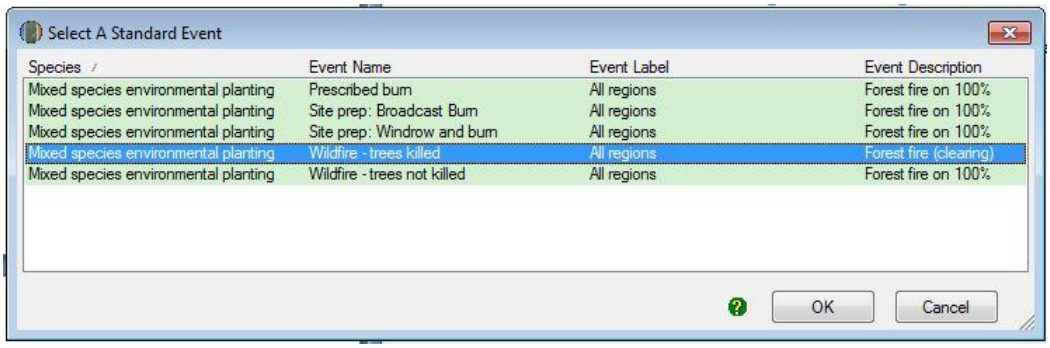
3.10.5 Adding fire events

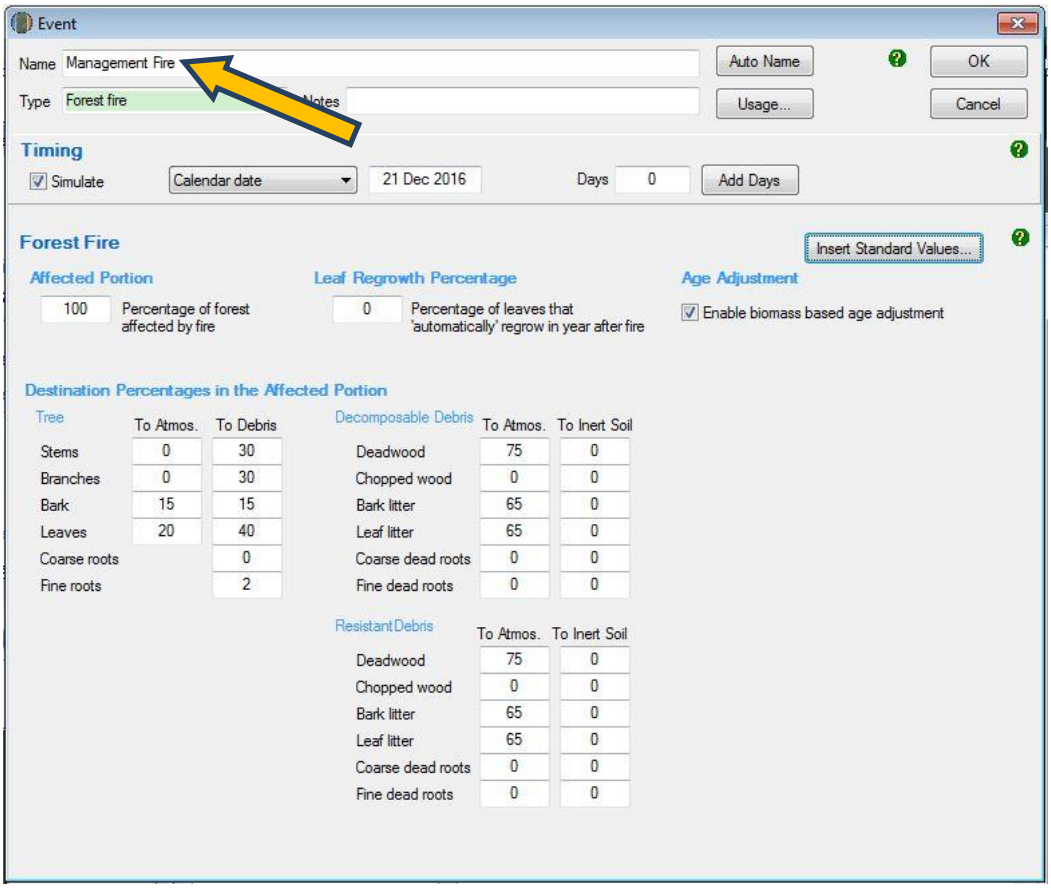
3.10.5.1 Adding a management fire event

These steps must be repeated for each management fire event that follows a clearing event that occurs in a CEA during the simulation period. A management fire event encourages grass for pasture. It is a fire that occurs within a clearing interval and is used to set back the regrowth, killing a substantial proportion of the above ground plant parts. For each of these events, the date must reflect the date of that event.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline Historic baseline Hybrid baseline Project carbon	1. Click on the 'New' button to create a new event. 2. In the blank field besides the 'Timing' section, insert the date of the management fire in the simulation period. The intervals between events must reflect those that occurred historically. For example, for default values used in baselines, this is 7 years after the regeneration event. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Change the name of the event to 'Management fire'. 6. CHANGE THE SETTINGS TO MATCH THOSE IN THE SCREENSHOT BELOW. 7. Tick the 'Enable biomass based age adjustments' box. 8. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
21 Dec 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
Resistant Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots

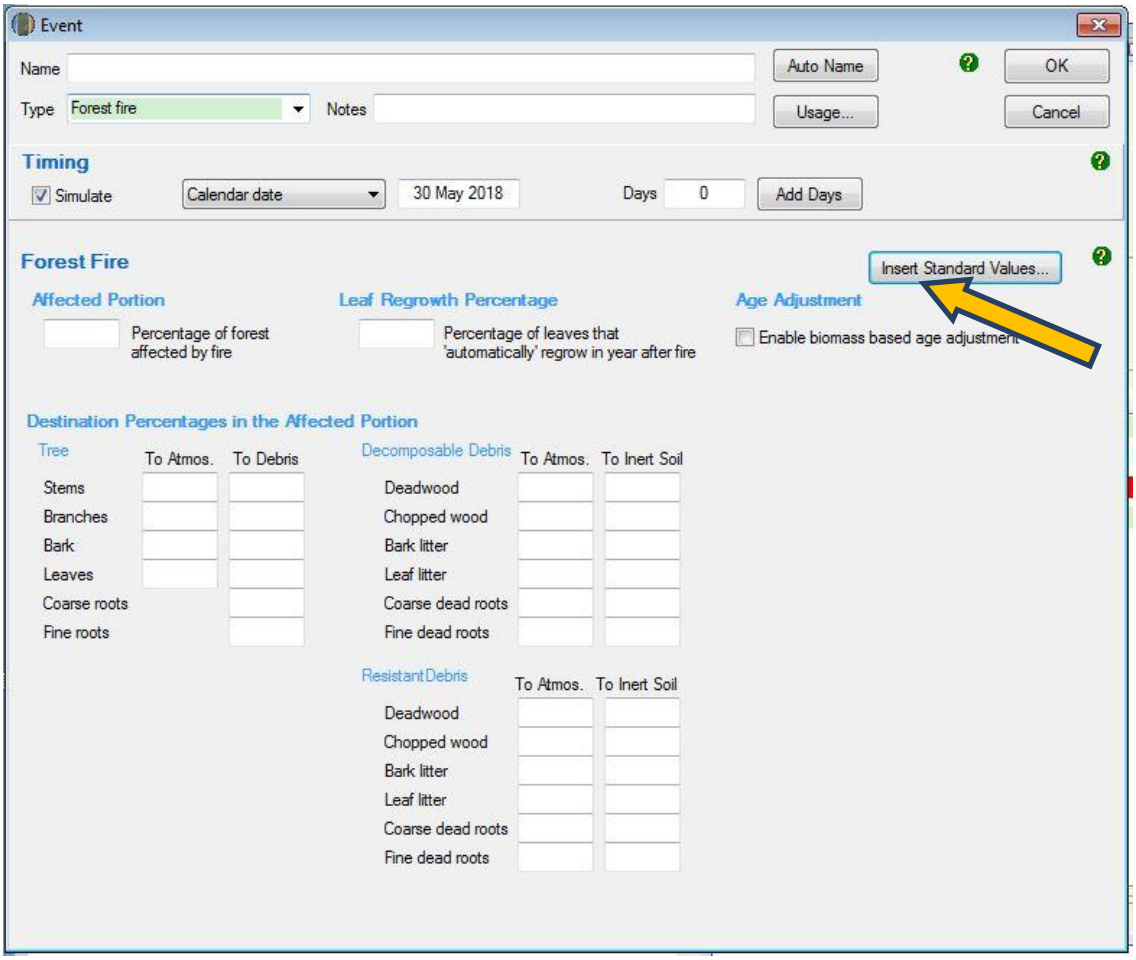

Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

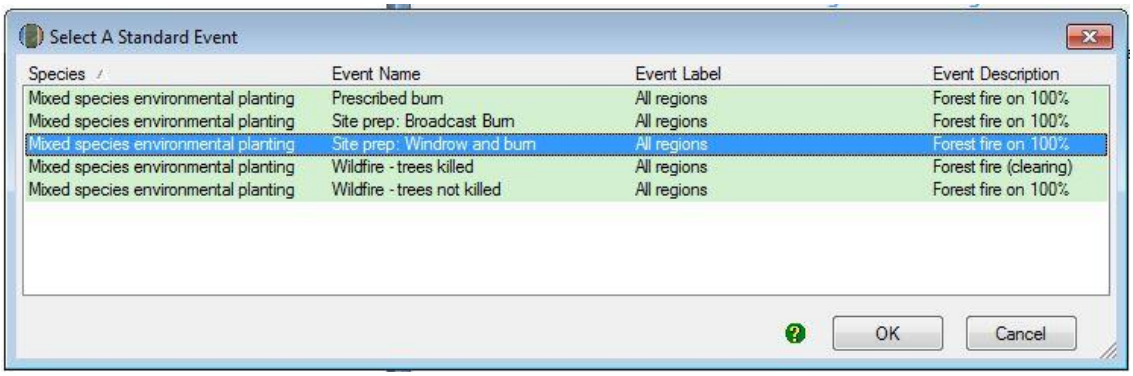


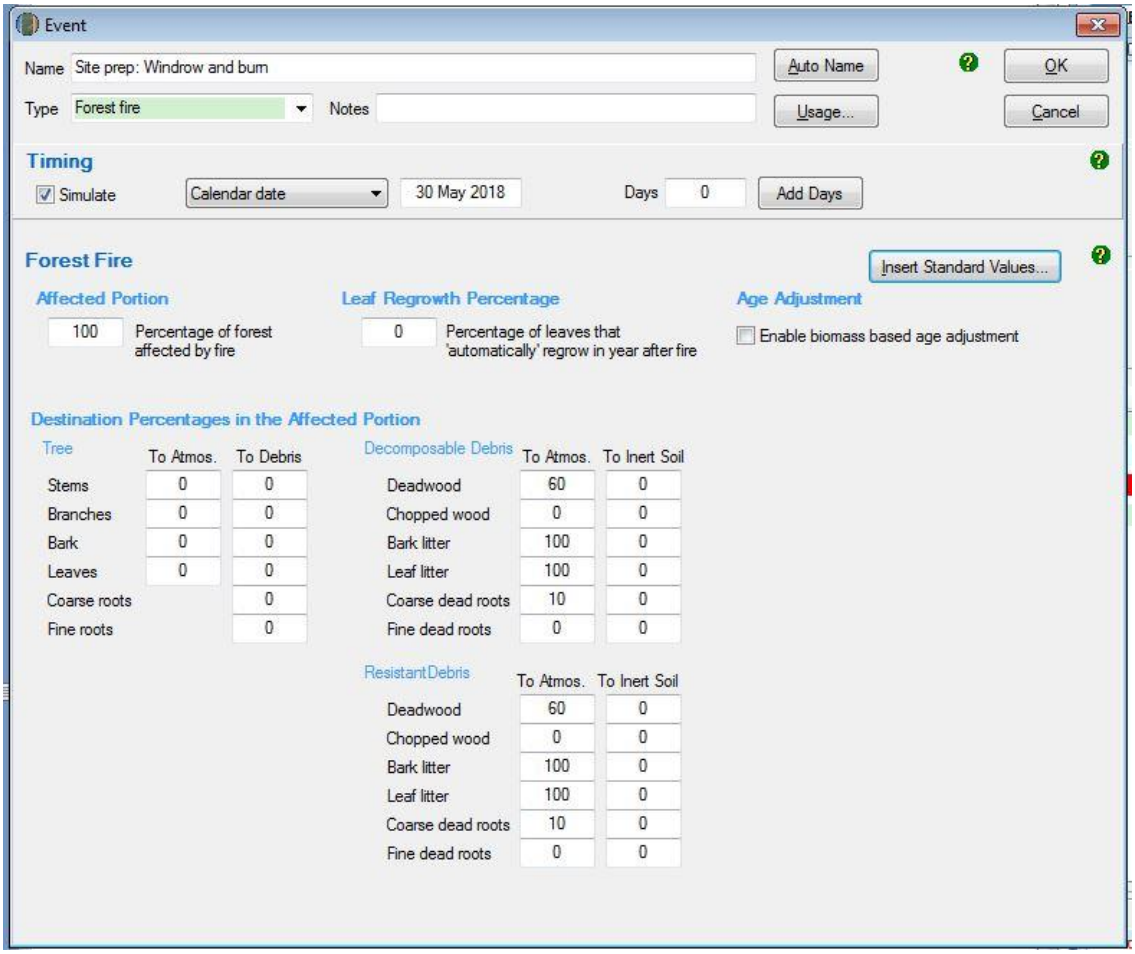
3.10.5.2 Adding a windrow and burn fire event

These steps must be repeated for each windrow and burn fire event that follows a clearing event that occurs in a CEA. A windrow and burn fire event reduces the amount of debris that remains after the clearing event. For each of these events, the date MUST reflect the interval between events.

Simulation Type	**Steps required**
C100_5%	• Not permitted
Project carbon	• Not permitted
C10 Default baseline Historic baseline Hybrid baseline	1. Click on the 'New' button to create a new event. 2. Insert the date of the windrow and burn fire in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Site prep: Windrow and burn' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Do NOT change any other setting. 6. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
30 May 2018
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
Resistant Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots

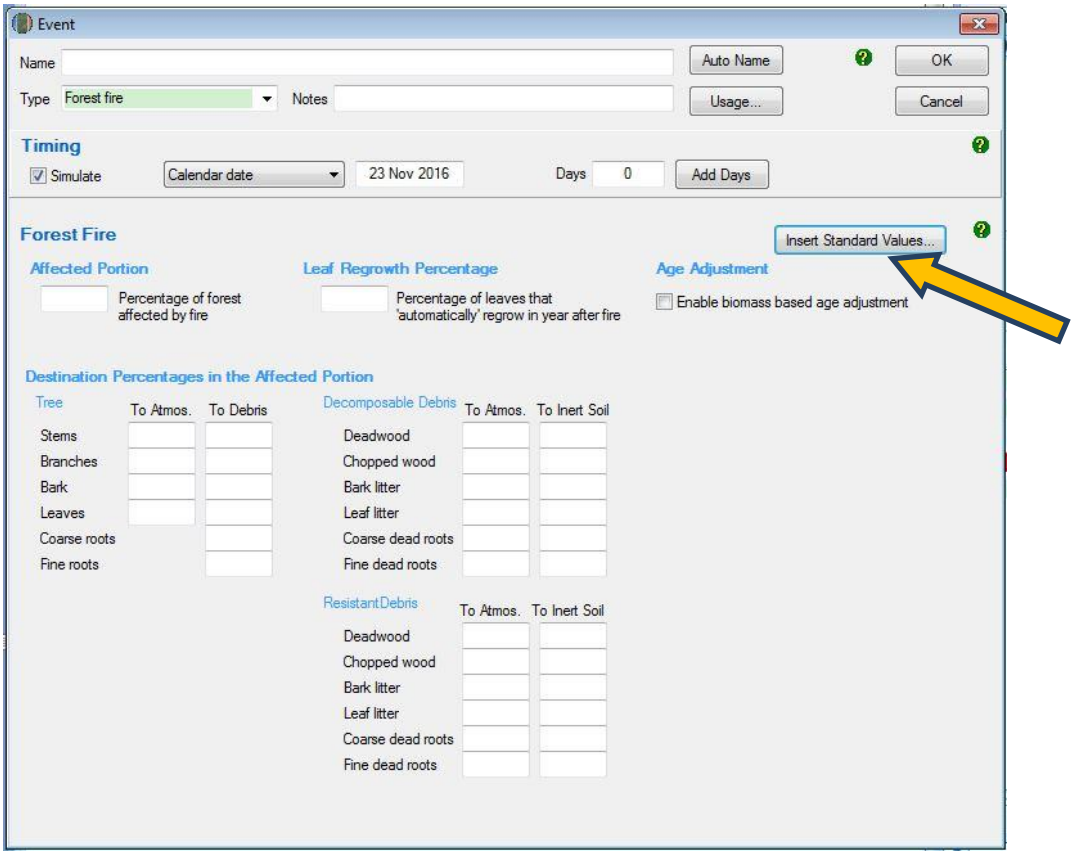

Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

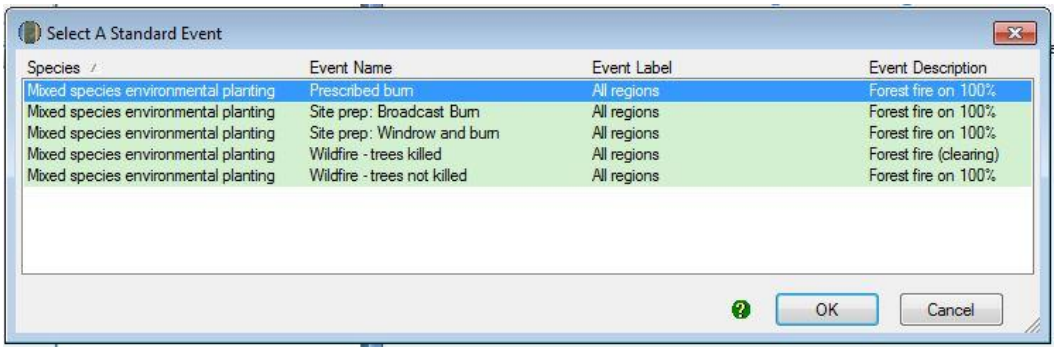


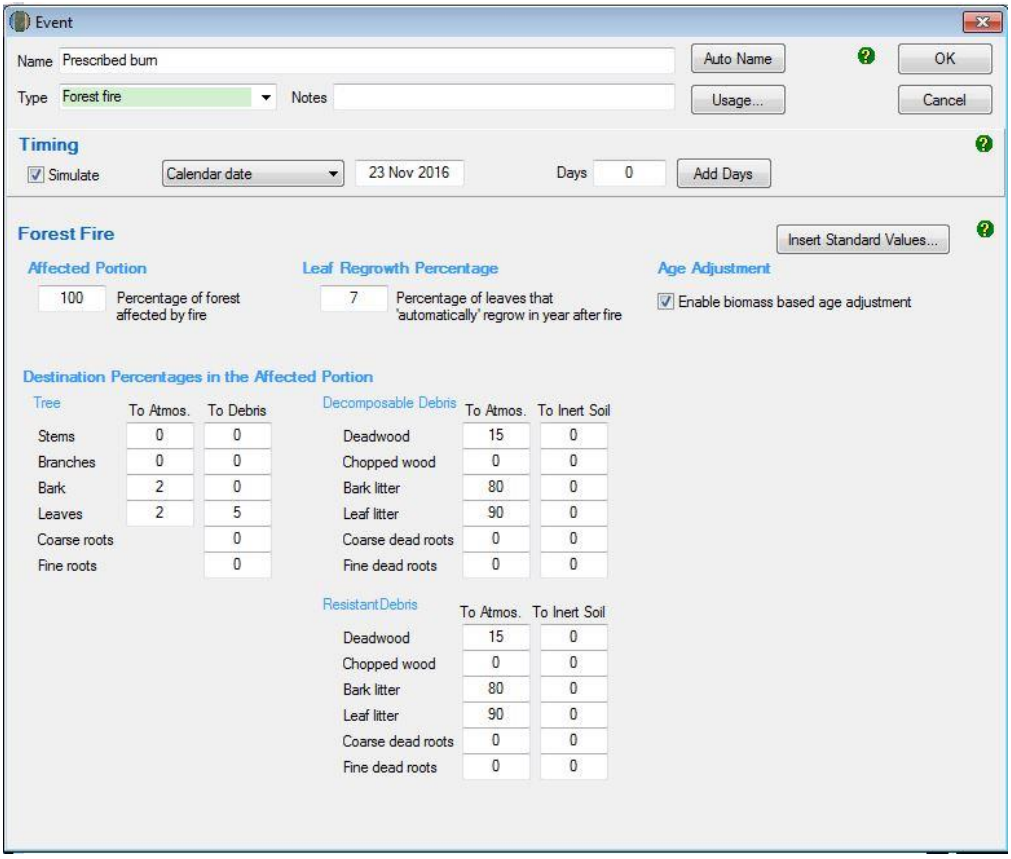
3.10.5.3 Adding a prescribed fire event – to reduce fire risk

These steps must be repeated for each prescribed fire event aimed at reducing fuel loads and hence fire risk, that occurs in a CEA during the simulation period. A prescribed fire is used to control the accumulation of the debris pool. For each of these events the date must reflect the date of that event.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
Project carbon	1. Click on the 'New' button to create a new event. 2. Insert the date of the prescribed fire in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Prescribed burn' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Tick the 'Enable biomass based age adjustments' box. 6. Do NOT change any other setting. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
23 Nov 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots

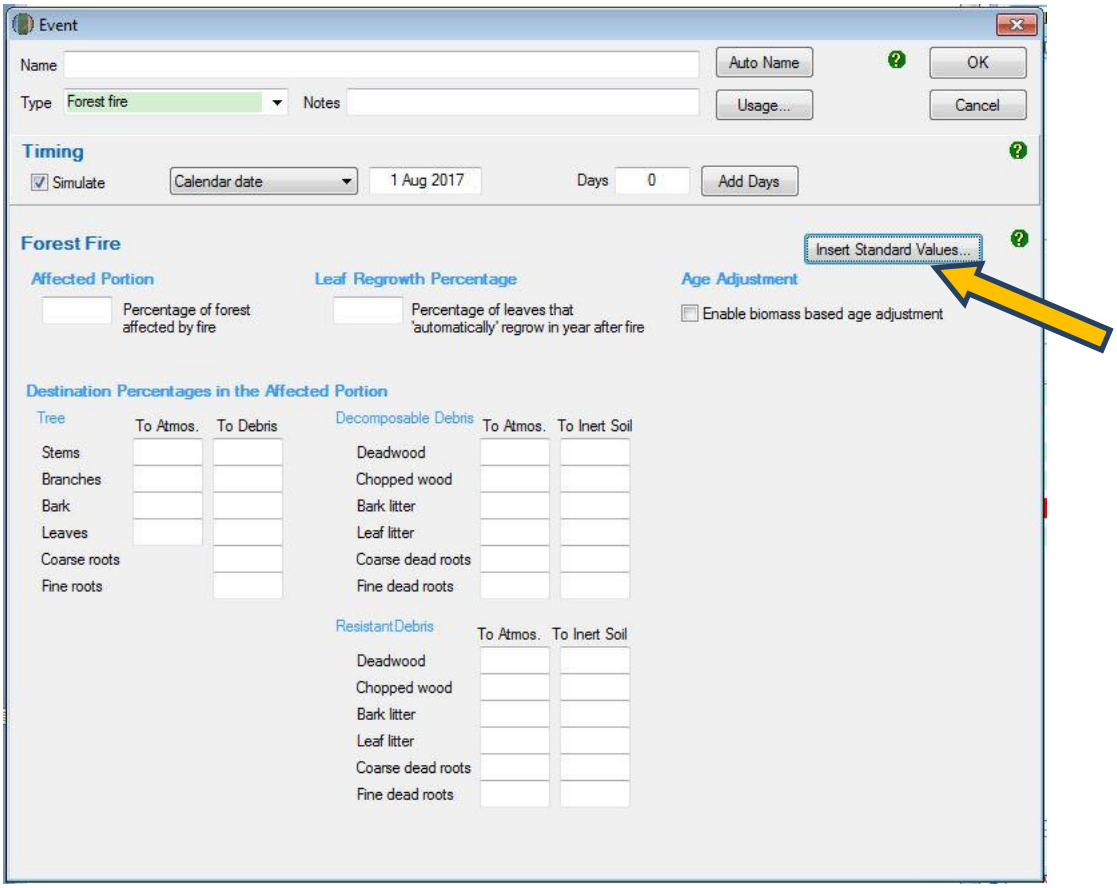

Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

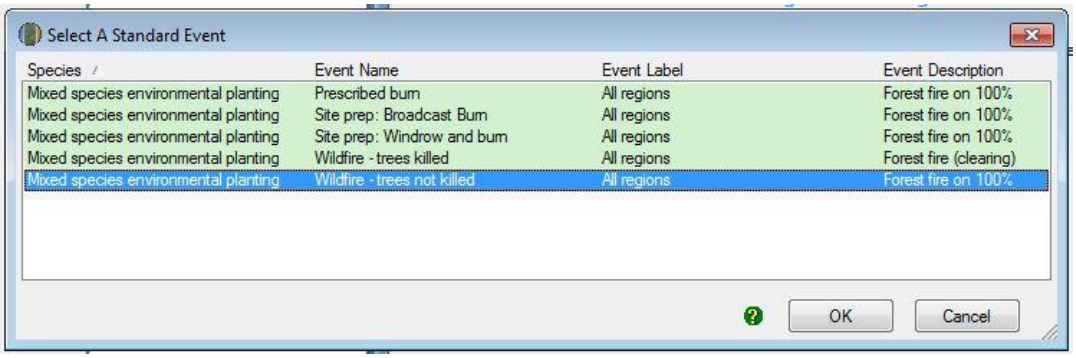


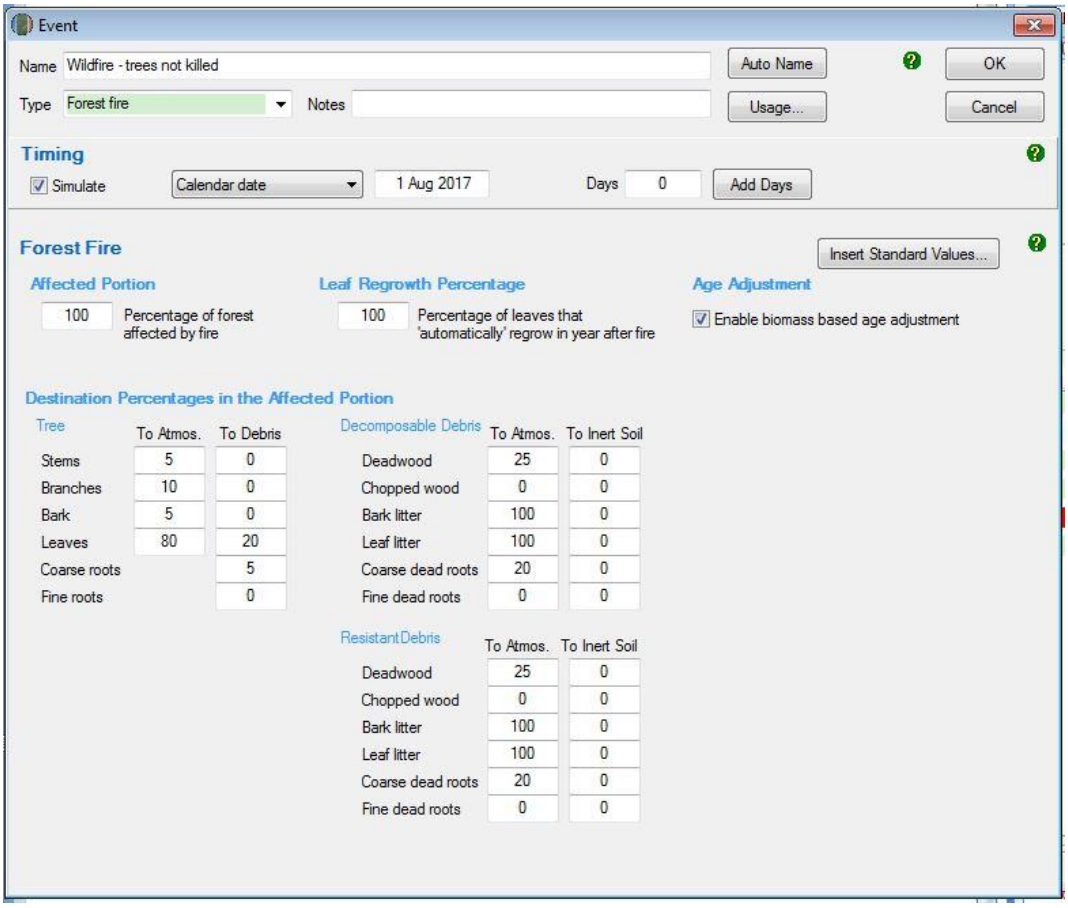
3.10.5.4 Adding a wildfire – trees not killed event

These steps must be repeated for each 'wildfire – trees not killed' event that occurs in a CEA during the simulation period. For each wildfire – trees not killed event the date must be the date on which the event occurred.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
Project carbon	1. Click on the 'New' button to create a new event. 2. Insert the date of the wildfire where trees are not killed in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees not killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Tick the 'Enable biomass based age adjustments' box. 6. Do NOT change any other setting. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
1 Aug 2017
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots

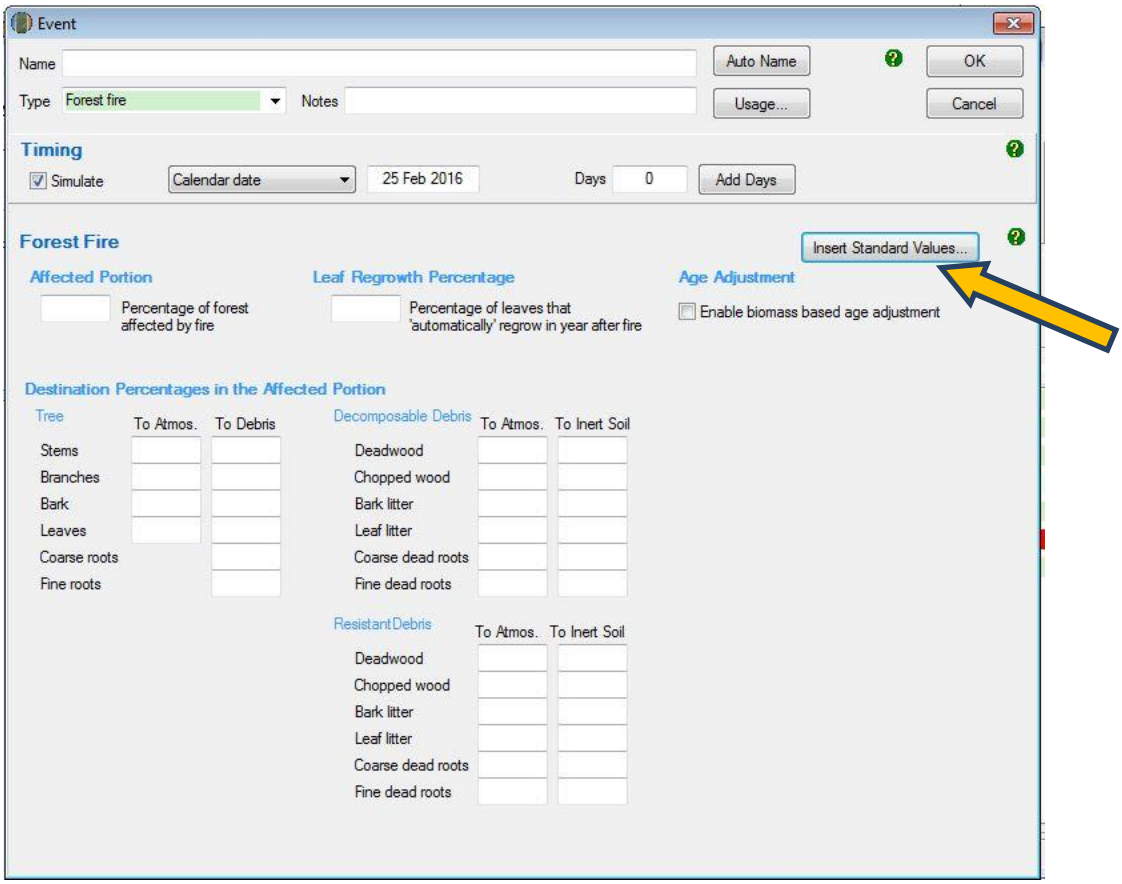

Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

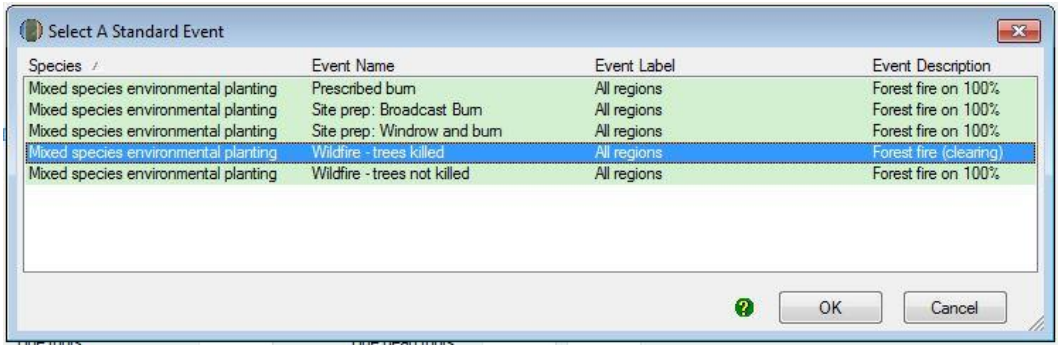


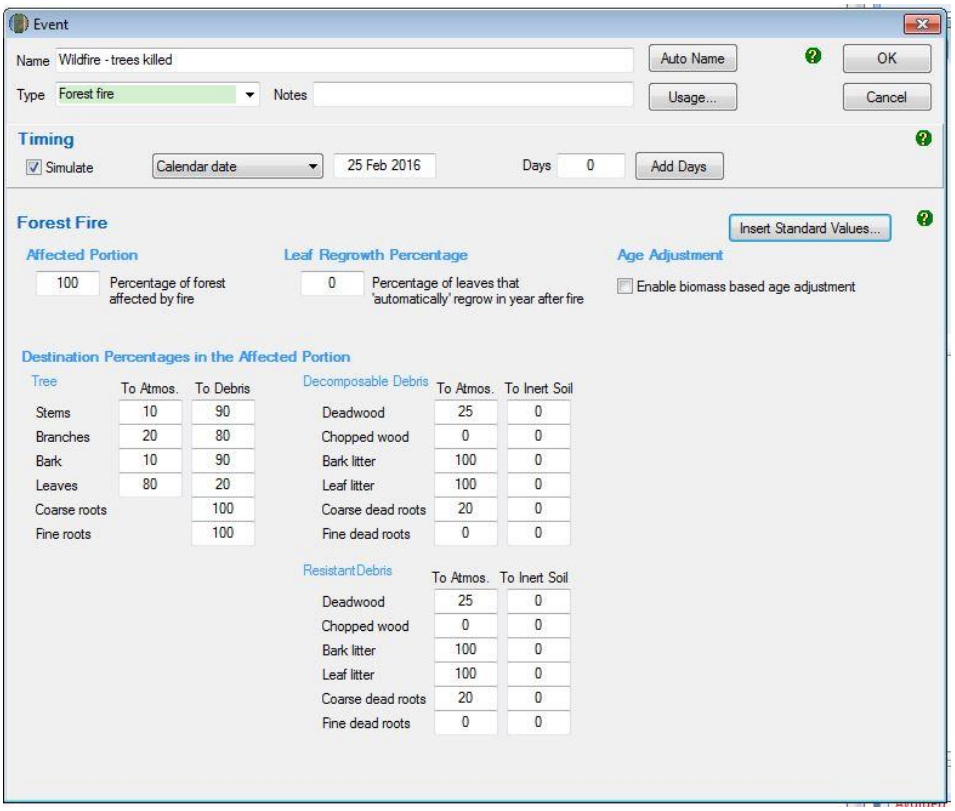
3.10.5.5 Adding a wildfire – trees killed event

These steps must be repeated for each wildfire – trees killed event that occurs during the simulation period and for each wildfire – trees killed event the date must be the date on which the event occurred.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
Project carbon	1. Click the 'New' button to create a new event. 2. Insert the date that the wildfire – trees killed event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. 3. In the drop down menu next to 'Type', select 'Forest Fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Click 'OK'. 6. Do NOT change any other settings. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
25 Feb 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
Resistant Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

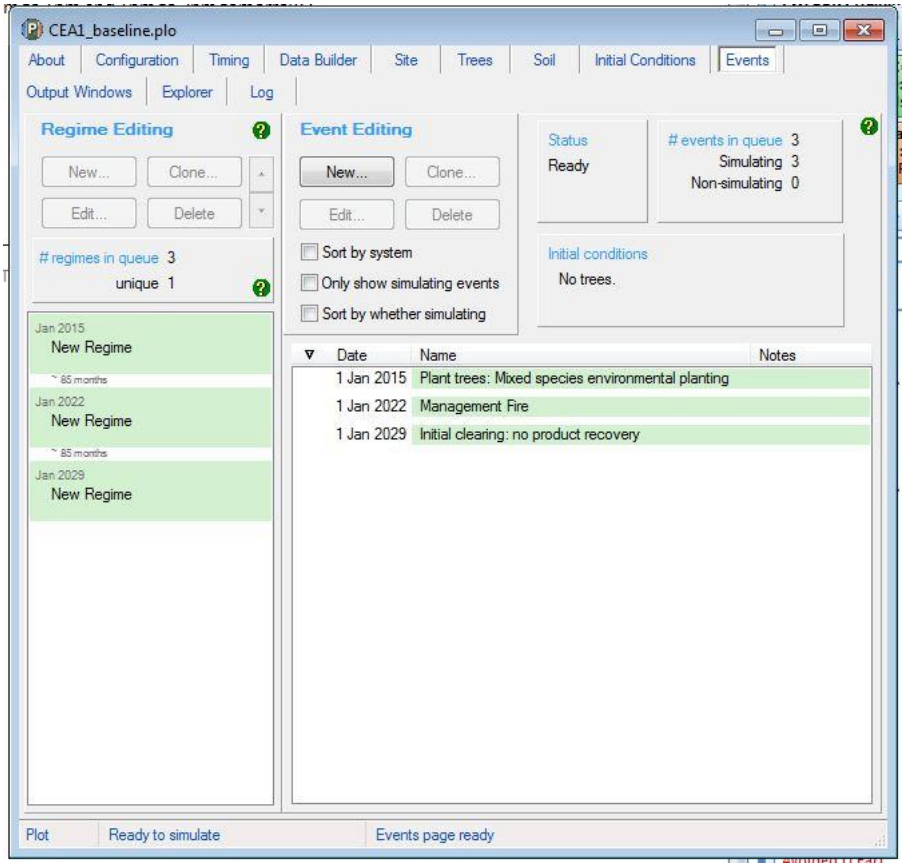


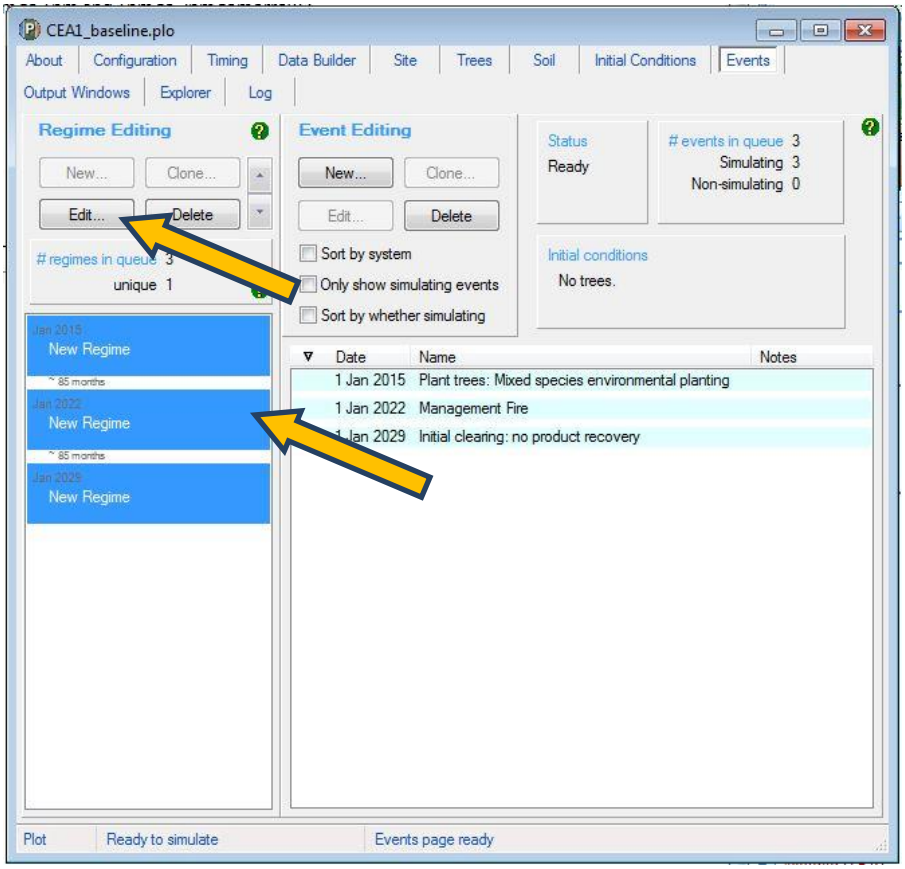
3.10.6 Creating and cloning regimes

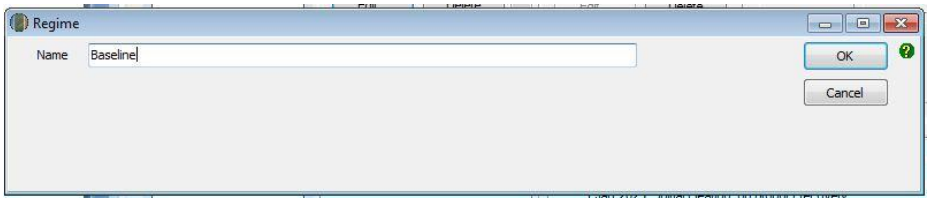
For default, historic and hybrid baselines, the entire events queue that includes all simulated events for the entire baseline management event scenario (see section 4.12 of the Determination) must be cloned to cover the 100 year baseline forecast period.

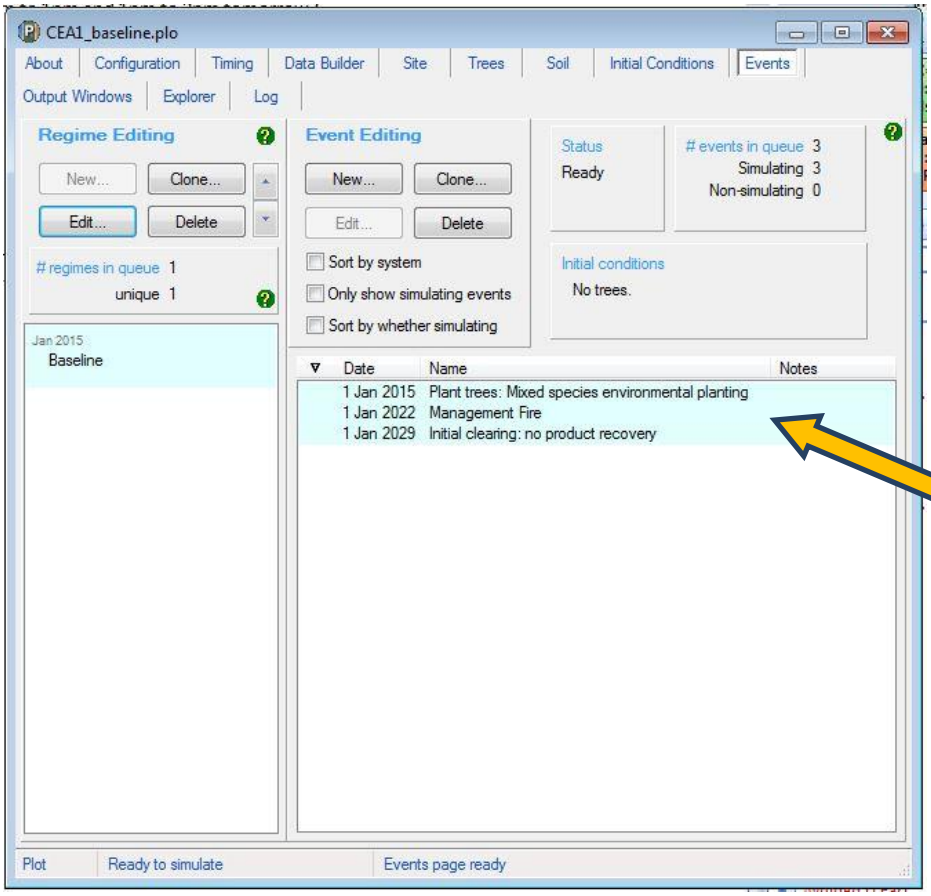
Simulation Type	Steps required
Default baseline	• Follow the above steps to create a plot and the events forming a single clearing interval of 15 years (regeneration, management fire where applicable and clearing). By default, FullCAM will create a new regime for each event added. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Press the 'Clone' button under the Regime Editing header. • Enter '15' for calendar years and for 'number of times', a value high enough to clone events over the entirety of the 100-plus year baseline period and click 'ok'. • Any events that are highlighted grey towards the bottom of the events queue fall beyond the 100-plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
Historic baseline	• Follow the above steps to create a plot and the events forming the two clearing intervals of the durations supported by historical evidence.

	• Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Calculate the number of years between the first event of the first interval and the last event of the second interval. Add 1 to this number. Ie. years between initial regeneration event modelled and the last clearing event modelled plus 1. • Press the 'Clone' button under the Regime Editing header. • Enter the number calculated above for 'calendar years' and for 'number of times', a value high enough to clone events over the entirety of the 100-plus year baseline period and click 'ok'. • Any events that are highlighted grey towards the bottom of the events queue fall beyond the 100-plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
Hybrid baseline	• Follow the above steps to create a plot and the events forming the first clearing interval of 15 years, and the second clearing interval of the duration supported by historical evidence. By default, FullCAM will create a new regime for each event added. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Calculate the number of years between the first event of the first interval and the last event of the second interval. Add 1 to this number. Ie. years between initial regeneration event modelled and last clearing event plus 1. • Press the 'Clone' button under the Regime Editing header. • Enter the number calculated above for 'calendar years' and for 'number of times', a value high enough to clone events over the entirety of the 100-plus year baseline period and click 'ok'. • Any events that are highlighted grey towards the bottom of the events queue fall beyond the 100-plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
C10 C100_5% Project carbon	• Not applicable

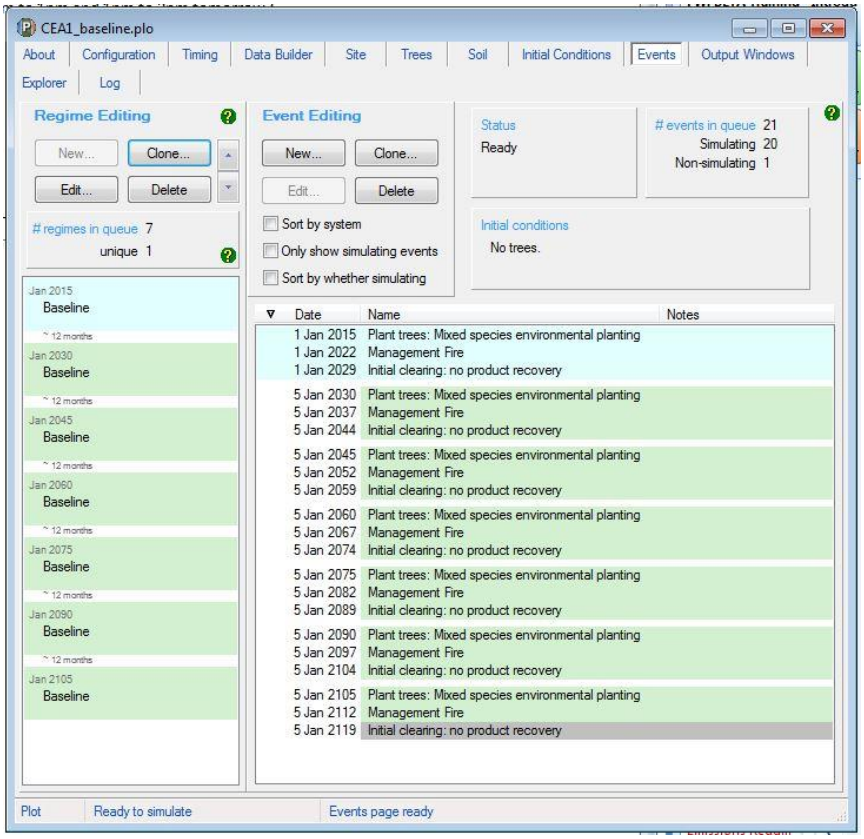

CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 3
unique 1
Jan 2015
New Regime
~ 85 months
Jan 2022
New Regime
~ 85 months
Jan 2029
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 3
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015
Plant trees: Mixed species environmental planting
1 Jan 2022
Management Fire
1 Jan 2029
Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready


CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
unique 1
New Regime
~ 85 months
New Regime
~ 85 months
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 3
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015
Plant trees: Mixed species environmental planting
1 Jan 2022
Management Fire
1 Jan 2029
Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready

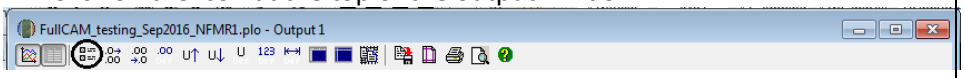

Regime
Name
Baseline
OK
Cancel

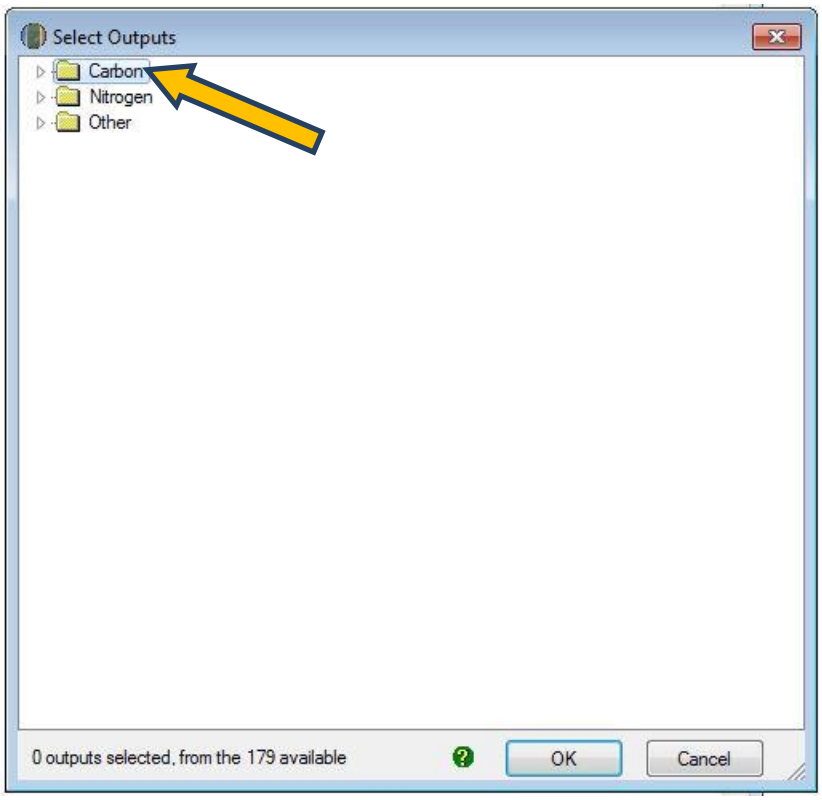

CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 1
unique 1
Jan 2015
Baseline
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 3
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015 Plant trees: Mixed species environmental planting
1 Jan 2022 Management Fire
1 Jan 2029 Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready

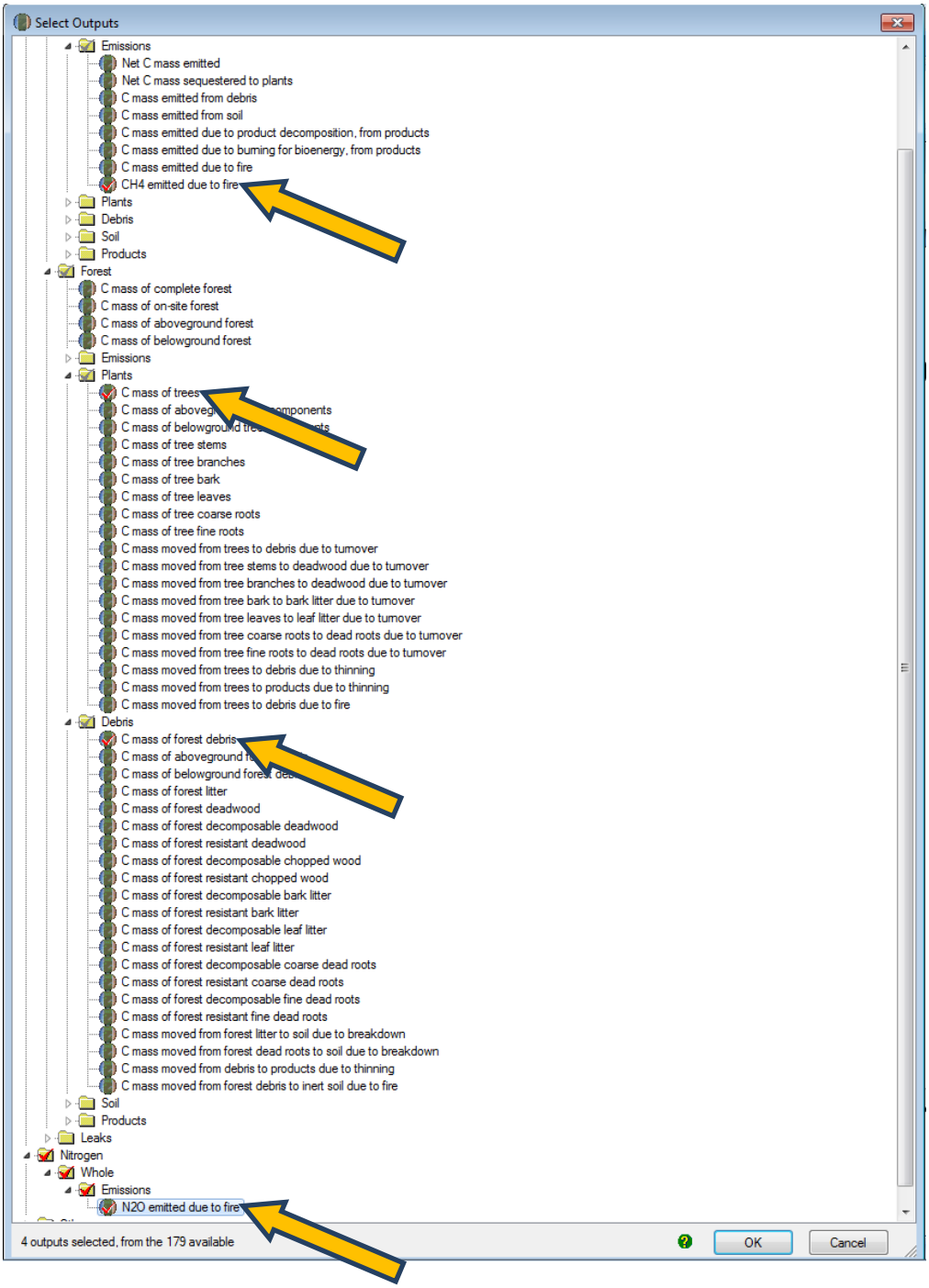

Clone Regimes
Timing Offset for Cloned Regimes
Calendar years
15
Number of times
6
OK
Cancel



3.11 The Output Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Double click on 'Output1' listed in the Output Window. • Click on the icon at the top of the output window:  • Selected outputs have a tick next to their entry, and on the folder(s) where they are located. Unselect all items so that the text reads '0 outputs selected'.
C100_5% C10	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Click 'OK'.
Default baseline Hybrid baseline Historic baseline	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Select the debris carbon pools: Carbon / Forest / Plants / C mass of debris. • Click 'OK'.
Project carbon	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Select the debris carbon pools: Carbon / Forest / Debris / C mass of forest debris. • Select the CH_4 emissions from fire: Carbon / Whole / Emissions / CH4 emitted due to fire. • Select the N_2O emissions from fire: Nitrogen / Whole / Emissions / N2O emitted due to fire. • Click 'OK'.


Select Outputs
Carbon
Nitrogen
Other
0 outputs selected, from the 179 available
OK
Cancel



3.12 Running Simulations

To run the simulation, press the icon in the top menu bar: 

3.13 Viewing outputs

Outputs can be viewed by clicking the icon (circled) at the top of the Output window as either:

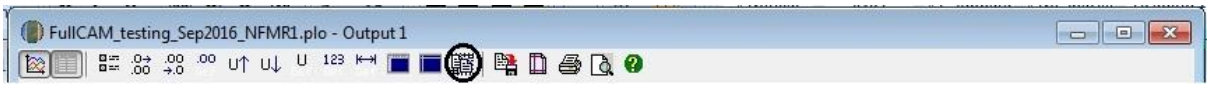
8. *Graph*

9. Tabular form

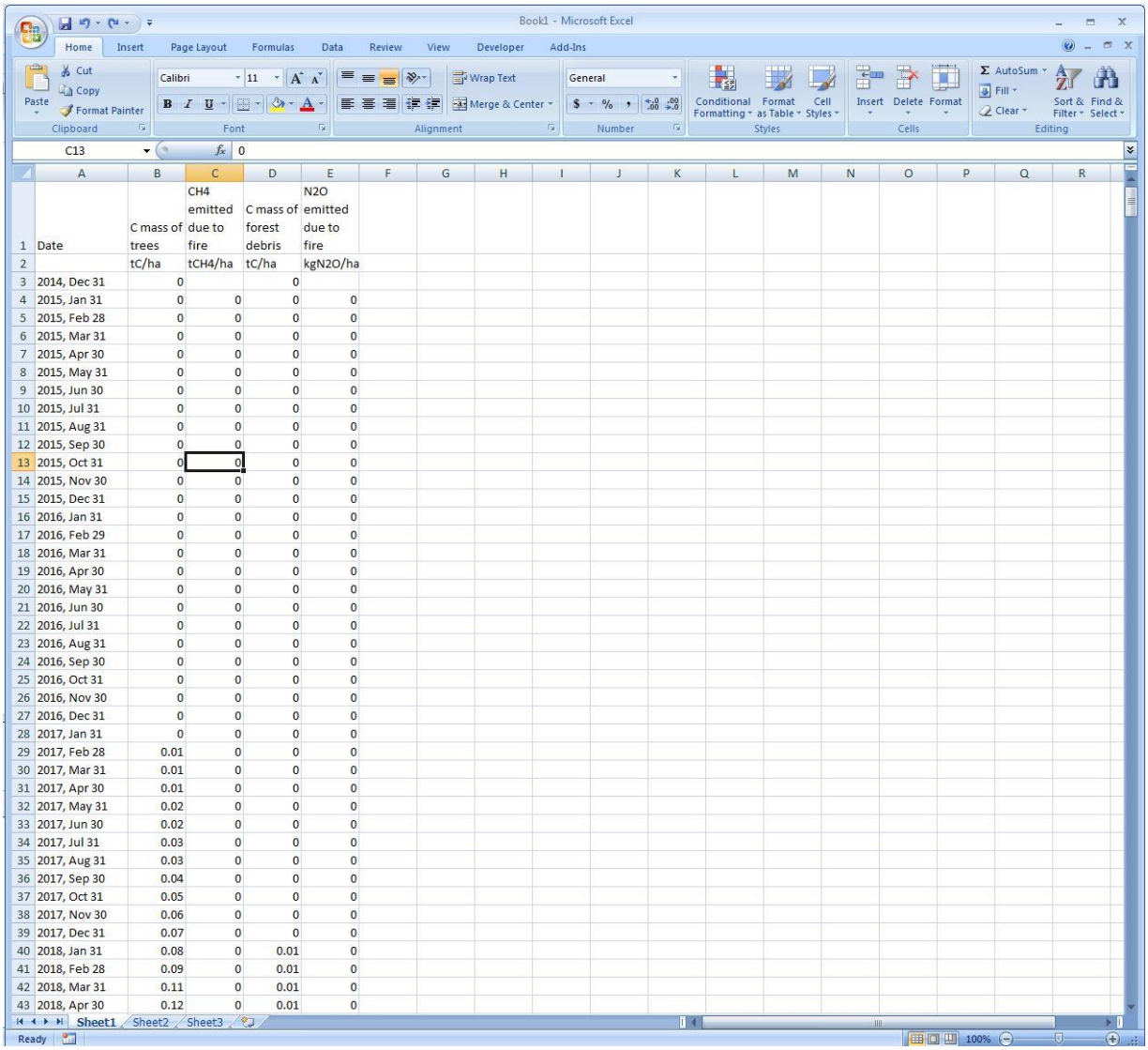
3.14 Transferring outputs into a spreadsheet

To transfer data into a Microsoft Excel or equivalent spreadsheet for analysis:

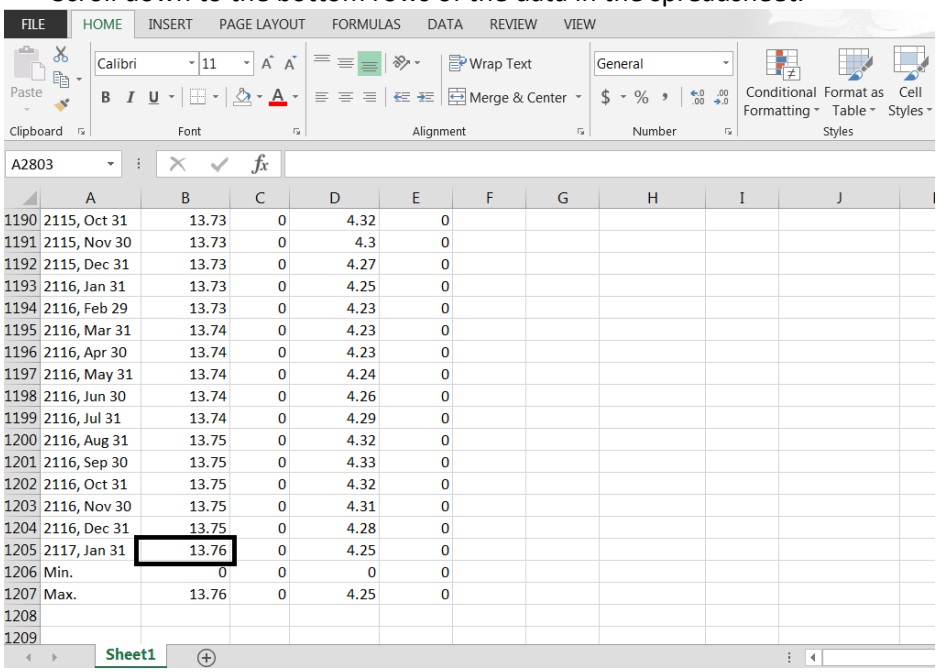
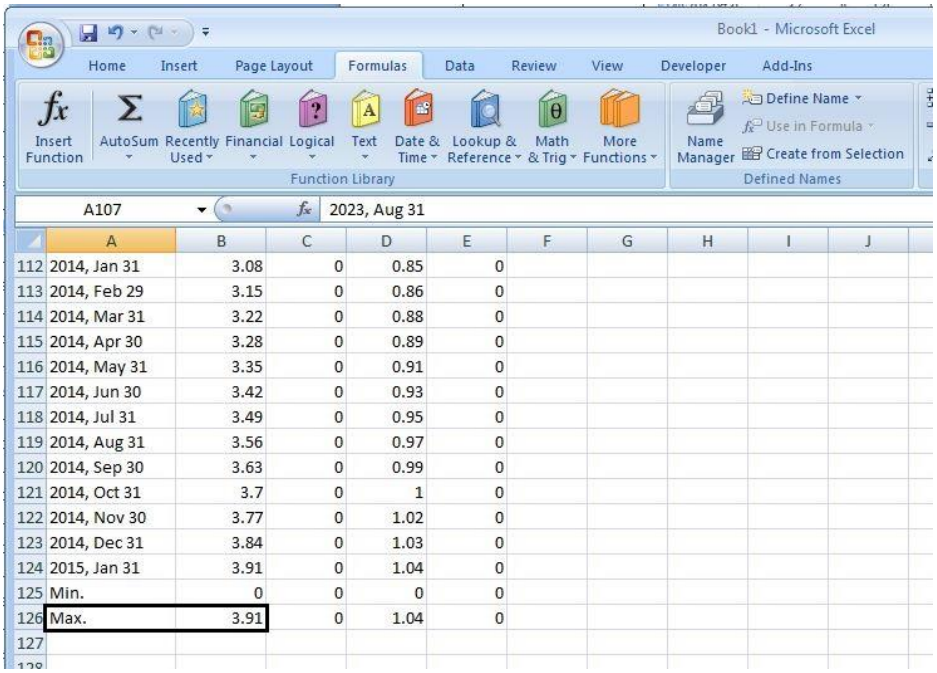
Copy all the output data by clicking on the icon (circled) in the top of the Output window.



Open Microsoft Excel (or equivalent spreadsheet software), and 'Paste' the data copied from FullCAM into the spreadsheet. For example:



	A	B	C	D	E
1	Date	C mass of trees	CH4 emitted due to fire	C mass of forest debris	N2O emitted due to fire
2		tC/ha	tCH4/ha	tC/ha	kgN2O/ha
3	2014, Dec 31	0		0	
4	2015, Jan 31	0	0	0	0
5	2015, Feb 28	0	0	0	0
6	2015, Mar 31	0	0	0	0
7	2015, Apr 30	0	0	0	0
8	2015, May 31	0	0	0	0
9	2015, Jun 30	0	0	0	0
10	2015, Jul 31	0	0	0	0
11	2015, Aug 31	0	0	0	0
12	2015, Sep 30	0	0	0	0
13	2015, Oct 31	0	0	0	0
14	2015, Nov 30	0	0	0	0
15	2015, Dec 31	0	0	0	0
16	2016, Jan 31	0	0	0	0
17	2016, Feb 29	0	0	0	0
18	2016, Mar 31	0	0	0	0
19	2016, Apr 30	0	0	0	0
20	2016, May 31	0	0	0	0
21	2016, Jun 30	0	0	0	0
22	2016, Jul 31	0	0	0	0
23	2016, Aug 31	0	0	0	0
24	2016, Sep 30	0	0	0	0
25	2016, Oct 31	0	0	0	0
26	2016, Nov 30	0	0	0	0
27	2016, Dec 31	0	0	0	0
28	2017, Jan 31	0	0	0	0
29	2017, Feb 28	0.01	0	0	0
30	2017, Mar 31	0.01	0	0	0
31	2017, Apr 30	0.01	0	0	0
32	2017, May 31	0.02	0	0	0
33	2017, Jun 30	0.02	0	0	0
34	2017, Jul 31	0.03	0	0	0
35	2017, Aug 31	0.03	0	0	0
36	2017, Sep 30	0.04	0	0	0
37	2017, Oct 31	0.05	0	0	0
38	2017, Nov 30	0.06	0	0	0
39	2017, Dec 31	0.07	0	0	0
40	2018, Jan 31	0.08	0	0.01	0
41	2018, Feb 28	0.09	0	0.01	0
42	2018, Mar 31	0.11	0	0.01	0
43	2018, Apr 30	0.12	0	0.01	0

Simulation Type	Steps required
C100_5%	• Scroll down to the bottom rows of the data in the spreadsheet.  • Record the value in the 'C Mass of Trees' column for the last row of data pertaining to a date. This is C100 or the value of C at 100 years. To determine C100_5%, or 5% of this value, multiply C100 by 0.05.This value is used for the materiality test at section 4.7 of the Determination, calculated in accordance with section 4.8 of the Determination.
C10	• Scroll down to the bottom of the spreadsheet, where the 'Min' and 'Max' values for each column will be shown.  • Record the 'Max' value for the 'C Mass of trees' column (=C10). This value is used for the materiality test at section 4.7 of the Determination, calculated in accordance with section 4.9 of the Determination.

Default baseline Historic baseline Hybrid baseline	• Refer to Division 4.4 of the Determination for calculating baselines, specifically Equation 4 at section 4.24. Section 5 of these Guidelines details how each FullCAM output in the spreadsheet data corresponds to the equation parameters.
Project carbon	• Refer to Division 4.4 of the Determination for calculating end of reporting period Project carbon stocks, specifically Equation 2 at section 4.22. Section 5 of these Guidelines details how each FullCAM output in the spreadsheet data corresponds to the equation parameters.

4. FullCAM simulations and offsets reporting

Project proponents must calculate the project net abatement by completing the equations in sections 4.21 to 4.29 of the Determination. Parameters generated in FullCAM are used in Equations in the Determination.

Note that for some of the equations the average of the FullCAM output over the simulation period will be required, whereas for others the value of the FullCAM output at the end of the simulation period will be used. Refer to the equations within the Determination to determine which value to use. Averages can be calculated using the average function within your spreadsheet software.

Table 7: FullCAM outputs and Corresponding Parameters as defined in the Determination

FullCAM Output	Parameter as defined in the Determination	Scenario	Equation in the determination
C mass of debris	$CD_{CEA,i}$	Project	3
	$BCD_{CEA,i,k}$	Baseline	4
C mass of trees	$CT_{CEA,i}$	Project	3
	$BCT_{CEA,i,k}$	Baseline	4
CH_4 emitted from debris due to fire	$E_{CH_4,i}$	Project	7
N_2O emitted due to fire	$E_{N_2O,i}$	Project	8

Australian Government

Department of the Environment and Energy

FullCAM Guidelines

Requirements for using the Full Carbon Accounting Model (FullCAM) in the Emissions Reduction Fund (ERF) methodology determination:

Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013

Version 2.1

(published and in force from xx May 2017)

Disclaimer

This document has been developed to assist project proponents to calculate abatement in FullCAM as required by the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013.* This document is incorporated by reference in sections 1.3, 4.8, 4.9, 4.12, 4.14, 4.16, 4.18, 4.19, 4.30 and 5.3 of that determination. Project proponents should not use this document as a substitute for complying with the requirements in the Methodology Determination.

Before relying on any material contained in this document, project proponents should familiarise themselves with the requirements of the following legal documents: Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013, Carbon Credits (Carbon Farming Initiative) Act 2011, Carbon Credits (Carbon Farming Initiative) Rule 2015 and Carbon Credits (Carbon Farming Initiative) Regulations 2011. Project proponents are also advises to obtain professional advice suitable to their particular circumstances.

This document does not displace relevant legislative provisions or other laws. All users are encouraged to read this document in conjunction with the relevant legislation, including the methodology determinations, referenced throughout this document. Where any inconsistencies are apparent, please be aware that the legislative provisions will take precedence.

This document will be updated periodically and users should note that some inputs and values may change over time. It is the user's responsibility to ensure that they are using the version of this document and any tool/s required in association as in force at the applicable offsets report submission date (consistent with the definitions in section 1.3 of the Methodology Determination).

The Department of the Environment and Energy and the Commonwealth of Australia will not be liable for any direct, indirect or consequential loss arising out of, or in connection with, or reliance on, information on, or produced by, using this document.

Contents

1. Introduction

1.1 Use of FullCAM with the Native Forest from Managed Regrowth Methodology Determination 2013

The calculation of carbon abatement under the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* (the Determination) is dependent upon the use of the Full Carbon Accounting Model (FullCAM) consistently with the requirements of this document. In particular, sections 4.8, 4.9, 4.12, 4.14, 4.16, 4.18 and 4.19 of the Determination require that the materiality test, baseline scenario and project scenario for each carbon estimation area must be modelled in FullCAM in accordance with the requirements in both the Determination and this document.

Section 4.18 of the Determination requires that any project-specific inputs specified in this document must be used to determine the project carbon stocks for a carbon estimation area. Note that each of the simulations and modelling events detailed in this document have specific inputs that must be used. In effect, proponents are required to model project carbon stocks reflecting actual management events for the entirety of the simulation period.

Section 4.30 and 4.31 of the Determination also requires key input and output data to be produced using FullCAM in accordance with the requirements in the Determination and this document. Where content of this document relates to provisions of the Determination, references are given to the location of those provisions.

Project proponents must only change FullCAM default settings as indicated in this document, and all other settings must not be changed. This is to ensure that defaults will apply where relevant.

The latest version of FullCAM is available for download from www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector. You should check the Determination to determine which version of FullCAM you are required to use for your applicable offsets report. If you determine that you must use a version of FullCAM that is unavailable on the website, please contact the Department at erfforests@environment.gov.au to obtain a copy.

1.2 Format of this document

This document provides:

- an overview of FullCAM relevant to the Determination;
- an overview of the simulations you must run in FullCAM as per the Determination;
- a step-by-step walkthrough of using FullCAM to run the simulations correctly; and
- an overview of the FullCAM outputs as they relate to equations within the Determination.

Section 1 of this document provides an overview of FullCAM, its features relevant to users and important requirements for using this document. Section 2 outlines the process used to determine which type of baseline proponents must use in accord with the Determination. Section 3 provides a step-by-step walkthrough of how to run FullCAM 'simulations' for the materiality test, baselines, and project reporting.

Section 2 includes tables summarising the simulations that users may be required to run in FullCAM. These tables summarise the objective, time period and outputs for each simulation, as well as the project activities that may need to be simulated. Where settings differ between different simulation types for the step-by-step process, section 3 outlines the separate parameters required. Users should familiarise themselves with the simulations in section 2 before following the steps in section 3 to run the simulations. Section 4 provides an overview of the FullCAM outputs needed to complete the equations within the Determination.

1.3 FullCAM background

FullCAM is used in Australia's National Greenhouse Gas Accounts for the land sector. FullCAM provides fully integrated estimates of carbon pools in forest and agricultural systems for Australia's land sector reporting. In addition, it accounts for human-induced changes in emission and sequestration of major greenhouse gases. FullCAM was developed under the National Carbon Accounting System (NCAS) at the then Australian Greenhouse Office to provide a dynamic account of the changing stocks of carbon in Australia's land systems since 1970 by integrating data on land cover change, land use and management, climate, plant productivity, and soil carbon over time. FullCAM estimates carbon stock change and greenhouse gas emissions at fine spatial and temporal scales, and uses a wide range of spatially referenced data.

Users of FullCAM can determine estimates of carbon stock change and greenhouse gas emissions for ERF projects on a similar basis to that used for land use and land use change in Australia's National Greenhouse Gas Inventory.

1.4 FullCAM plots and running simulations

FullCAM can run simulations on a 'plot'. A plot, for modelling purposes, is defined as a piece of land for which the event history, when modelled in FullCAM, is the same across that area of land. Separate plot files are created for each CEA.

In FullCAM, there are several types of plots that can be selected. Only 'forest system' is relevant to this Determination. This document provides overviews of the simulations that users may be required in Section 2, and the steps to run these simulations in Section 3.

FullCAM models using a single 'model point' location. Proponents do not need to define plot boundaries within FullCAM, rather proponents must input the coordinates for a single location within the plot boundaries that is at the approximate centre of the plot (the model point – see paragraph 3.3(1)(c) of the Determination). The latest spatial data for a plot must be downloaded using the 'Data Builder' tab each time the software is run. This process is described in section 3.5 of this document.

Separate plot files must be created for each carbon estimation area (CEA) (see section 3.3 of the Determination). In order to ensure all settings are correct, including defaults, we recommend creating new plot files each time a new version of FullCAM or these Guidelines is used. Plot files created under previous versions may contain different settings that will affect outputs and users are responsible for any inconsistencies.

For each CEA, separate plot files must be created for:

- determining whether a zero baseline or non-zero baseline must be used (initial reporting period only);
- estimating carbon stocks under a non-zero baseline (if a zero baseline is not appropriate); which may be either a 'default' baseline, an 'historic' baseline or an 'hybrid' baseline;
- estimating carbon stocks for the current reporting period; and
- determining if a disturbance event must be reported prior to the next reporting period.

1.5 Overview of the FullCAM interface

The FullCAM software user interface displays menus and a series of tabs. Each tab has a suite of fields in which information may either be required to complete as instructed in section 3 or left unchanged. The program is designed so that certain tabs in a plot file are made available only if required fields have valid information entered in earlier tabs. If the text of a tab or field is red, then FullCAM requires information in that tab or field before a simulation can be run. When all the required fields within a tab have valid information entered, the tab text will become blue. Help is provided within FullCAM by clicking on the  symbol available in most windows. A general overview of each tab follows.

There are only three tabs users see when they create a new FullCAM plot:

Tab	Explanation
About	Includes a free text field where users can enter information about the plot file that they have created. This is a good space to keep track of changes that have been made or editing of event parameters.
Configuration	Users select the system (e.g. forest, agricultural) they want to simulate in the plot.
Timing	Enter the timing for starting and ending the simulation and the time steps required for output data.

Once fields in the above three tabs are populated users can access the following additional tabs:

Tab	Explanation
Data Builder	In this tab users enter the latitude and longitude of the 'Model Point Location' where they wish to simulate a plot file. Internet access is required to complete this tab. By choosing to 'Download Spatial Data' the associated soil and climate data for that latitude and longitude are automatically loaded into relevant parts of the remaining tabs. In the tab users can then download tree and/or crop species information and management regimes as appropriate. This information is also automatically loaded into relevant parts of the remaining tabs.
Site	Specific parameters (e.g. water [rainfall], temperature, productivity) are described.
Trees	Description of the properties of the tree species.
Crops	Description of the properties of crop or pasture species (only displays if agricultural system selected).
Soil	Description of soil properties.
Initial Conditions	In this tab the values for carbon at the start of the simulation are described. Values will automatically be populated by **Data Builder** using data downloaded from the FullCAM server.
Events	All of the events for the entire simulation period are listed in this tab. Users can add or remove events. Care must be taken not to violate requirements for modelling 'management events' within the Determination. The names on the event list are

	colour-coded to indicate whether they are ready, whether they are simulating or not, and what system they affect. The colour codes are: Red: Event not ready (renders event queue not ready); Grey: Event non-simulating (outside simulation period, will not affect simulation); Green: Forest; Yellow: Agricultural; and Brown: Mixed. Finally, the events users select with the cursor are coloured in the usual highlight colour.
Output Window	Defines what outputs are presented in output windows.
Explorer	Display of the parameter settings for each tab.
Log	This tab records changes made to the file to assist with analysis and error tracking.

1.6 Application of this document

This document is the FullCAM Guidelines for the Determination and section 1.3 of the Determination requires the version of this document as in force from time to time (ie the most recent version) to be used in offsets reports. This document includes 2 texts together:

- The ***New Part*** made up of sections 1 to 4 of this Document; and
- The ***Old Part*** made up of the Schedule to this Document containing the FullCAM Guidelines published on 16 December 2016.

If the exception does not apply, the New Part applies.

If the exception applies, the proponent has a choice between the New Part and the Old Part.

The ***exception*** is the application of this document to an offsets report submitted before 31 December 2017 that needs to be audited and for which the assurance engagement terms were agreed before 1 May 2017.

2. Simulations overview

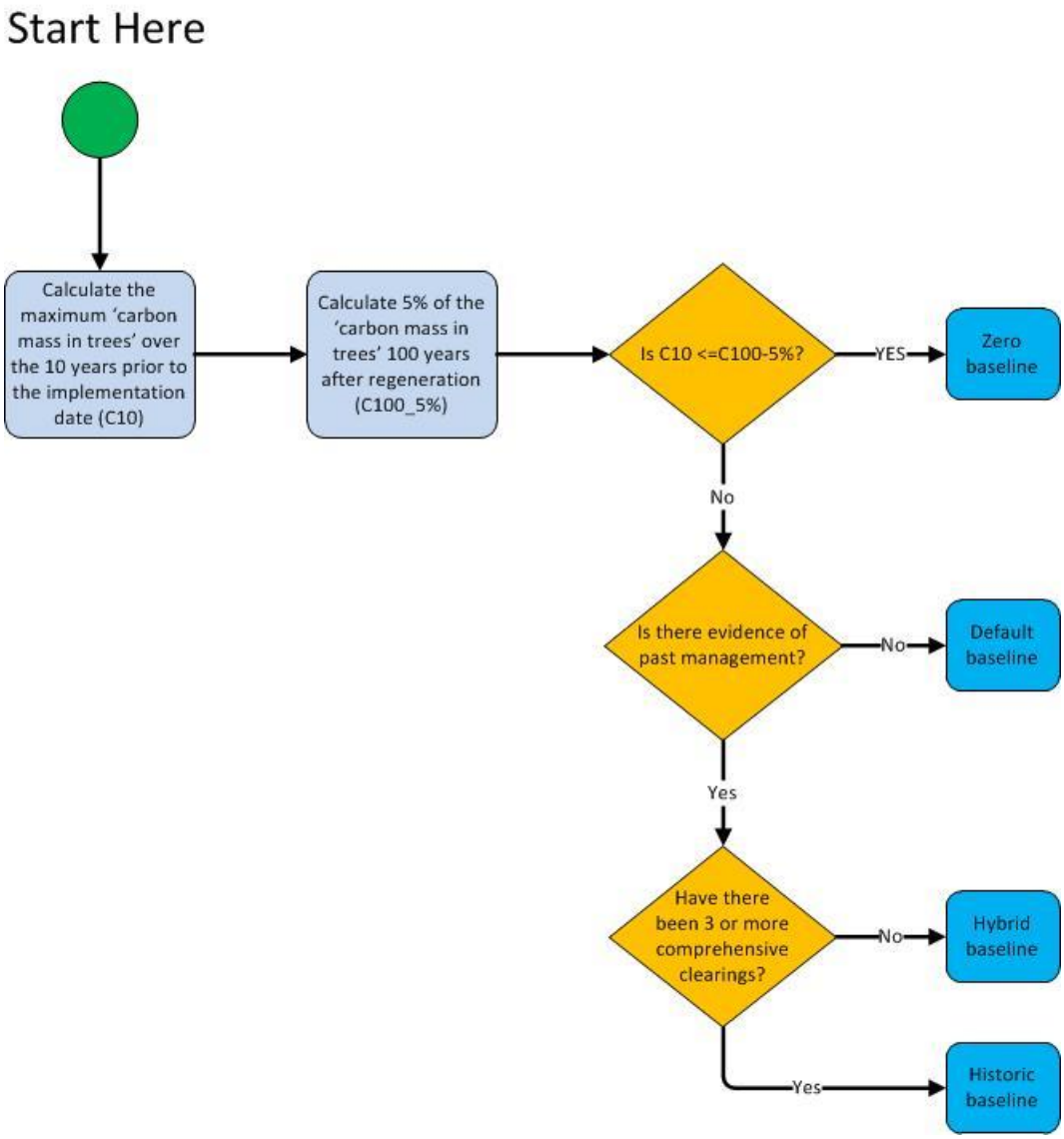
Sections 4.8, 4.9, 4.12, 4.14, 4.18 and 4.19 of the Determination require that the materiality test, baseline scenario and project scenario for each carbon estimation area must be modelled in FullCAM in accordance with the requirements in both the Determination and this document.

2.1 Baseline scenarios

The baseline for each CEA will be either of two categories depending on the materiality test below (Section 2.2) – a zero baseline or a non-zero baseline.

Within the non-zero baseline category there are three possible baselines depending on the extent of historical information available regarding the clearing history – default, hybrid or historic. The decision flowchart below gives an overview of the process for determining which baseline to use.

Figure 1: Decision tree for determining the type of baseline to be used for each Carbon Estimation Area (CEA). See section 4.12 of the Determination for the relevant provisions.



2.2 Baseline materiality test

To determine whether a zero baseline may apply in a CEA, project proponents must complete the materiality test explained by this section and to be undertaken by following Section 3 of this document. Proponents must also comply with the provisions given for the materiality test in sections 4.7-4.9 of the Determination.

Completing the materiality test involves calculating two factors:

Factor	Explanation	Process for Calculating
C100_5%	5 per cent of the 'carbon mass of trees' at 100 years after the implementation date	see (a) below for how to calculate
C10	the maximum 'carbon mass of trees' over the ten years prior to the implementation date	see (b) below for how to calculate

Note: 'Implementation date' is defined in section 1.3 of the Determination. It is the date when the project mechanism (a change in land management enabling native vegetation to achieve forest cover) was implemented in a CEA. Each CEA may have a different implementation date.

The values calculated for these factors will allow you to determine which baseline to use:

Result	Baseline to use
C10 is less than or equal to C100_5%	Zero baseline
C10 is greater than C100_5%	Non-zero baseline (default, hybrid or historic)

Overview of simulation for calculating C100_5%

Table 1: Overview of simulation for calculating C100_5%

Objective	Calculate 5 per cent of the 'C mass of trees' at 100 years after the implementation date.
Simulation period	From the implementation date to 100 years after the implementation date.
Events permitted	Regeneration
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees)

Overview of simulation for calculating C10

Note: When calculating C10, project proponents must have documentary evidence for each event that is entered into the FullCAM event queue.

Table 2: Overview of simulation for calculating C10

Objective	Calculate the maximum carbon mass of trees reached during the 10 years before the implementation date.
Simulation period	From the day after the last comprehensive clearing before the 10 year period that ends on the implementation date to the implementation date.
Events permitted	Regeneration Clearing Thinning Growth pause Grazing by livestock Management fire Windrow and burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees)

Note: 'comprehensive clearing' is defined in section 1.3 of the Determination. It means the destruction of trees or saplings, or both, by mechanical or chemical means that may be accompanied by use of fire, leaving the land in a non-forested state for pastoral land use.

2.3 Non-zero baselines

Non-zero baselines must be calculated if, according to the materiality test under the previous section, the maximum carbon stock during the ten years prior to the implementation date has reached a material level (i.e. C10 > C100_5%).

Overview of simulation for calculating a Default Baseline

A default non-zero baseline is suitable for project proponents whose records are not sufficient to model either an historic or a hybrid baseline. For further information about default non-zero baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the Explanatory Statement for the original Determination. A default non-zero baseline is modelled in FullCAM by repeating the default baseline management event scenario over the baseline forecast period. This scenario consists of a sequence of comprehensive clearings that occur at 15 year intervals (refer to Table 3).

If project proponents can demonstrate that fire was used to suppress regrowth on land that is part of the same pastoral property as the CEA then:

- a management fire event may be included in each 15 year interval; and
- a 'Windrow and Burn' fire event may be added 6 months after a comprehensive clearing event.

Table 3: Overview of simulation for calculating a Default Baseline

Objective	Calculate the default baseline which estimates average carbon stocks in a carbon estimation area in the absence of an eligible offsets project.
Simulation period	From one day after the last comprehensive clearing event that occurred before the implementation date. Simulations end 100 years after the implementation date (the baseline forecast period).
Events permitted	Cycled every 15 years: • Regeneration; • Clearing; • Management fire 7 years after Regeneration event – where sufficient evidence; and • Windrow and Burn – where sufficient evidence.
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris)

Overview of simulation for calculating a Hybrid Baseline

A hybrid baseline is suitable for project proponents who have evidence of two comprehensive clearings that occurred less than 15 years apart and before the implementation date. For further

information about hybrid baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the Explanatory Statement for the original Determination.

A hybrid baseline is modelled in FullCAM by repeating the hybrid baseline management event scenario over the baseline forecast period. This scenario consists of a sequence of comprehensive clearings that occur at two alternating intervals, one default interval of 15 years, and one historic interval matching the interval between the last two clearings before the implementation date (refer to Table 4).

If project proponents can demonstrate that fire was used to suppress regrowth on land that is part of the same pastoral property as the CEA, then:

- a management fire event may be included in the 15 year *default* interval; and
- a 'Windrow and Burn' fire event may be included 6 months after the comprehensive clearing event at the beginning of the 15 year *default* interval.

If project proponents can demonstrate that fire was used in the second *historic* interval, then that fire event may be included in that interval.

Overview of simulation for calculating a Historic Baseline

Project proponents wishing to model an historic baseline must have evidence for at least three comprehensive clearings that occurred in the carbon estimation area before the implementation date. For further information about historic baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the original Explanatory Statement.

A historic non-zero baseline is modelled in FullCAM by repeating the historic baseline management event scenario over the baseline forecast period. There are stringent evidentiary requirements for modelling an historic baseline. Project proponents must have documentary evidence for each event modelled in the scenario (refer Table 4).

Table 4: Overview of simulation for calculating a Historic or Hybrid Baseline

Objective	Calculate historic and hybrid non-zero baselines which estimate average carbon stocks in a carbon estimation area ~~over 100 years~~ in the absence of an eligible offsets project. ~~Averages are estimated from the implementation date until 100 years after the implementation date.~~
Simulation period	One day after the most recent comprehensive clearing event. Simulations end 100 years after the implementation date (the baseline forecast period).
Events permitted	Regeneration Clearing Thinning Management fire Windrow and Burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris)

2.4 Overview of simulation for calculating project carbon stocks

~~Project proponents must model all fire, thinning and regeneration events that occurred in the CEA in the current and previous reporting period(s) to determine the project carbon stocks as per section 4.18 of the Determination.~~

To determine the project carbon stocks, project proponents must model all events listed in the table below that reflect the actual management events that occurred in the CEA during the entirety of the simulation period (from one day after the last comprehensive clearing before the implementation date until the end of the current reporting period).

Table 5 Overview of simulation for calculating project carbon stocks

Objective	Calculate total carbon stocks in each CEA at the end of each reporting period. These carbon stocks will reflect the age of the regrowth within the CEA, observed climate, and activities and disturbance subsequent to the establishment of the offsets project.
Simulation period	From one day after the last comprehensive clearing before the implementation date. Simulations end at the end of the current reporting period.
Events permitted	Regeneration Clearing Thinning Growth pause Grazing by livestock Prescribed fire – to reduce fire risk Wildfires – trees not killed Wildfires – trees killed Management fire Windrow and burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris) Monthly totals for emissions of CH_4 from fire (FullCAM Output = Whole / Emissions / CH_4 emitted due to fire) Monthly totals for emissions of N_2O from fire (FullCAM Output = Nitrogen / Whole / Emissions / N_2O emitted due to fire)

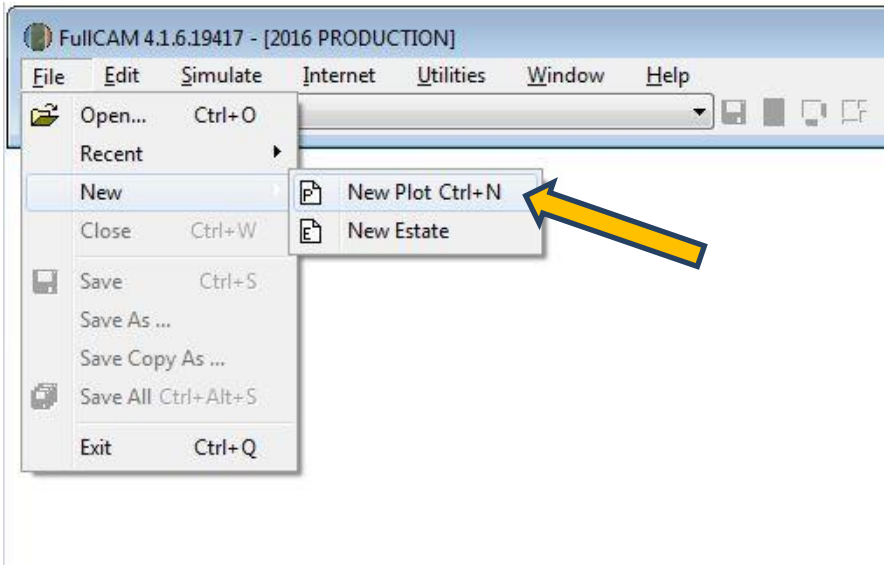
3. Setting up simulations for carbon estimation areas

The following steps must be followed for entering data into each tab in a FullCAM plot file. Each table provides a sequential list of steps in the right hand column. The left hand column indicates the Simulation Type that the steps are relevant to. Screenshots relevant to each set of steps, directly follow each table.

3.1 Opening a file

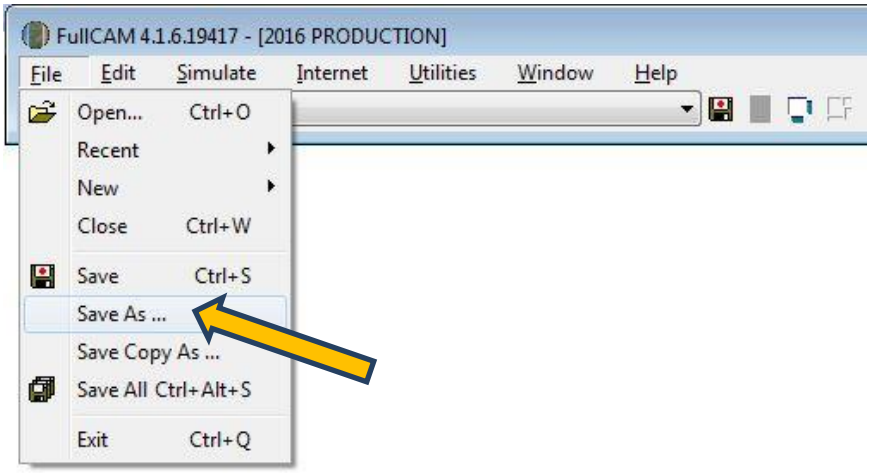
Simulation Type	Steps required

C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Open a new plot under the 'File' menu. Enter a name for the plot that reflects the identifier for the CEA and model scenario, e.g. 'CEA1_baseline'.



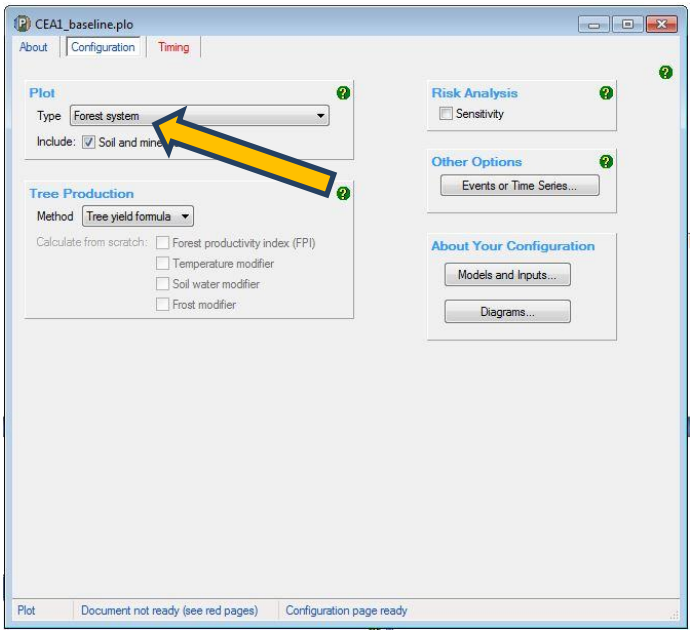
3.2 Saving a plot file

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Save the plot file using the 'File' menu on the FullCAM toolbar. • Save the plot file regularly when setting up and running simulations.



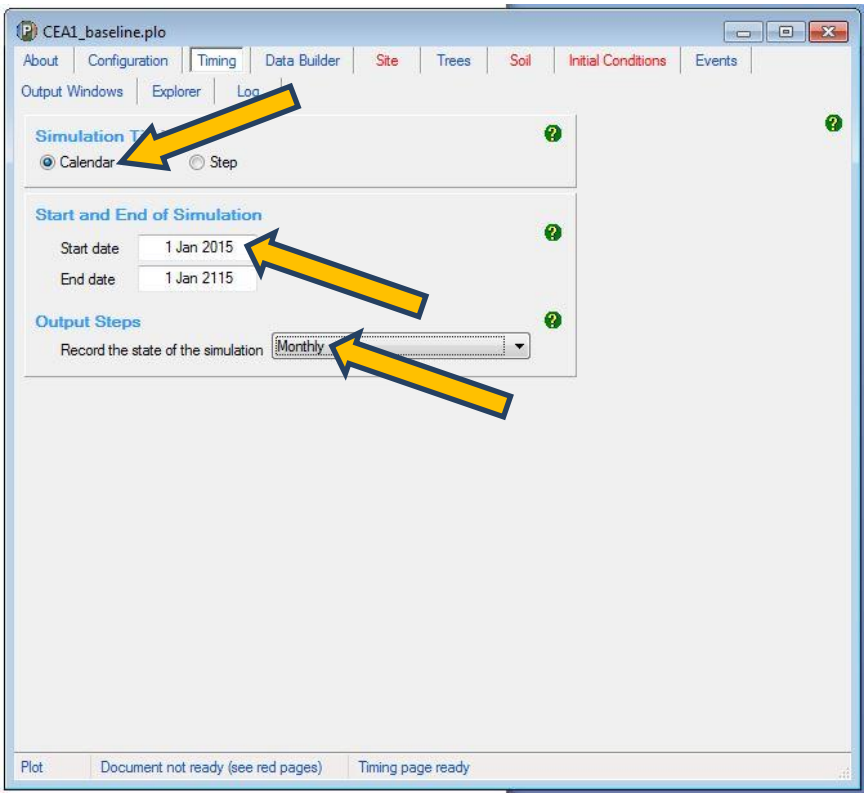
3.3 The Configuration Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• From the 'Plot' drop down menu, select 'Forest system'. • Do NOT change any other settings.



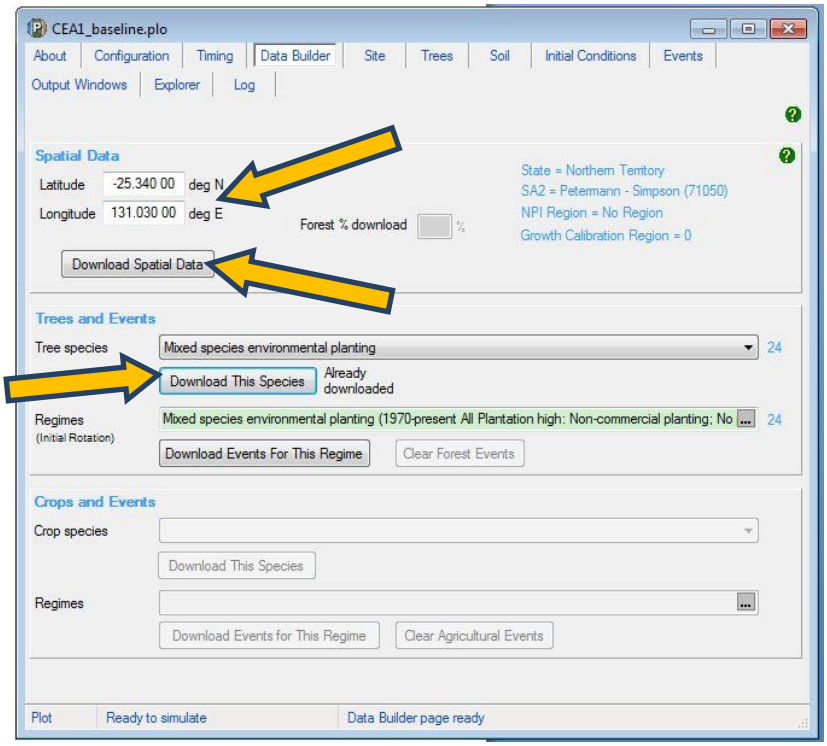
3.4 The Timing Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Set the Simulation Timing to 'calendar'. • Set the Output Steps to 'months'.
C100_5%	• Enter the date to start simulations as the implementation date. • Enter the date to end the simulation as 100 years after the implementation date.
C10	• Enter the date to start simulations as the day after the last comprehensive clearing that occurred before the 10 year period that ends on the implementation date. Enter the date to end the simulation as the implementation date.
Default baseline Historic baseline Hybrid baseline Project carbon	• Enter the date to start simulations as one day after the last comprehensive clearing before the implementation date. • Enter the date to end the simulation as 100 years after the implementation date.
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any other settings. • New tabs will appear once this tab has been completed.



3.5 The Data Builder Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Check the box to turn on the Data Builder (this requires an internet connection). • Enter the latitude and longitude (in decimal degrees) of the model point location central to the CEA being modelled and not in an exclusion area. • Click the button to 'Download Spatial Data' and click 'OK' on the information box that pops up. • Select 'Mixed species environmental plantings' from the dropdown box for 'Tree species' and then click the button to 'Download This Species' and 'Yes' to 'Make mixed species environmental plantings the initial tree species'. NB: Do NOT use the 'Mixed species environmental plantings temperate' setting. • Do NOT download a regime (and therefore the events associated with the regime) for this species. • Do NOT change any other settings.



3.6 The Site Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any settings.

3.7 The Tree Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any settings.

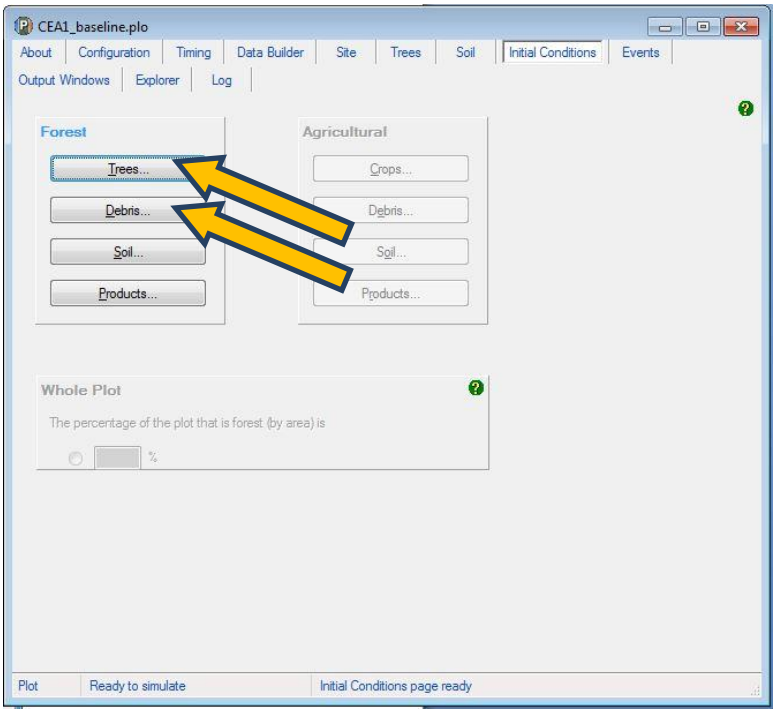
3.8 The Soil Tab

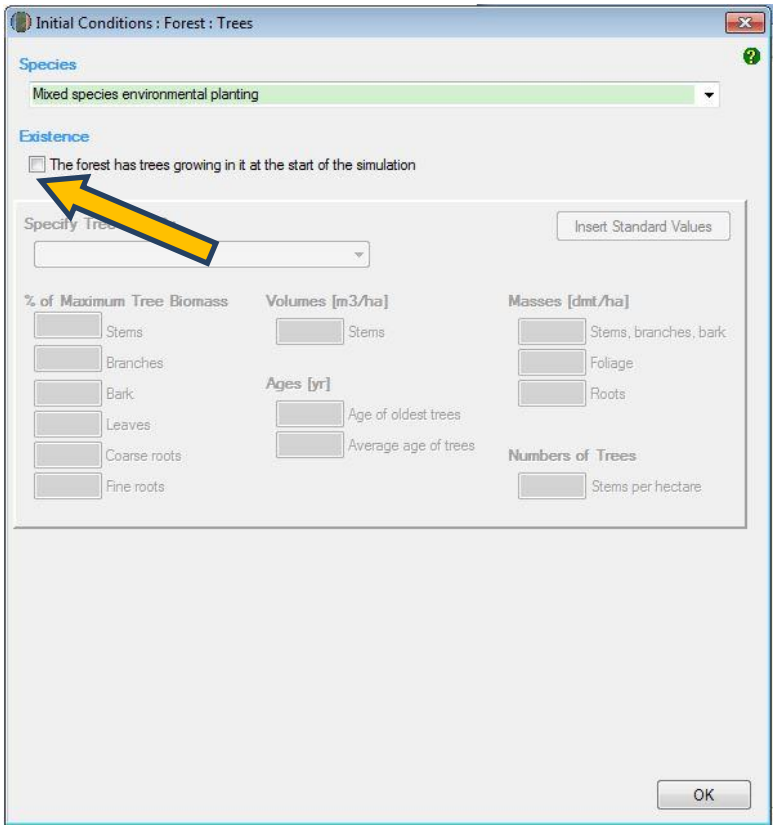
Simulation Type	Steps required
C100_5% C10 Default baseline	• Do NOT change any settings.

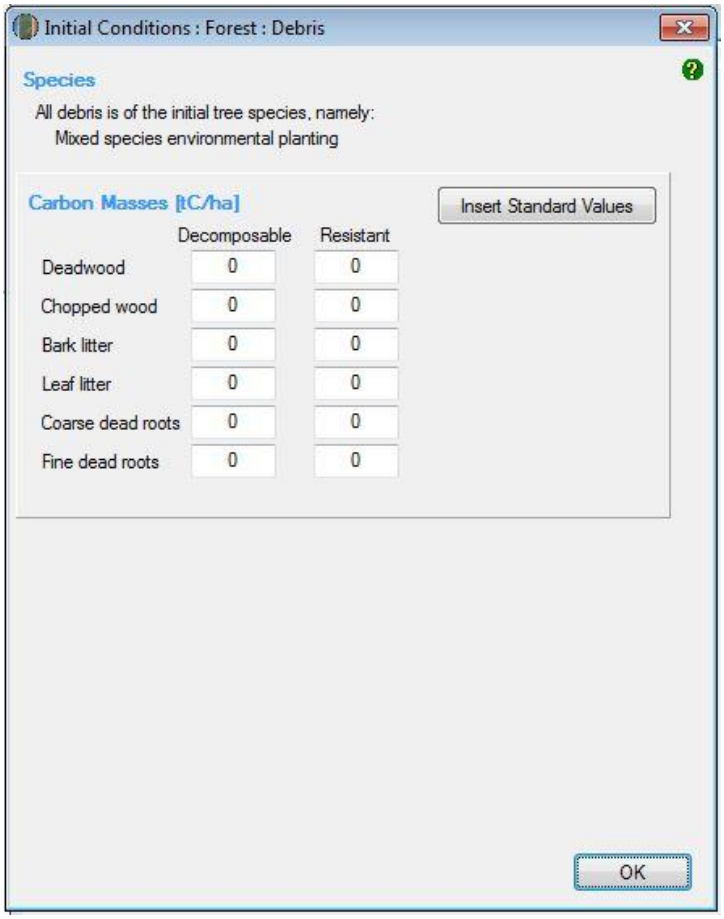
Historic baseline Hybrid baseline Project carbon	

3.9 The Initial Conditions Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Click the button labelled 'Trees' and uncheck the box under 'Existence' to show that the site did not have trees growing on it at the start of the simulation. Click 'OK'. • Click the button labelled 'Debris' and change all the default settings for each debris pool to zero. • Do NOT change any other settings.




Initial Conditions : Forest : Trees
Species
Mixed species environmental planting
Existence
The forest has trees growing in it at the start of the simulation
Insert Standard Values
% of Maximum Tree Biomass
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Volumes [m3/ha]
Stems
Ages [yr]
Age of oldest trees
Average age of trees
Masses [dmt/ha]
Stems, branches, bark
Foliage
Roots
Numbers of Trees
Stems per hectare
OK

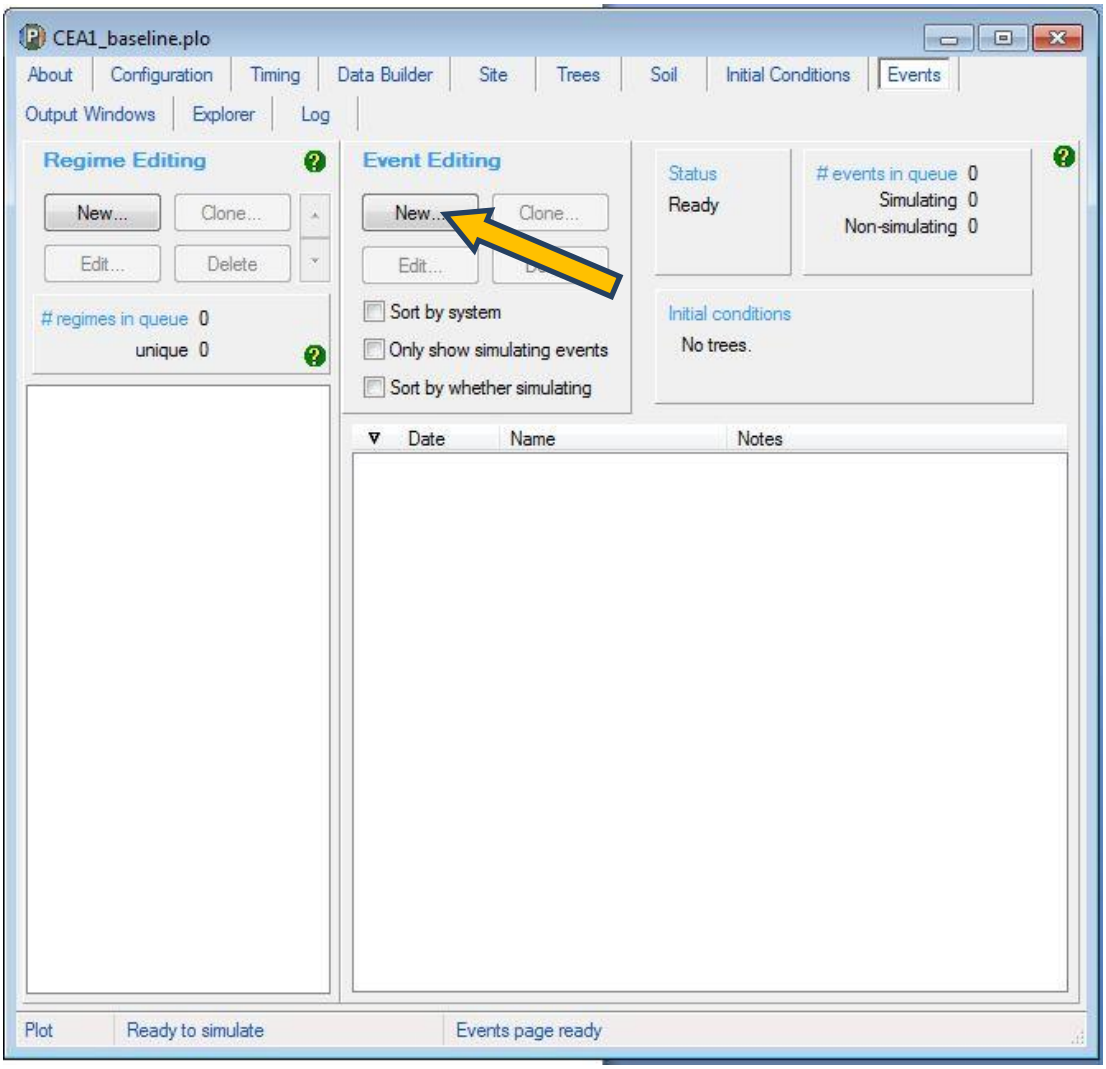

Initial Conditions : Forest : Debris
Species
All debris is of the initial tree species, namely:
Mixed species environmental planting
Carbon Masses [tC/ha]
Insert Standard Values
Decomposable
Resistant
Deadwood 0 0
Chopped wood 0 0
Bark litter 0 0
Leaf litter 0 0
Coarse dead roots 0 0
Fine dead roots 0 0
OK

3.10 The Events Tab

The Events Tab is where events for a simulation can be added and displayed in sequence.

Table 6: Permitted Events for each Simulation Type

Simulation Type	Permitted Events
C100_5%	Regeneration
C10	Regeneration Clearing Thinning Growth pause Grazing by livestock Management fire Windrow and burn fire
Default baseline	Regeneration Clearing Management fire – where sufficient evidence (see s 4.12 of the Determination) Windrow and burn fire – where sufficient evidence (s 4.12 of the Determination)
Historic baseline Hybrid baseline	Regeneration Clearing Thinning Management fire – where sufficient evidence (see s 4.12 of the Determination) Windrow and burn fire – where sufficient evidence (s 4.12 of the Determination)
Project carbon	Regeneration Clearing Thinning Growth pause Grazing by livestock Management fire Windrow and burn fire Prescribed fire – to reduce fire risk Wildfire – trees not killed Wildfire – trees killed



3.10.1 Adding a regeneration event

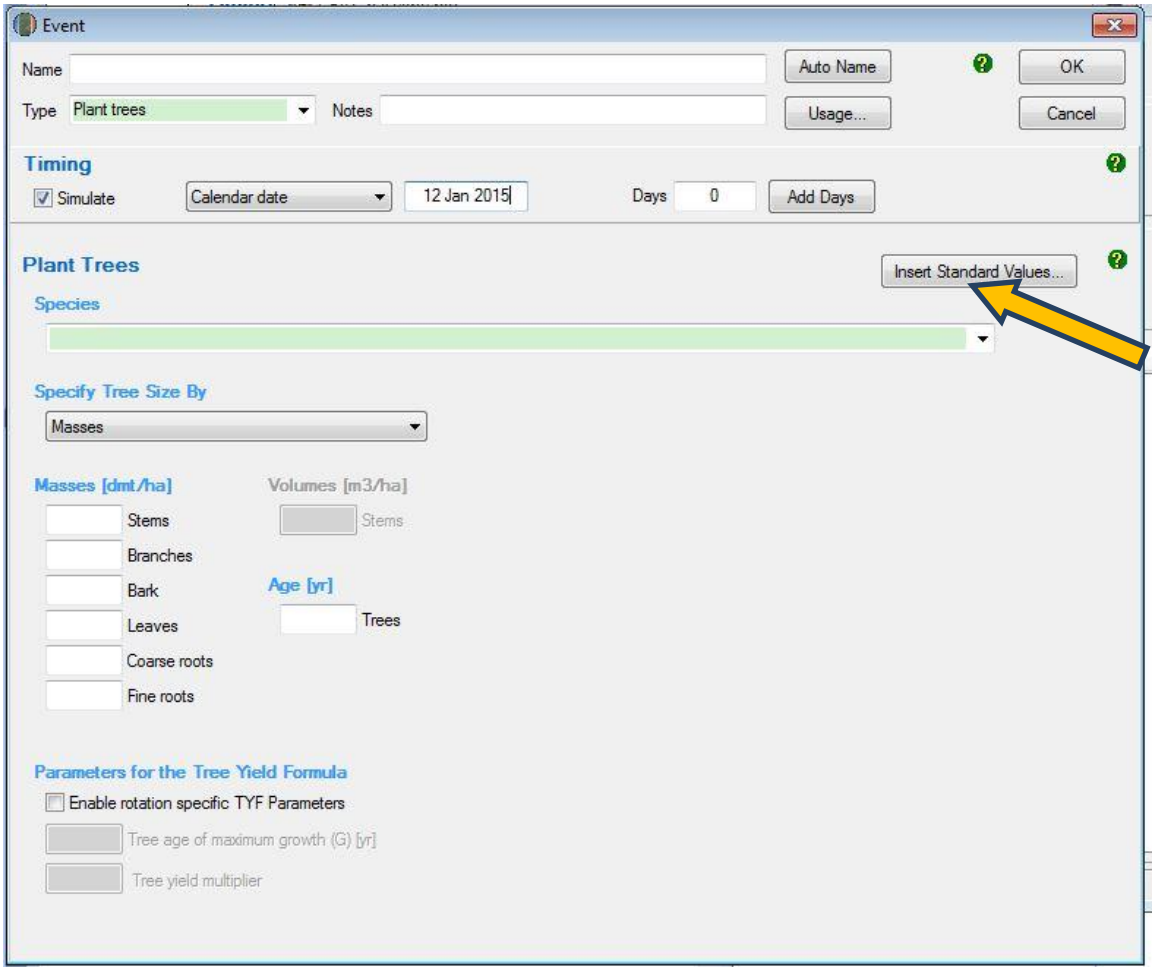
Regeneration events must be added to the FullCAM event queue for each CEA to model the establishment of forest potential after each comprehensive clearing. For project baselines, ~~i~~In the absence of evidence to the contrary, the timing of attainment of forest potential is deemed to occur one year after each comprehensive clearing event. For project baselines, ~~E~~evidence is required to set the date of regeneration to any other time after clearing. For project carbon scenarios, the timing of the regeneration event must be supported by evidence. See section 4.6 and subsection 4.19(2) of the Determination ~~for details~~respectively.

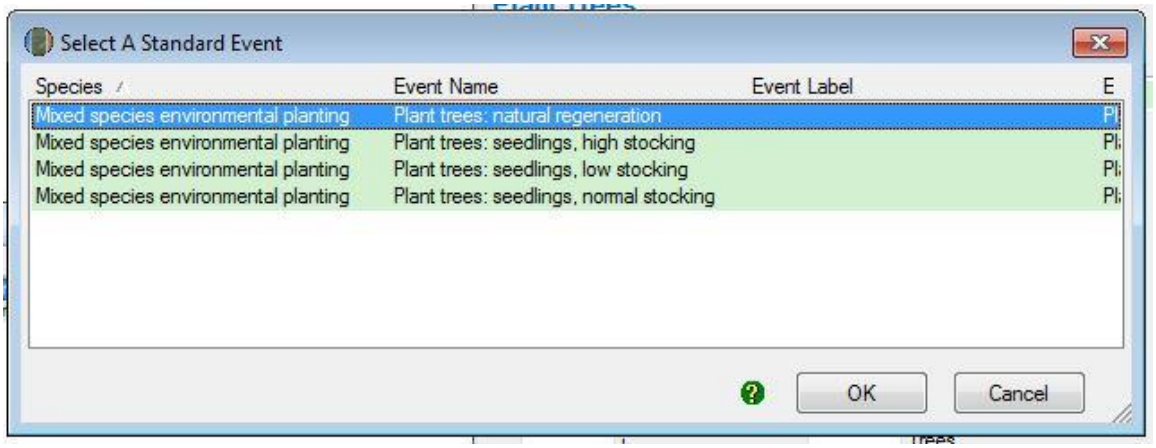
For the default baseline, regeneration events and clearing events should recur on a 15 year cycle for the duration of the simulation (i.e. 12 months from clearing to regeneration plus 14 years of growth prior to re-clearing).

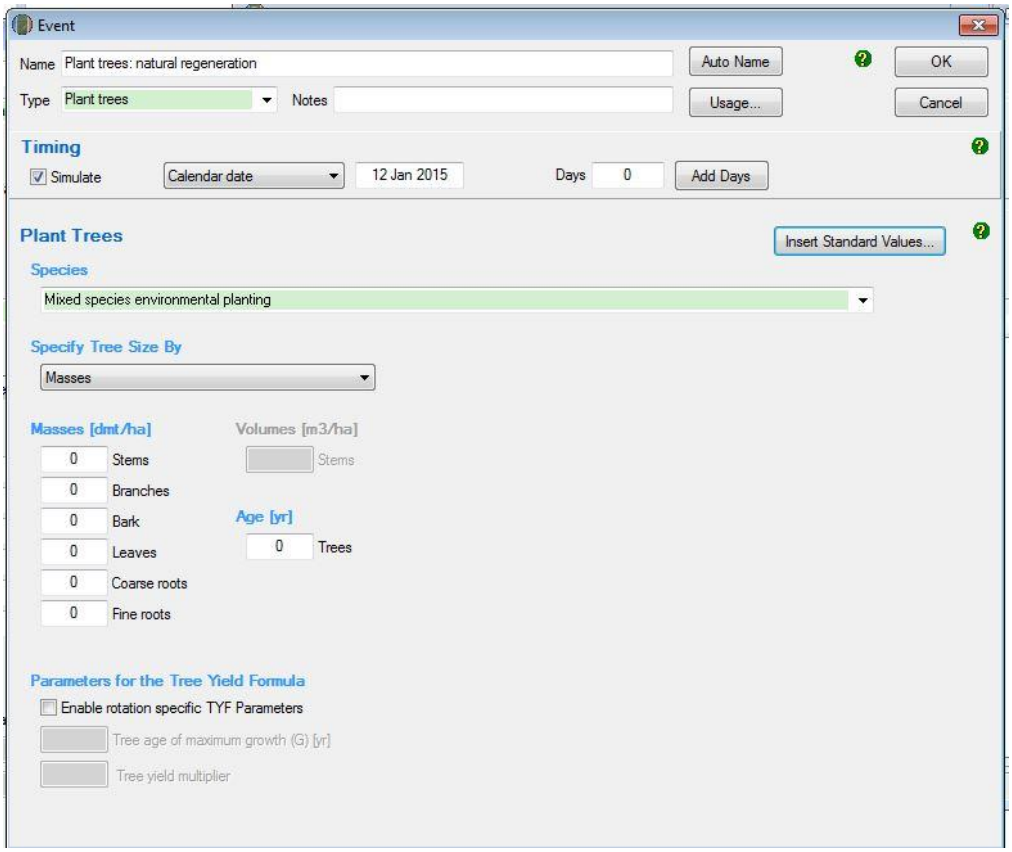
Note: Where there is evidence of regeneration following a wildfire where trees were killed, a regeneration event must be added to the events queue 12 months after each wildfire – trees killed event, unless there is specified evidence to set the date of regeneration to some other time after clearing (See section 4.6 of the Determination).

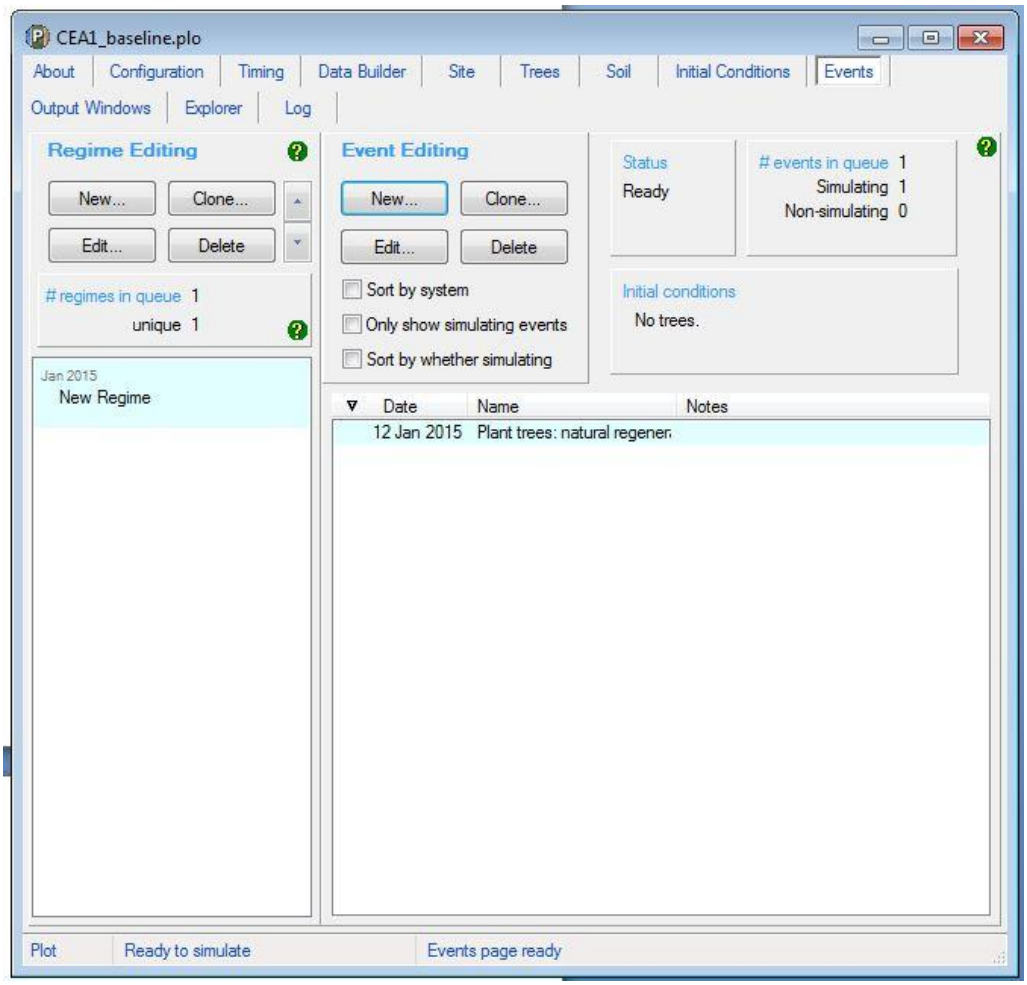
Note: Where there is evidence of regeneration following a windrow and burn following clearing, a regeneration event must be added to the events queue 6 months after each windrow and burn event.

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Click the 'New' button under 'Event Editing' to create a new event.
C100_5%	• Insert the simulation start date in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy.
Default baseline	• For the first regeneration event, insert the time when regeneration commenced following the most recent comprehensive clearing event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. For all other regeneration events insert the date 15 years after the previous regeneration event.
C10 Historic baseline Hybrid baseline Project carbon	• For the first regeneration event, insert the time when regeneration commenced following the most recent comprehensive clearing event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. For all subsequent regeneration events insert the date for each to represent the observed or default interval between regeneration events.
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• In the drop down menu next to 'Type', select 'Plant trees'. • Click 'Insert standard values'. Select the row with the 'Event Name' of 'Plant trees: natural regeneration' and then click 'OK' and 'Yes' to insert the name of the standard event. • Do NOT change any other setting. • Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Plant trees
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2015
Days
0
Add Days
Plant Trees
Insert Standard Values...
Species
Specify Tree Size By
Masses
Masses [dmt/ha]
Volumes [m3/ha]
Stems
Stems
Branches
Bark
Age [yr]
Leaves
Trees
Coarse roots
Fine roots
Parameters for the Tree Yield Formula
Enable rotation specific TYF Parameters
Tree age of maximum growth (G) [yr]
Tree yield multiplier


Select A Standard Event
Species
Event Name
Event Label
E
Mixed species environmental planting
Plant trees: natural regeneration
Mixed species environmental planting
Plant trees: seedlings, high stocking
Mixed species environmental planting
Plant trees: seedlings, low stocking
Mixed species environmental planting
Plant trees: seedlings, normal stocking
OK
Cancel

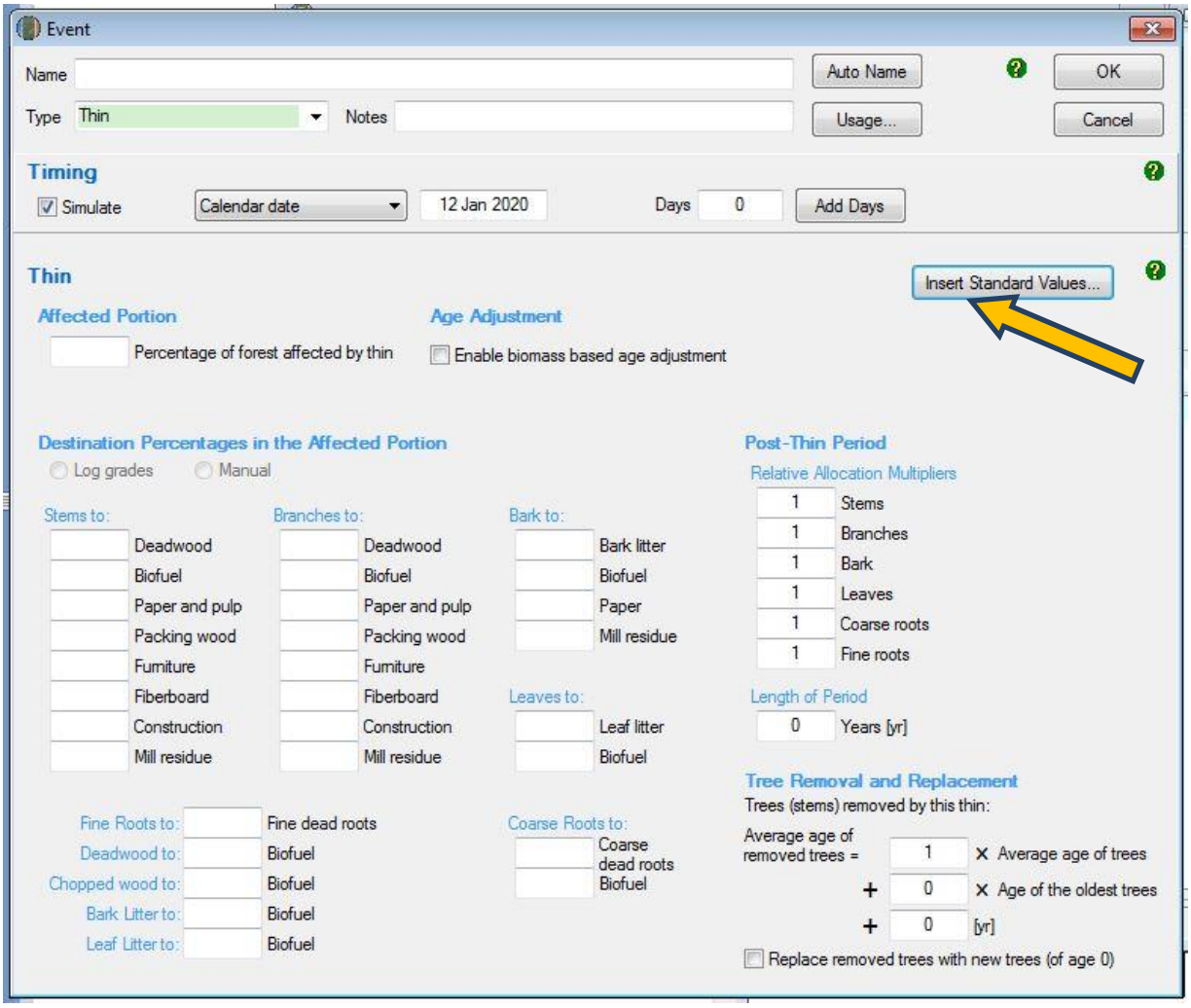

Event
Name Plant trees: natural regeneration
Auto Name
OK
Type Plant trees
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2015
Days 0
Add Days
Plant Trees
Insert Standard Values...
Species
Mixed species environmental planting
Specify Tree Size By
Masses
Masses [dmt/ha]
Volumes [m3/ha]
0 Stems
Stems
0 Branches
0 Bark
Age [yr]
0 Leaves
0 Trees
0 Coarse roots
0 Fine roots
Parameters for the Tree Yield Formula
Enable rotation specific TYF Parameters
Tree age of maximum growth (G) [yr]
Tree yield multiplier

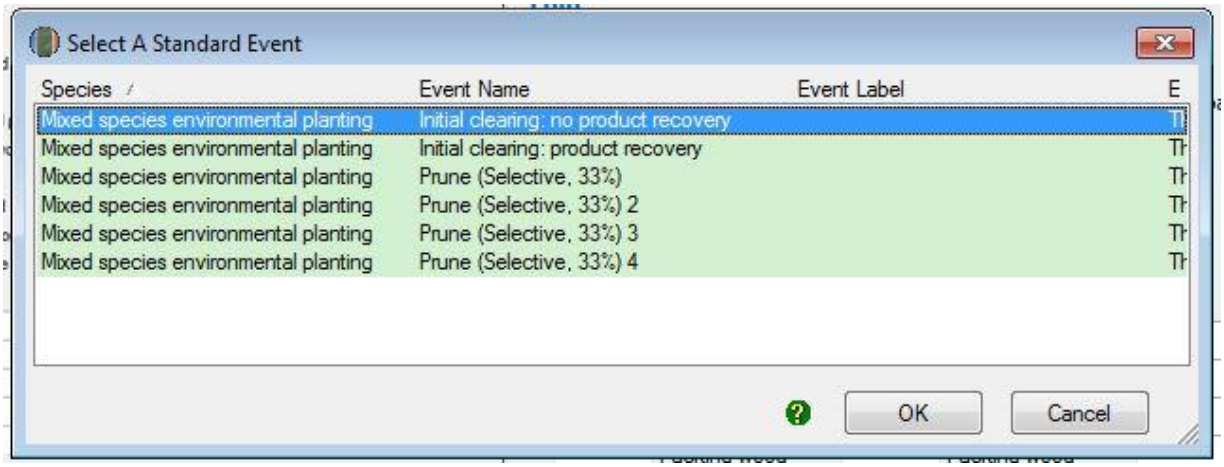

CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 1
unique 1
Jan 2015
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 1
Simulating 1
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
12 Jan 2015
Plant trees: natural regener
Plot
Ready to simulate
Events page ready

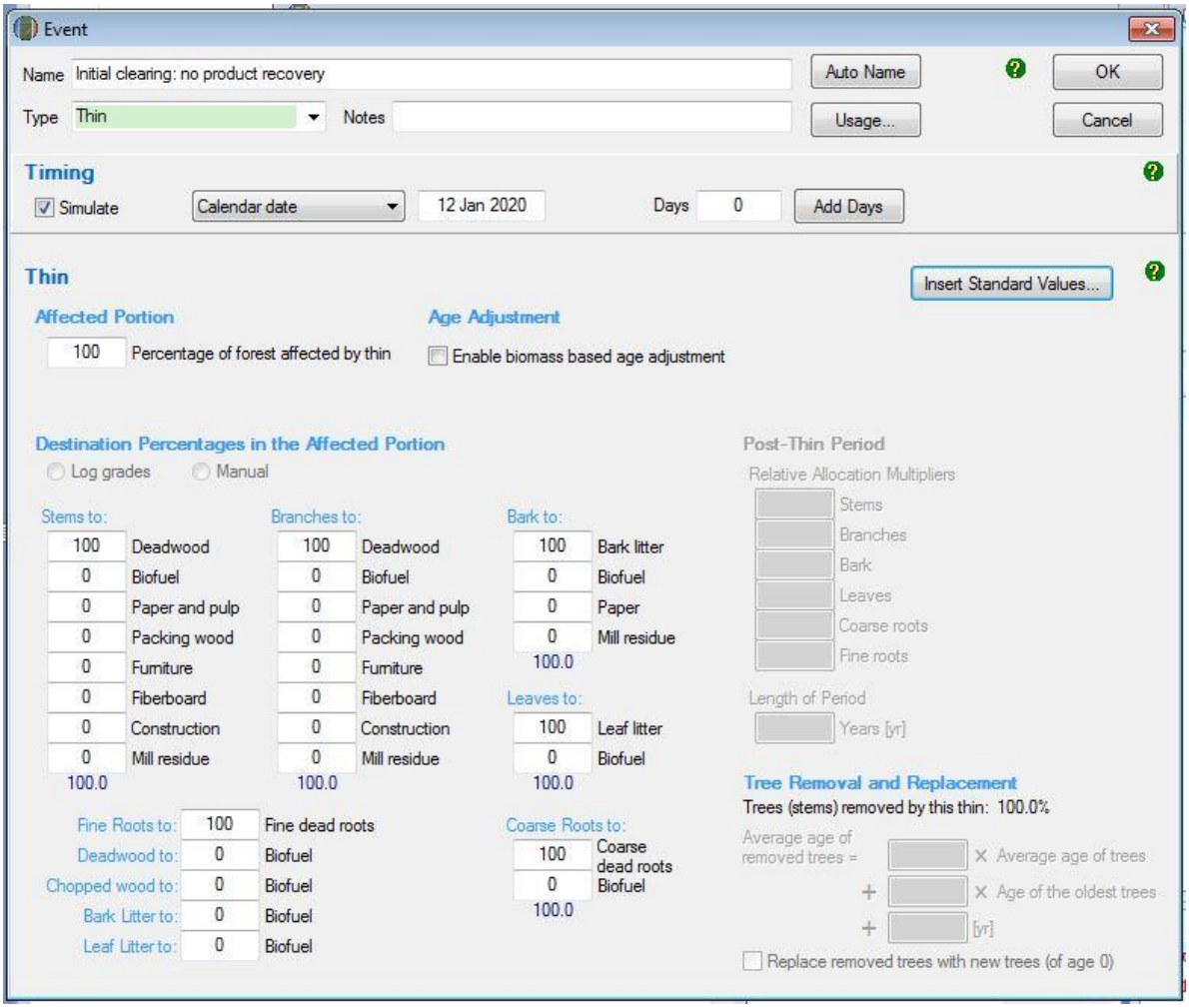
3.10.2 Adding a clearing event

These steps must be repeated for each clearing event that occurs in each CEA during the simulation period. For each clearing event the date must reflect the date of that clearing event.

Simulation Type	Steps required
C100_5%	• Not permitted
Project carbon	• Not permitted
C10 Default baseline Historic baseline Hybrid baseline	• Click the 'New' button under 'Event Editing' to create a new event.
C10 Historic baseline Hybrid baseline	• Insert the date of the clearing event in the blank field beside the 'Timing' section based on the interval observed historically. This will need to be entered in the format dd mmm yyyy. For subsequent clearing events, insert the date of clearing in this field to represent the observed or default interval between comprehensive clearings.
Default baseline	• Insert the date of the clearing event in the blank field beside the 'Timing' section. The intervals between events must reflect those that occurred historically. This will need to be entered in the format dd mmm yyyy. Each clearing event will be 14 years after the previous regeneration event.
C10 Default baseline Historic baseline Hybrid baseline	• In the drop down menu next to 'Type', select 'Thin'. • Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'Yes' to insert the name of the standard event. • Ensure that the box next to 'Affected portion' contains the value '100' to indicate a clearing event. • Do NOT change any other settings. • Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2020
Days
0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 × Average age of trees
+ 0 × Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)

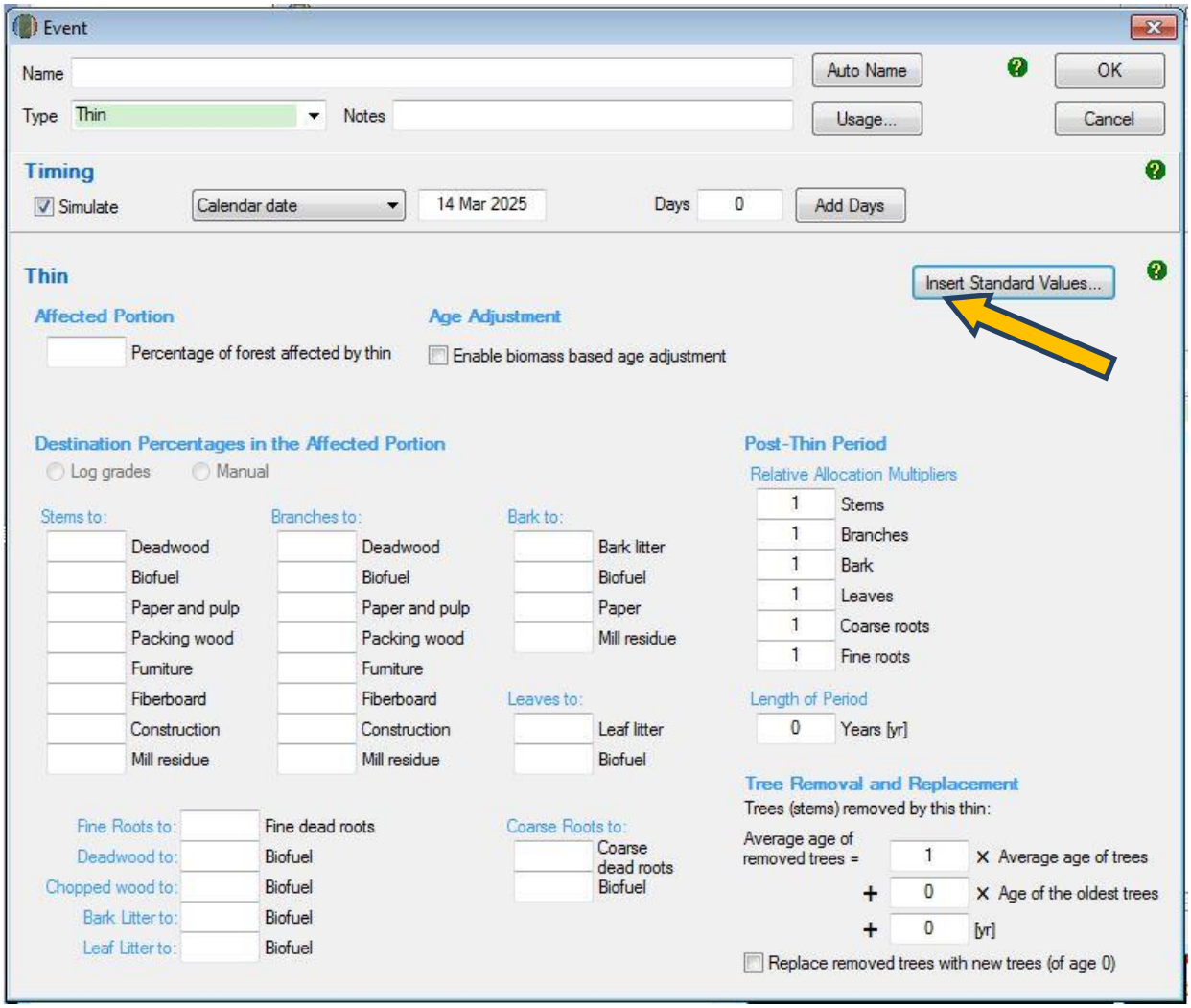

Select A Standard Event
Species
Event Name
Event Label
E
Mixed species environmental planting
Initial clearing: no product recovery
Mixed species environmental planting
Initial clearing: product recovery
Mixed species environmental planting
Prune (Selective, 33%)
Mixed species environmental planting
Prune (Selective, 33%) 2
Mixed species environmental planting
Prune (Selective, 33%) 3
Mixed species environmental planting
Prune (Selective, 33%) 4
OK
Cancel

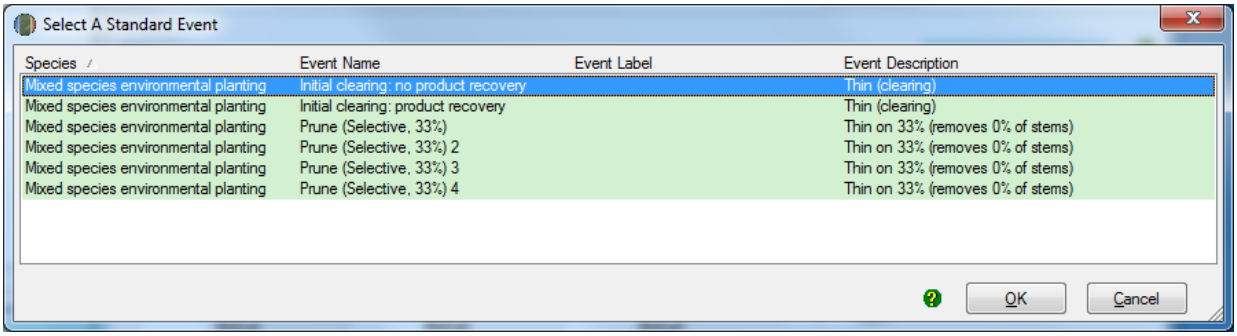


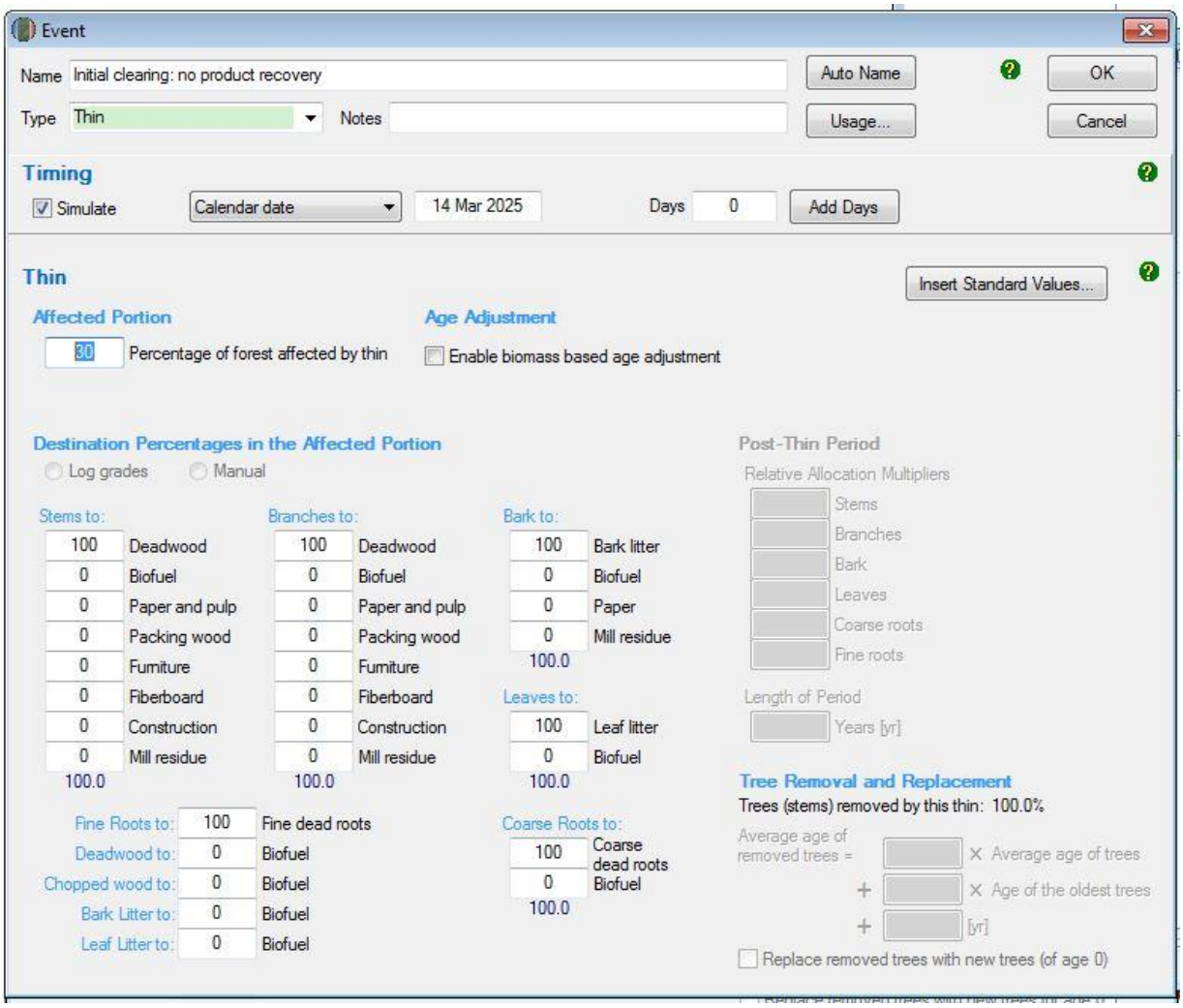
3.10.3 Adding a thinning event

These steps must be repeated for each thinning event that occurs in each CEA during the simulation period. For each thinning event the date must reflect the date of the thinning event.

Simulation Type	Steps required
C100_5%	• Not permitted
Default baseline	• Not permitted
C10 Historic baseline Hybrid baseline Project carbon	1. Click the 'New' button to create a new event. 2. Insert the date of the thinning event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. The intervals between events must reflect those that occurred historically. 3. In the drop down menu next to 'Type', select 'Thin'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. In the box next to 'Affected portion – the percentage of forest affected by thin' change the number to an estimate of the proportion of the stems that were killed in the thinning. You must report on how the estimate was derived in your project report. 6. Do NOT change any other settings. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
14 Mar 2025
Days
0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 × Average age of trees
+ 0 × Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Initial clearing: no product recovery
Thin (clearing)
Mixed species environmental planting
Initial clearing: product recovery
Thin (clearing)
Mixed species environmental planting
Prune (Selective, 33%)
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 2
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 3
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 4
Thin on 33% (removes 0% of stems)
OK
Cancel

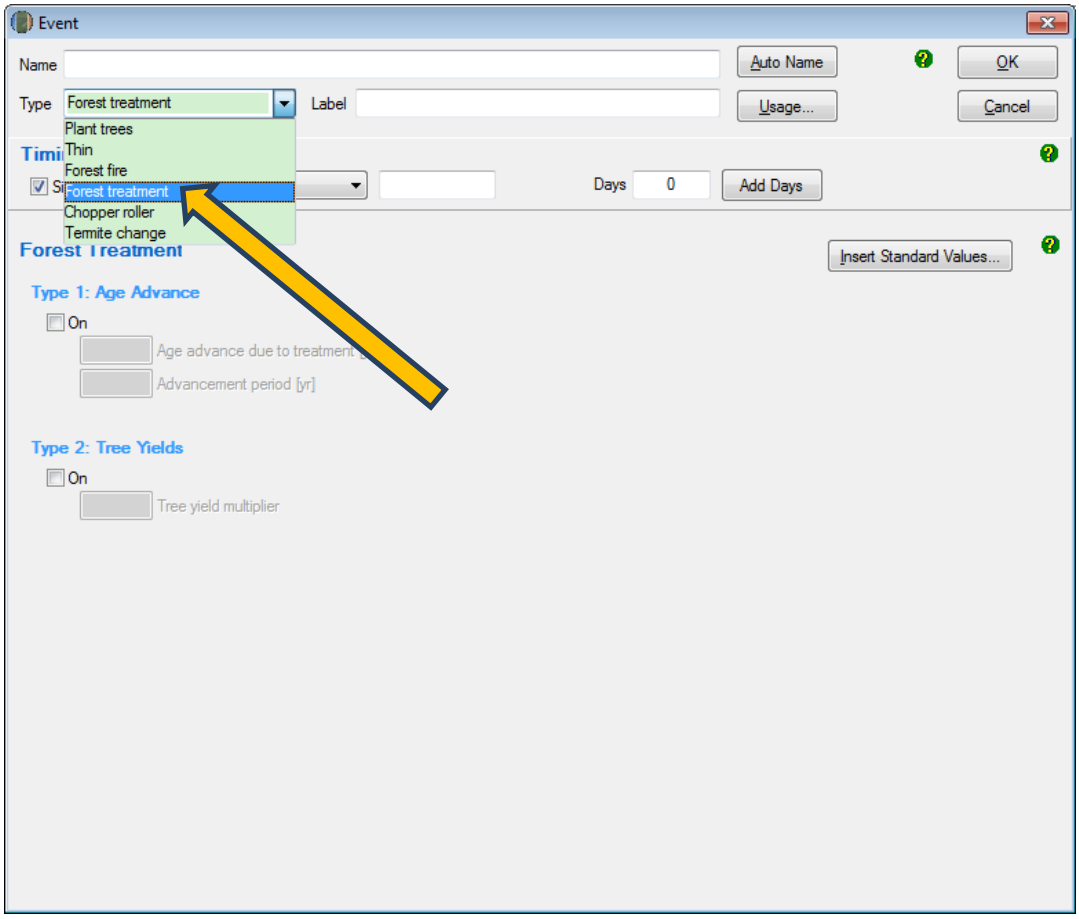


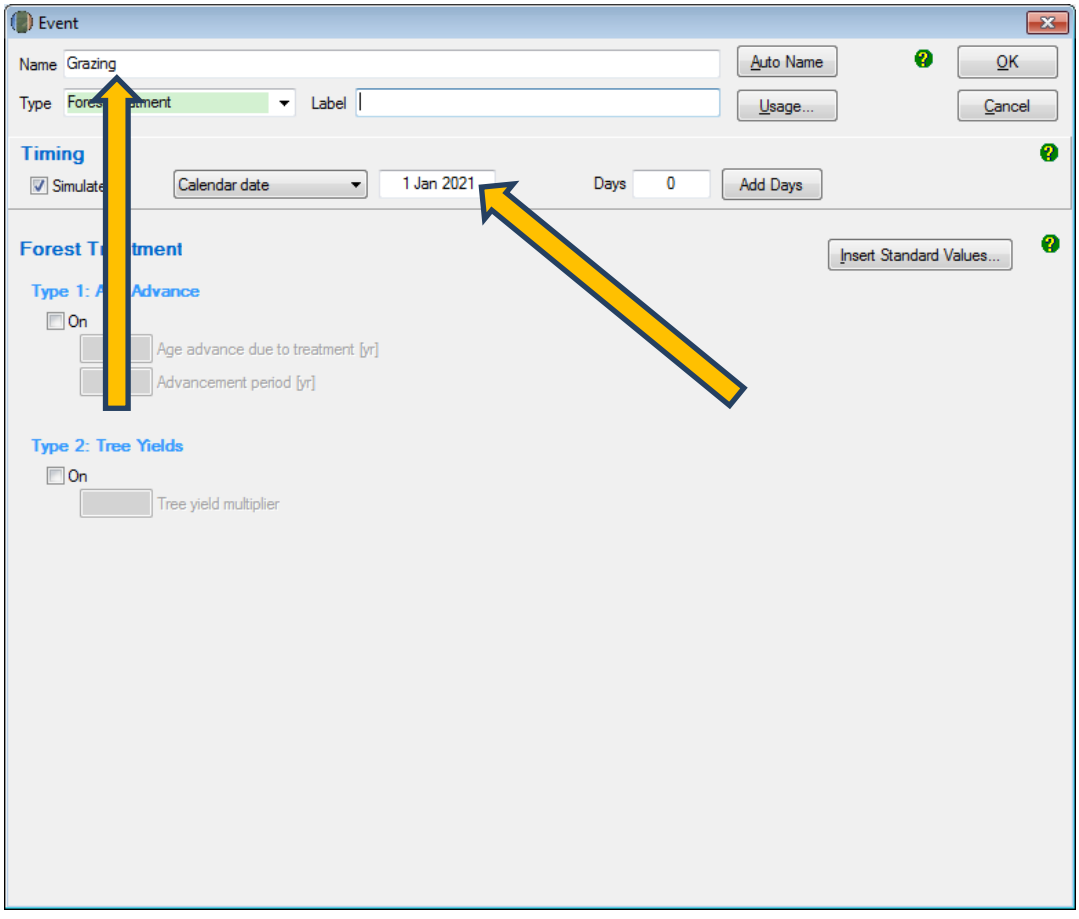
3.10.4 Adding a growth pause event

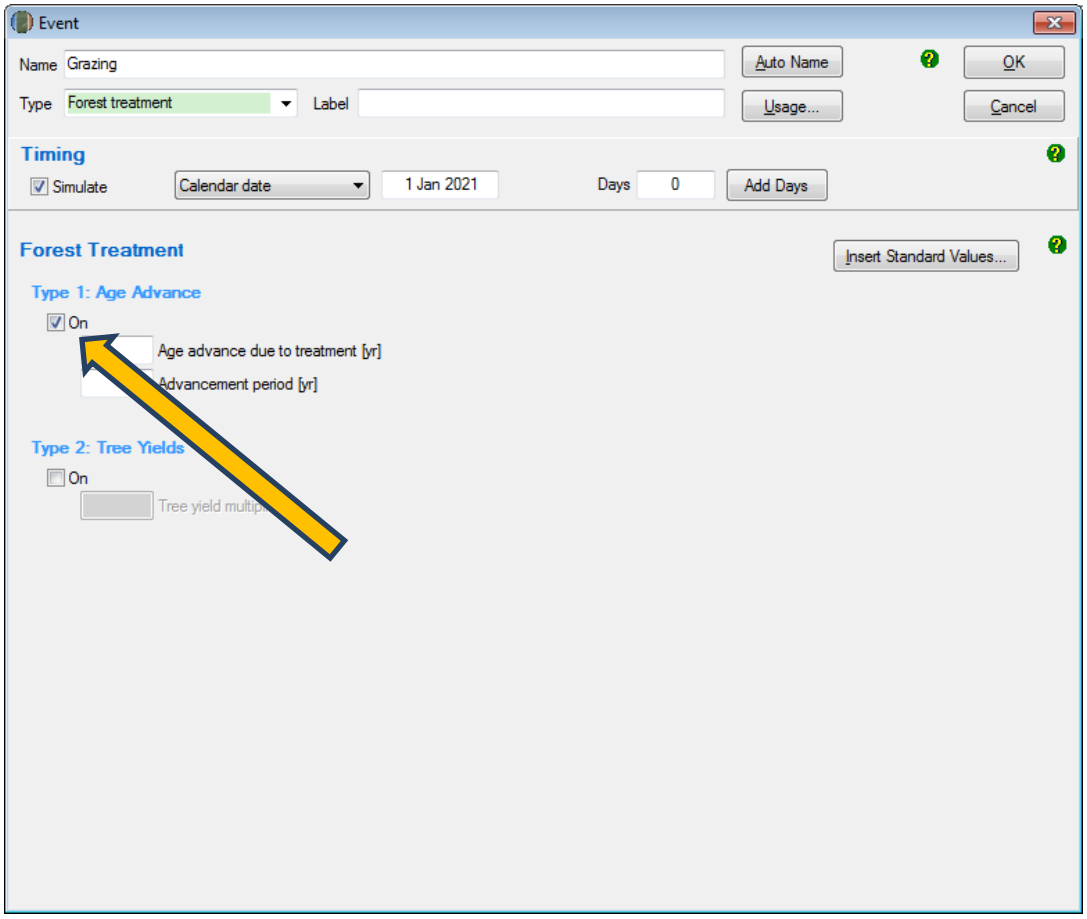
A growth pause event occurs when vegetation growth slows, stops or reverses due to a growth suppression event, such as material grazing by feral animals, weed infestation, disease, pests or similar, or a combination of factors. Where other events in this section are more specific to the actual event that has occurred, such as thinning, grazing by livestock or fire, they are to be modelled and not a growth pause event. To avoid any doubt, for the project carbon stocks and C10 simulations, a growth pause event must be added for any growth suppression events whether occurring before or after the implementation date.

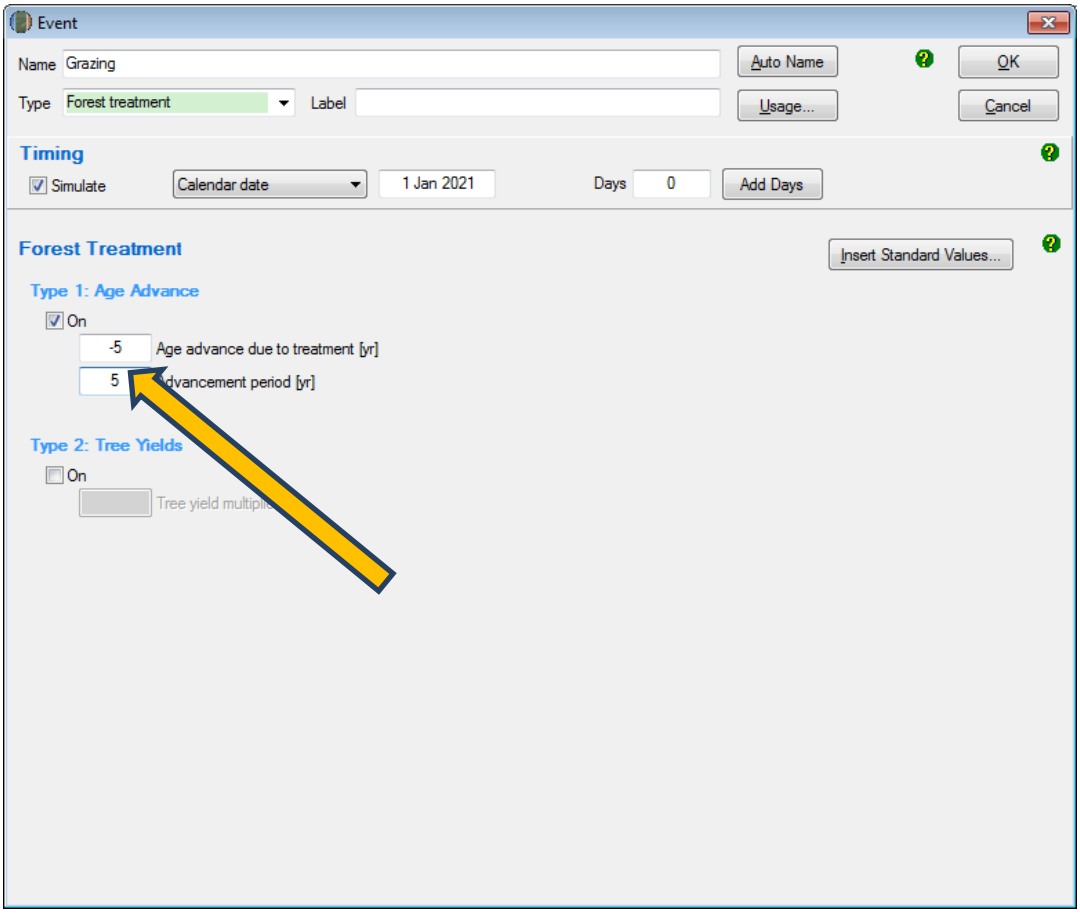
A growth pause event must run for at least the period of time that the suppression factor(s) was maintained. For example, if a weed infestation slowed, stopped or reversed the vegetation growth over a period of six months, the corresponding growth pause event in FullCAM should cover at least the entire six month period. A growth pause event should also cover the time from when the vegetation was first affected by the suppression factor(s) to when it has recovered beyond its condition and mass prior to being affected. The duration(s) determined and modelled should be supported by the 'forest management information' that the proponent must collect and maintain as per section 5.5 of the Determination.

Simulation Type	Steps required
C100_5% Default baseline Historic baseline Hybrid baseline	• Not permitted
C10 Project carbon	1. Add a new *Forest treatment* event. 2. DO NOT select *Insert Standard Values* (Note: This differs from the directions for other events above). 3. Enter the calendar date of the start date of the disturbance event. This can be estimated if the actual date is not known. 4. Enter 'Growth Pause' as the event name (or a more specific name for the event, e.g. 'Grazing'). 5. Check the *Type 1: Age Advance*, '*On*' box under *Forest Treatment*. 6. In the *Age advance due to treatment* box enter how long the growth pause event should run for according to the above notes as a decimal proportion in years, and as a negative number. For example, if the growth pause event occurred for 3 years and 9 months, then '-3.75' would be entered in this box. As another example, if the growth pause event occurred for 5 years, then '-5' would be entered in this box. 7. In the *Advancement period* box enter the absolute (aka positive) value of the number added in the 'Age advance due to treatment' box. For example, using the examples above in step 6, the value to add to this box would be: '3.75', or '5'. 8. Following these steps has the effect of 'pausing' growth in carbon stocks for the duration of the growth pause event. 9. DO NOT change any other values on this tab. 10. Press 'OK'.


Event
Name
Auto Name
OK
Type
Forest treatment
Label
Usage...
Cancel
Plant trees
Thin
Forest fire
Forest treatment
Chopper roller
Termite change
Days
0
Add Days
Insert Standard Values...
Type 1: Age Advance
On
Age advance due to treatment
Advancement period [yr]
Type 2: Tree Yields
On
Tree yield multiplier


Event
Name
Grazing
Auto Name
OK
Type
Label
Usage...
Cancel
Timing
Calendar date
1 Jan 2021
Days
0
Add Days
Insert Standard Values...
On
Age advance due to treatment [yr]
Advancement period [yr]
Type 2: Tree Yields
On
Tree yield multiplier


Event
Name Grazing
Auto Name
OK
Type Forest treatment
Label
Usage...
Cancel
Timing
Simulate
Calendar date
1 Jan 2021
Days 0
Add Days
Forest Treatment
Insert Standard Values...
Type 1: Age Advance
On
Age advance due to treatment [yr]
Advancement period [yr]
Type 2: Tree Yields
On


Event
Name Grazing
Auto Name
OK
Type Forest treatment
Label
Usage...
Cancel
Timing
Simulate
Calendar date
1 Jan 2021
Days 0
Add Days
Forest Treatment
Insert Standard Values...
Type 1: Age Advance
On
-5
Age advance due to treatment [yr]
5
Type 2: Tree Yields
On

3.10.5 Adding a grazing by livestock event

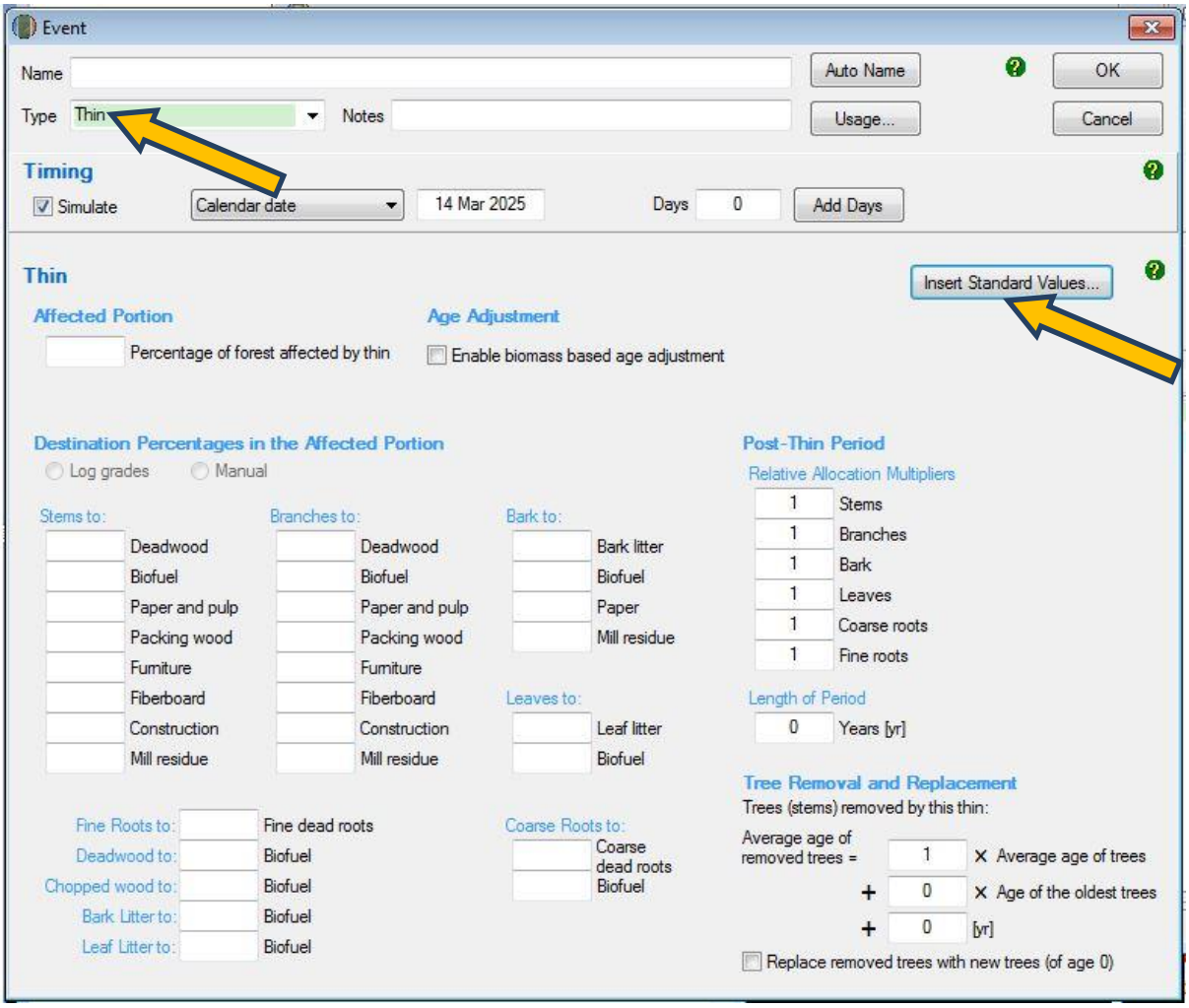
Where any grazing by livestock has occurred within a CEA, a grazing by livestock event must be added as per the instructions below. To avoid any doubt, for the project carbon stocks and C10 simulations, a grazing by livestock event must be added for applicable events whether occurring before or after the implementation date.

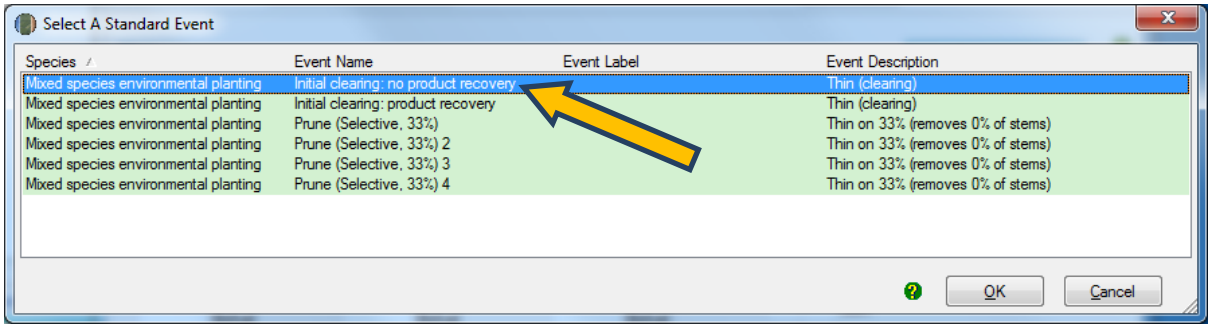
Notes on timing of a grazing by livestock event: Proponents must model the event as occurring on the date that the grazing by livestock in the CEA ceased. For grazing that is ongoing (has not ceased), proponents must model the event as occurring exactly one month before the end of the applicable reporting period. In subsequent reporting periods where the ongoing grazing has continued, proponents must delete the event modelled for the preceding reporting period, and add a new event for either the date that grazing ceased during the new reporting period, or again model it as occurring at one month before the end of the reporting period where the grazing remains ongoing.

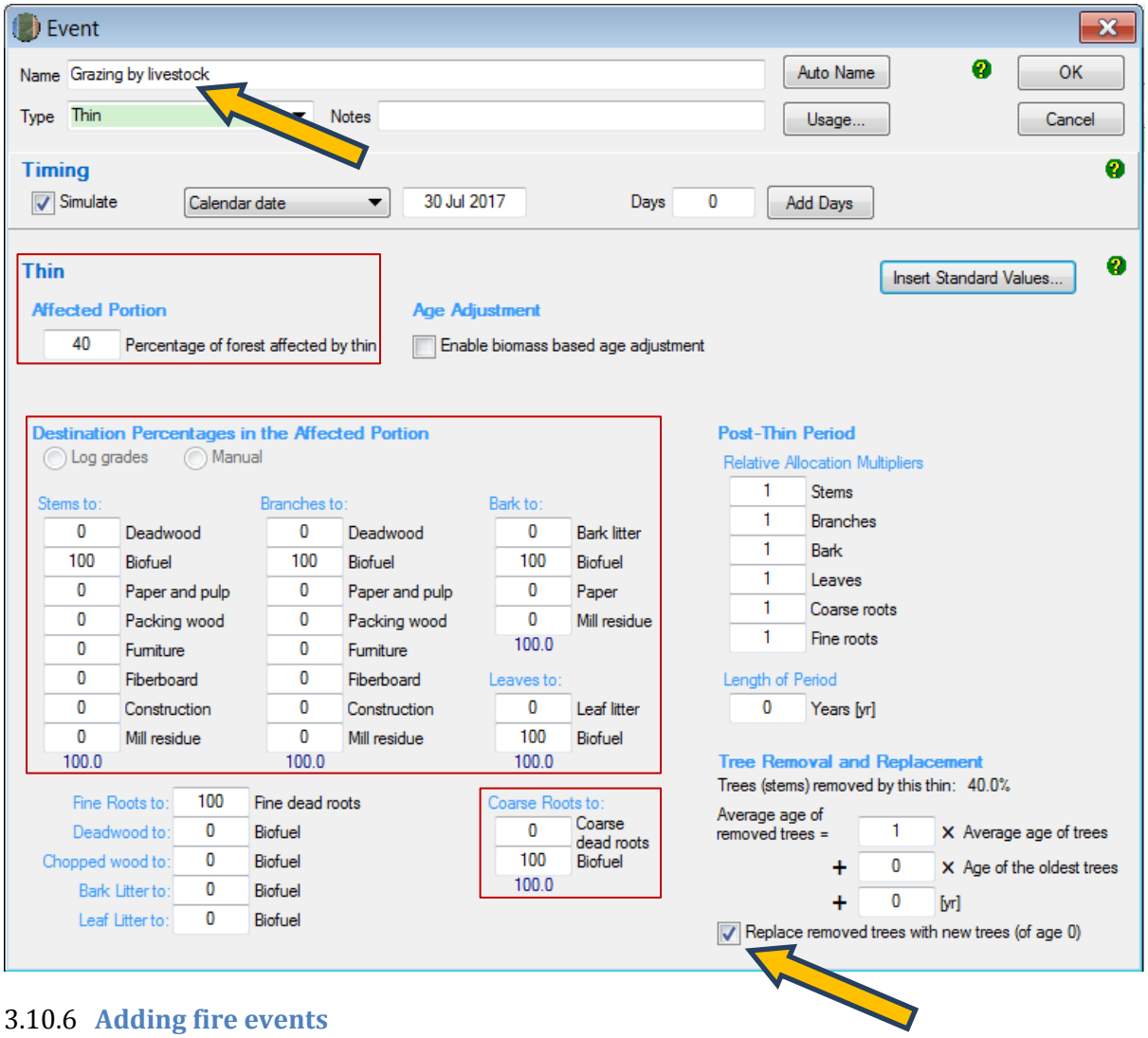
Where more than one grazing by livestock event has commenced in the history of the CEA, the proponent is only required to model the latter of the multiple events as per the above requirements. The events modelled should be supported by the 'forest management information' that the proponent must collect and maintain as per section 5.5 of the Determination.

Simulation Type	**Steps required**
C100_5% Default baseline Historic baseline Hybrid baseline	• Not permitted

Simulation Type	Steps required
C10 Project carbon	1. Click the 'New' button to create a new event. 2. Insert the date of the event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. Refer to the notes on timing above to determine which date to enter. 3. In the drop down menu next to 'Type', select 'Thin'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'No' to insert the name of the standard event. 5. Edit the name of the event to 'Grazing by livestock'. 6. In the box next to 'Affected portion – the percentage of forest affected by thin' change the number to '40'. 7. In the 'Destination Percentages in the Affected Portion – Stems to:' boxes, change the value of 'Biofuel' to '100' and all other boxes to '0'. 8. In the 'Destination Percentages in the Affected Portion – Branches to:' boxes, change the value of 'Biofuel' to '100' and all other boxes to '0'. 9. In the 'Destination Percentages in the Affected Portion – Bark to:' boxes, change the value of 'Biofuel' to '100' and all other boxes to '0'. 10. In the 'Destination Percentages in the Affected Portion – Leaves to:' boxes, change the value of 'Biofuel' to '100' and 'Leaf litter' to '0'. 11. In the 'Destination Percentages in the Affected Portion – Course roots to:' boxes, change the value of 'Biofuel' to '100' and 'Course dead roots' to '0'. 12. Ensure that the 'Replace removed trees with new trees (of age 0)' box is ticked. 13. Ensure that the values have been entered correctly by referring to the third screenshot below (see red boxes). 14. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
14 Mar 2025
Days
0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 × Average age of trees
+ 0 × Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Initial clearing: no product recovery
Thin (clearing)
Mixed species environmental planting
Initial clearing: product recovery
Thin (clearing)
Mixed species environmental planting
Prune (Selective, 33%)
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 2
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 3
Thin on 33% (removes 0% of stems)
Mixed species environmental planting
Prune (Selective, 33%) 4
Thin on 33% (removes 0% of stems)
OK
Cancel



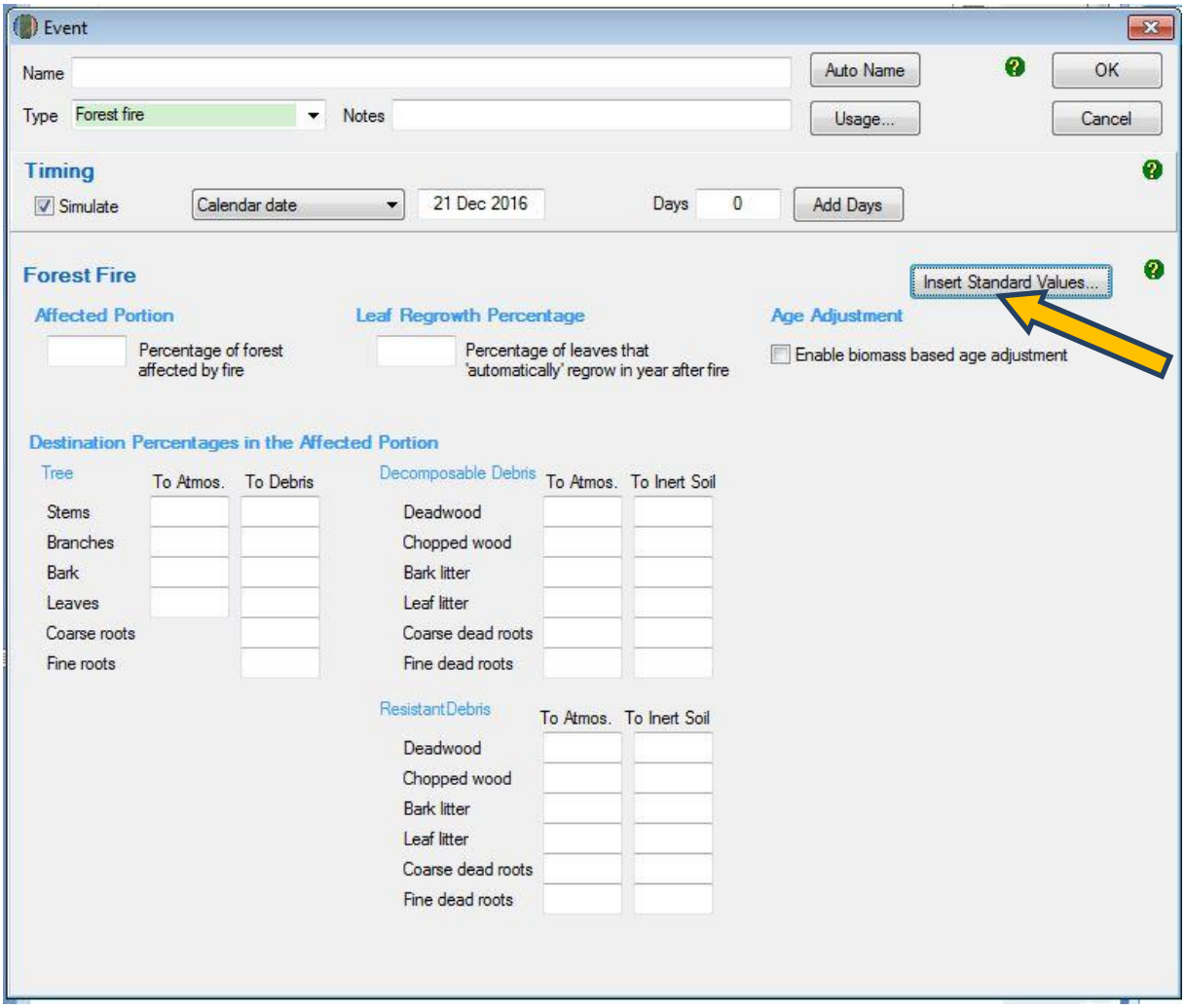
3.10.6 Adding fire events

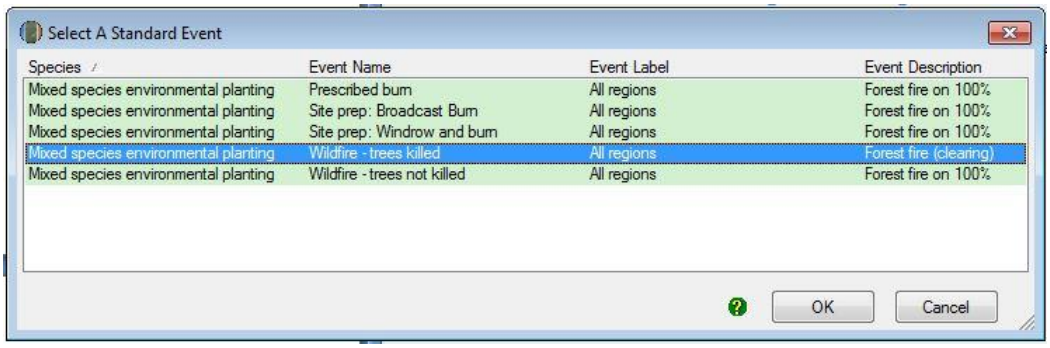
3.10.6.1 Adding a management fire event

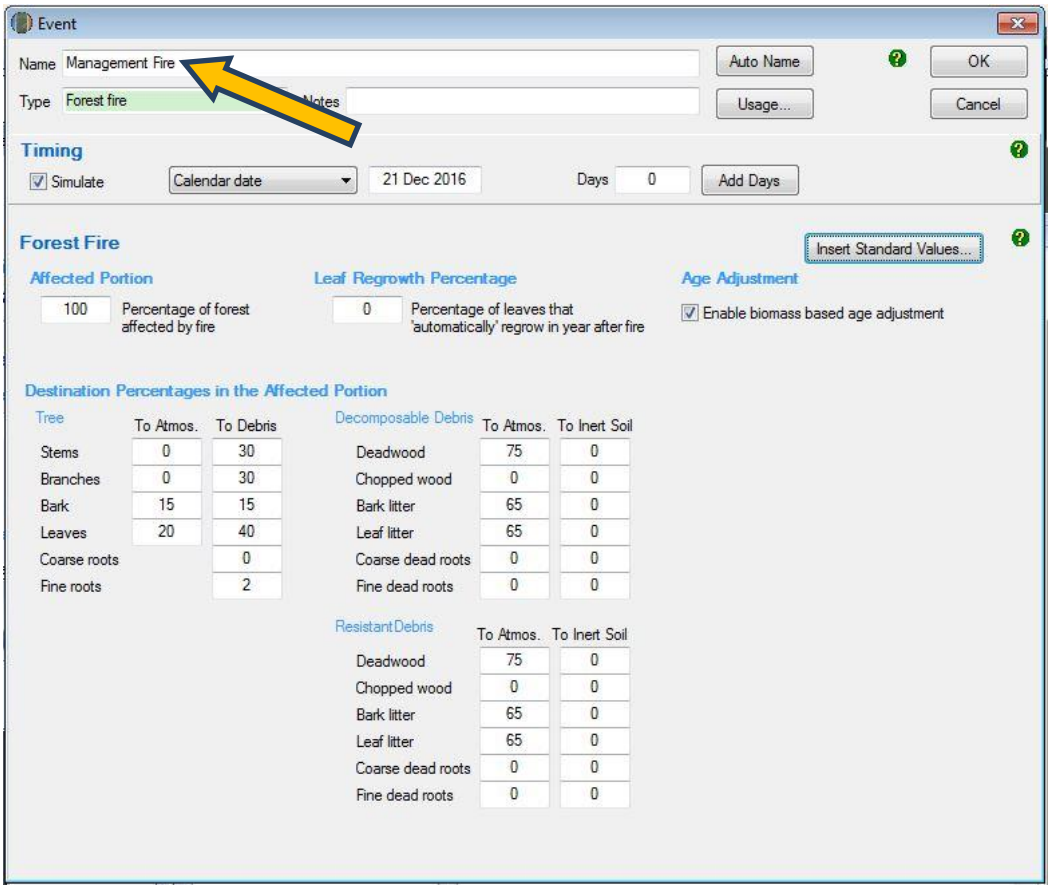
These steps must be repeated for each management fire event that follows a clearing event that occurs in a CEA during the simulation period. A management fire event encourages grass for pasture. It is a fire that occurs within a clearing interval and is used to set back the regrowth, killing a substantial proportion of the above ground plant parts. For each of these events, the date must reflect the date of that event.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted

Simulation Type	Steps required
Default baseline Historic baseline Hybrid baseline Project carbon	1. Click on the 'New' button to create a new event. 2. In the blank field besides the 'Timing' section, insert the date of the management fire in the simulation period. The intervals between events must reflect those that occurred historically. For example, for default values used in baselines, this is 7 years after the regeneration event. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Change the name of the event to 'Management fire'. 6. CHANGE THE SETTINGS TO MATCH THOSE IN THE SCREENSHOT BELOW. 7. Tick the 'Enable biomass based age adjustments' box. 8. Click 'OK' to finish adding the event to the event queue.





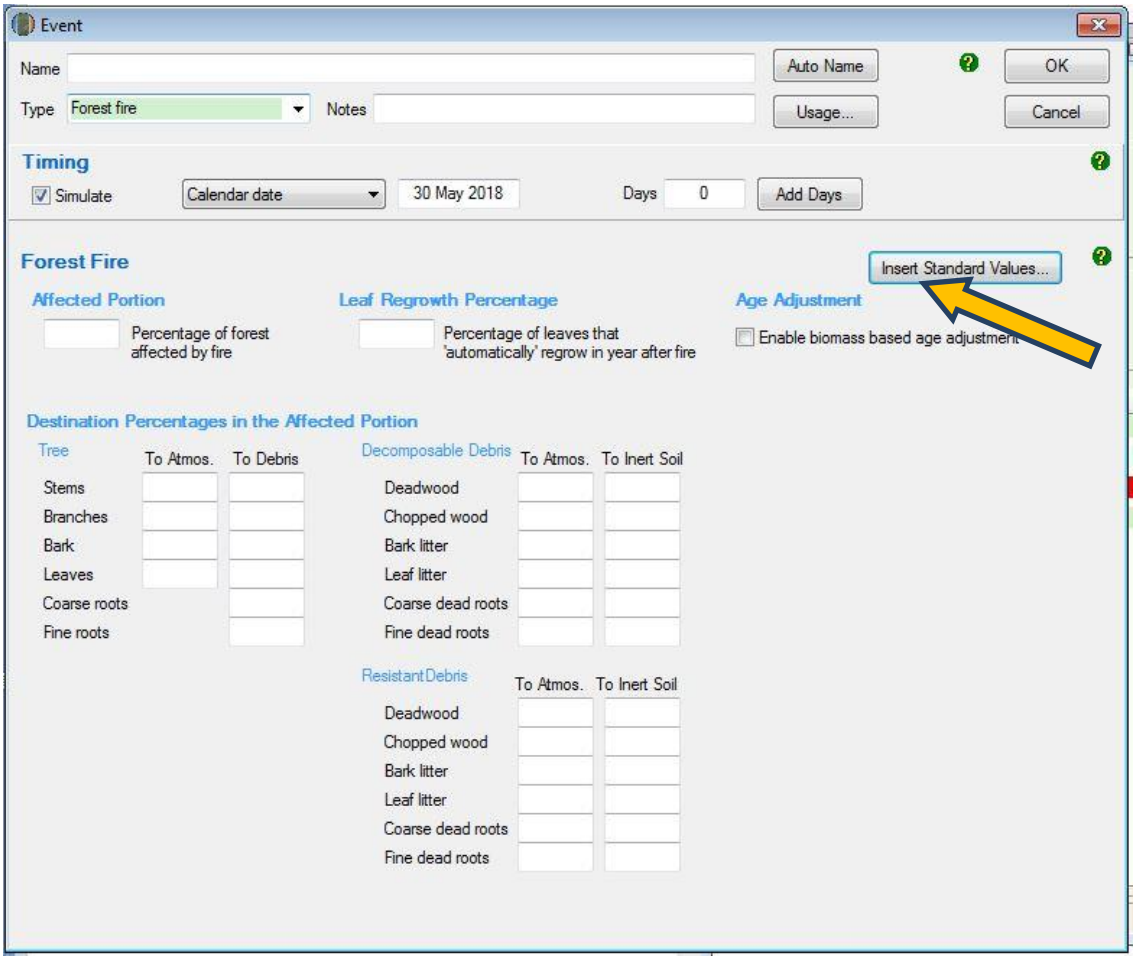


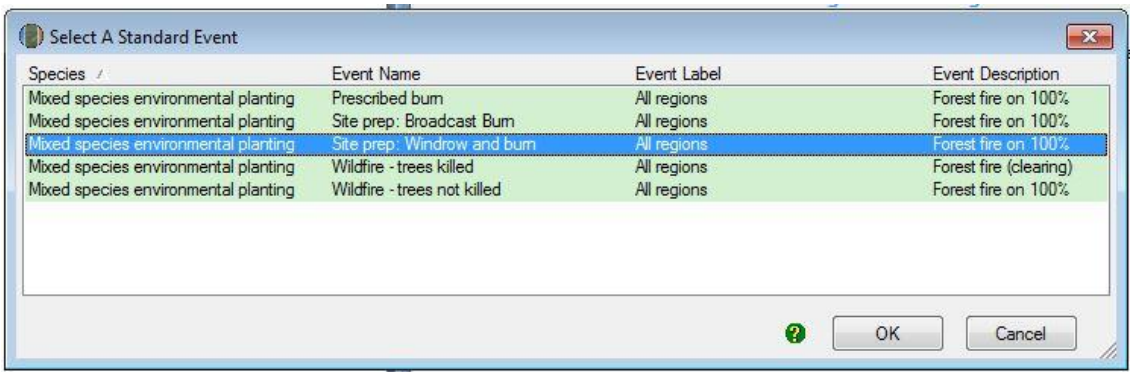
3.10.6.2 Adding a windrow and burn fire event

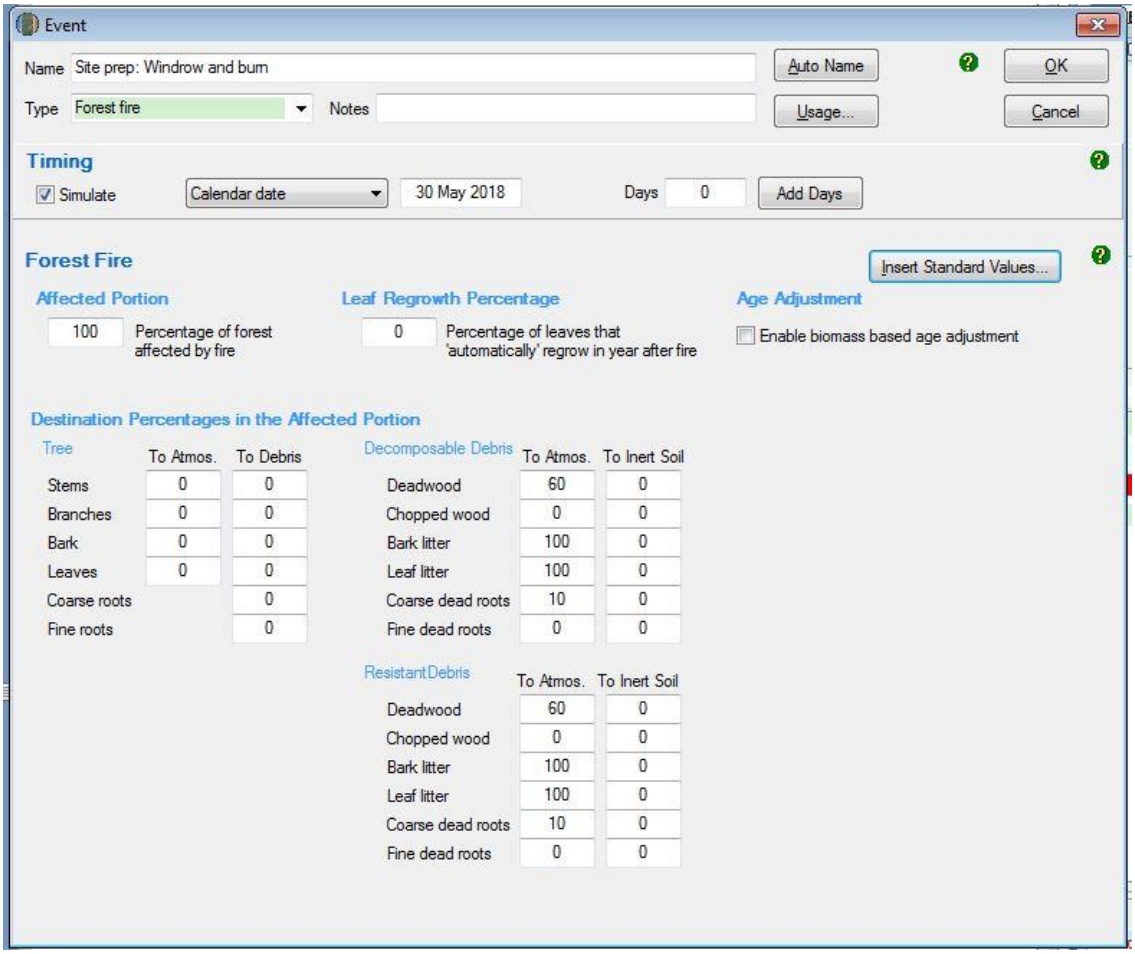
These steps must be repeated for each windrow and burn fire event that follows a clearing event that occurs in a CEA. A windrow and burn fire event reduces the amount of debris that remains after the clearing event. For each of these events, the date MUST reflect the interval between events.

Simulation Type	Steps required
C100_5%	• Not permitted
Project carbon	• Not permitted

C10 Default baseline Historic baseline Hybrid baseline	1. Click on the 'New' button to create a new event. 2. Insert the date of the windrow and burn fire in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Site prep: Windrow and burn' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Do NOT change any other setting. 6. Click 'OK' to finish adding the event to the event queue.



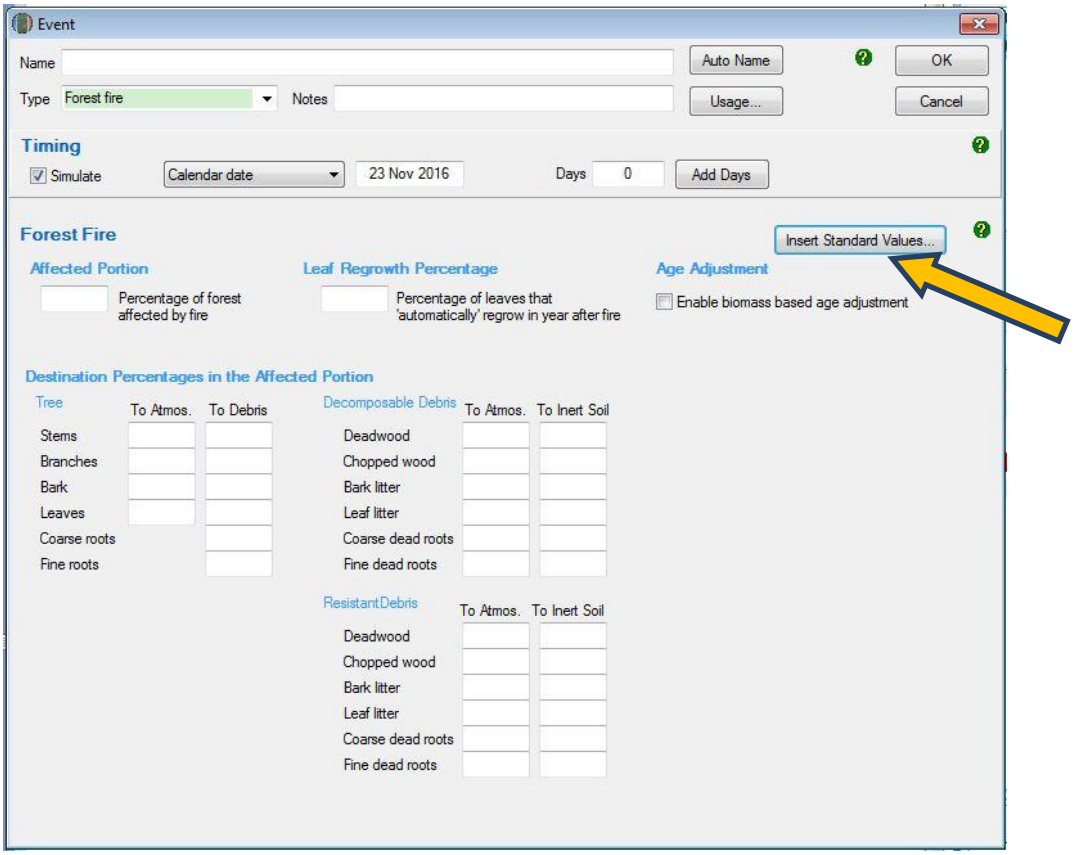


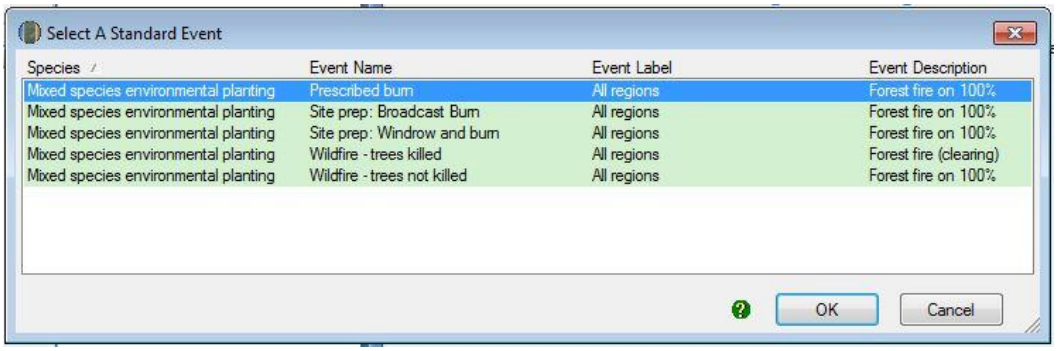


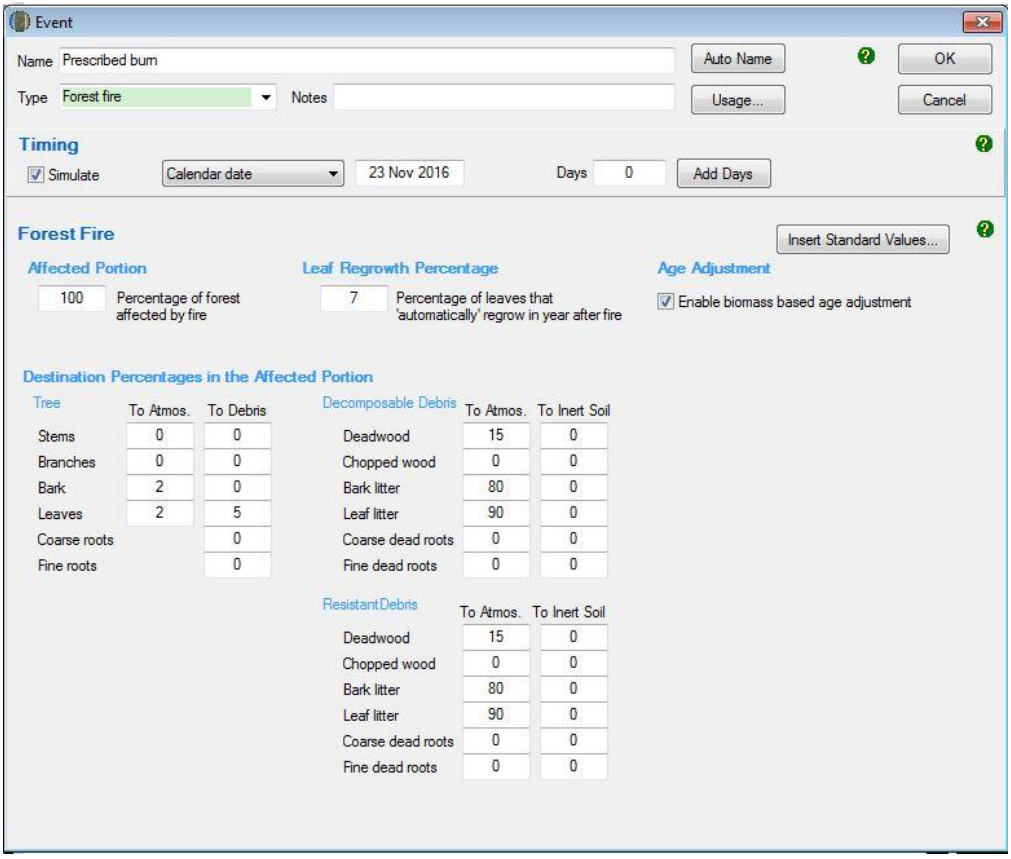
3.10.6.3 Adding a prescribed fire event – to reduce fire risk

These steps must be repeated for each prescribed fire event aimed at reducing fuel loads and hence fire risk, that occurs in a CEA during the simulation period. A prescribed fire is used to control the accumulation of the debris pool. For each of these events the date must reflect the date of that event.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
Project carbon	1. Click on the 'New' button to create a new event. 2. Insert the date of the prescribed fire in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Prescribed burn' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Tick the 'Enable biomass based age adjustments' box. 6. Do NOT change any other setting. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
23 Nov 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots

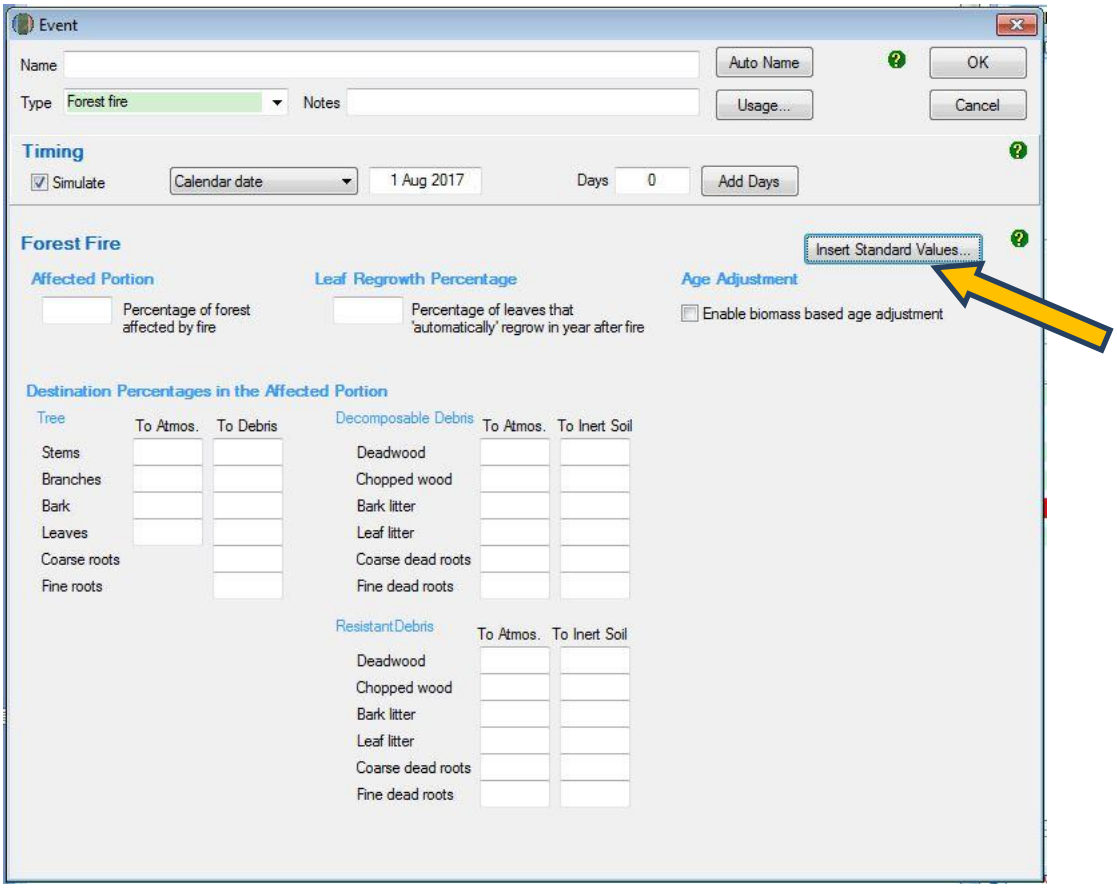

Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

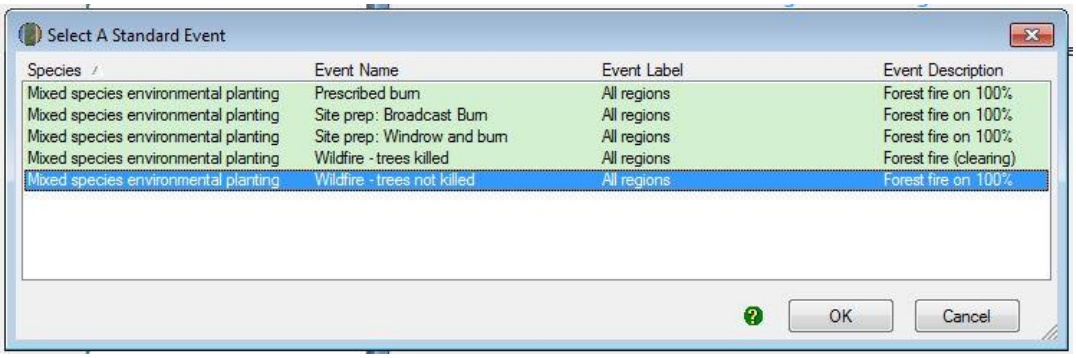


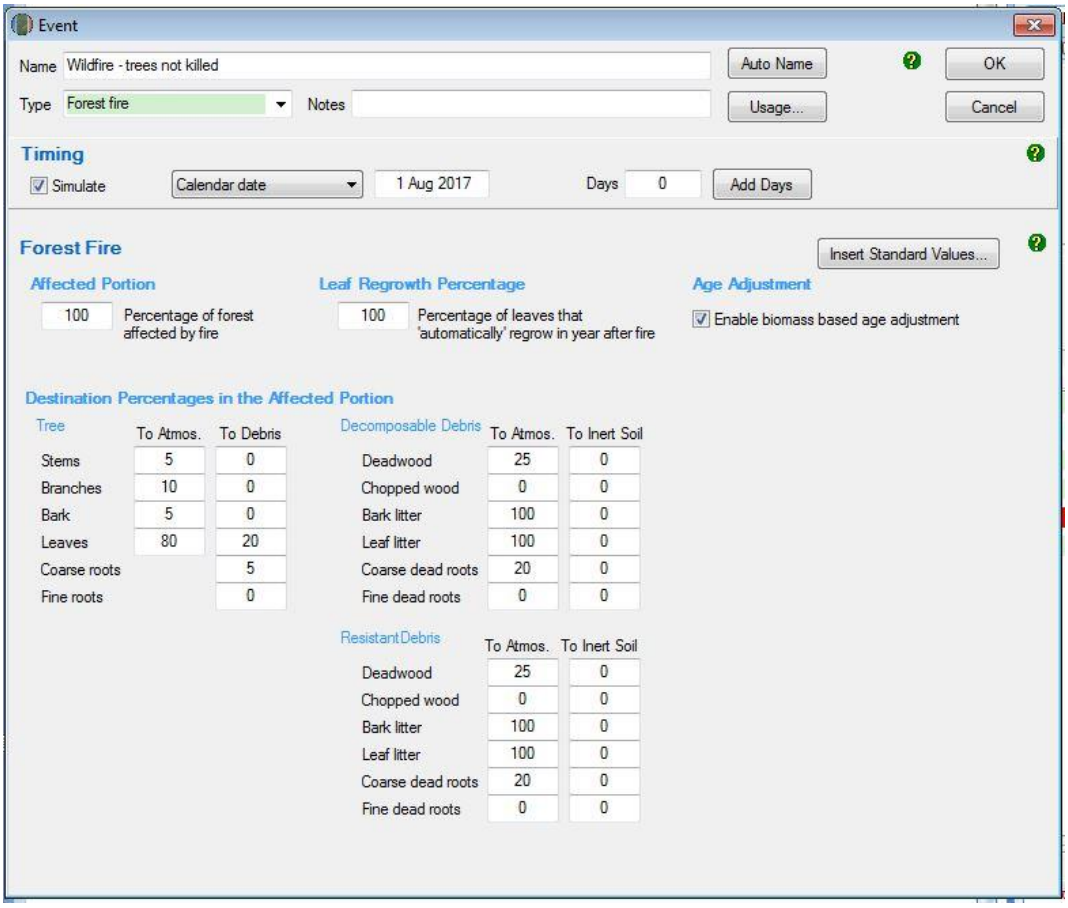
3.10.6.4 Adding a wildfire – trees not killed event

These steps must be repeated for each 'wildfire – trees not killed' event that occurs in a CEA during the simulation period. For each wildfire – trees not killed event the date must be the date on which the event occurred.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
Project carbon	1. Click on the 'New' button to create a new event. 2. Insert the date of the wildfire where trees are not killed in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees not killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Tick the 'Enable biomass based age adjustments' box. 6. Do NOT change any other setting. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
1 Aug 2017
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots

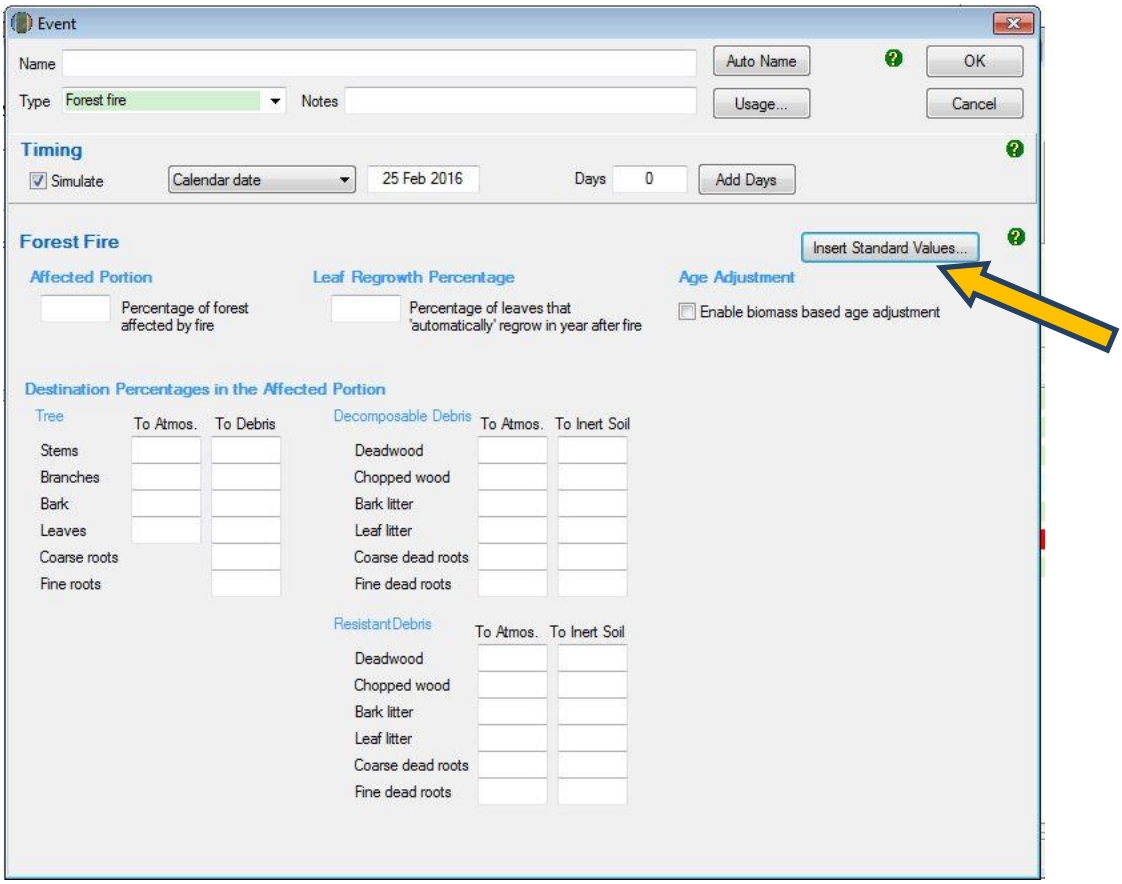

Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

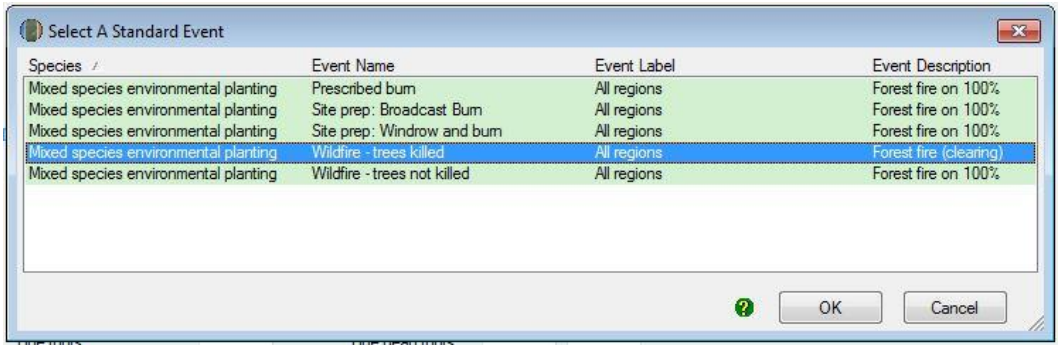


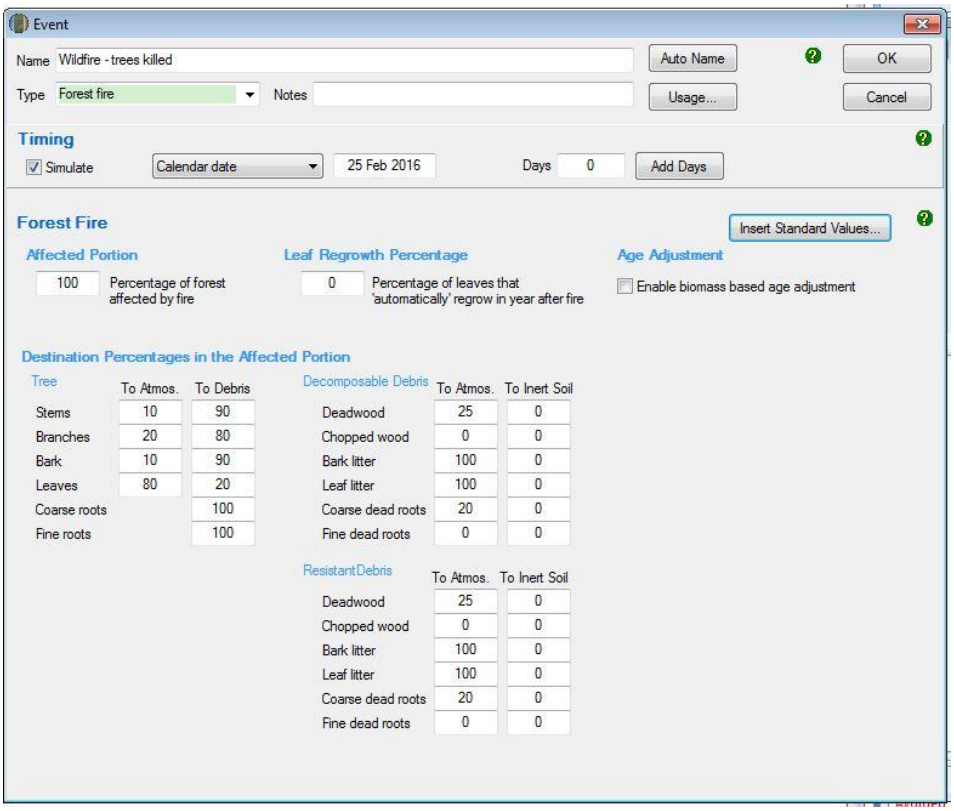
3.10.6.5 Adding a wildfire – trees killed event

These steps must be repeated for each wildfire – trees killed event that occurs during the simulation period and for each wildfire – trees killed event the date must be the date on which the event occurred.

Simulation Type	Steps required
C100_5%	• Not permitted
C10	• Not permitted
Default baseline	• Not permitted
Historic baseline	• Not permitted
Hybrid baseline	• Not permitted
Project carbon	1. Click the 'New' button to create a new event. 2. Insert the date that the wildfire – trees killed event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. 3. In the drop down menu next to 'Type', select 'Forest Fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Click 'OK'. 6. Do NOT change any other settings. 7. Click 'OK' to finish adding the event to the event queue.


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
25 Feb 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
Resistant Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel

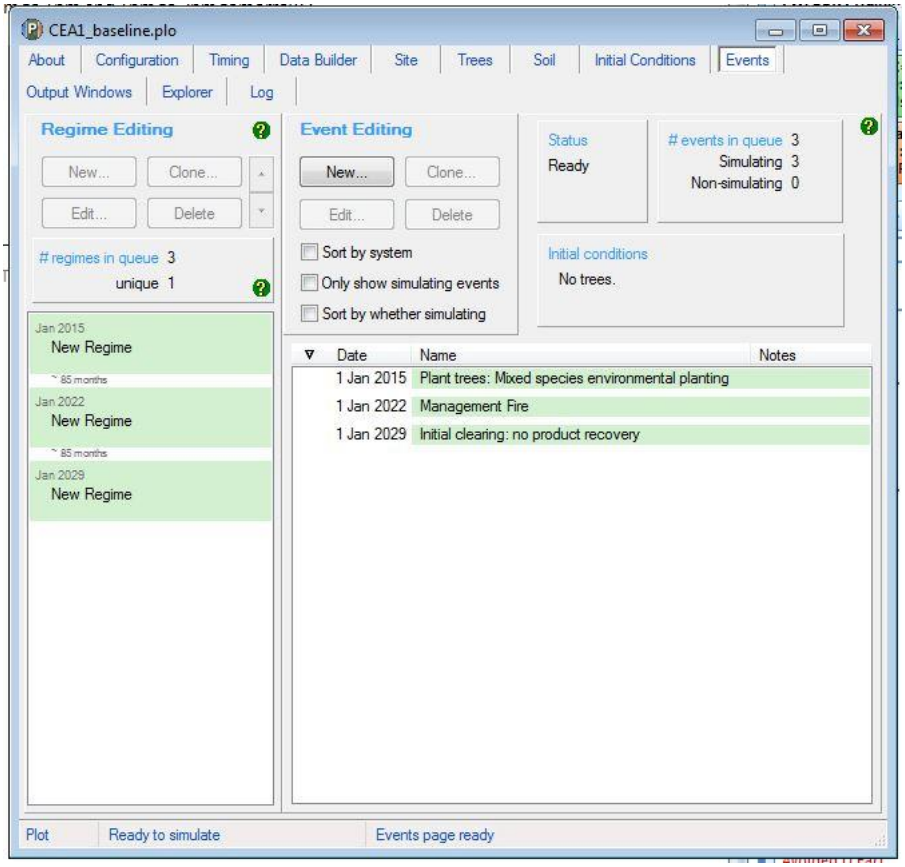


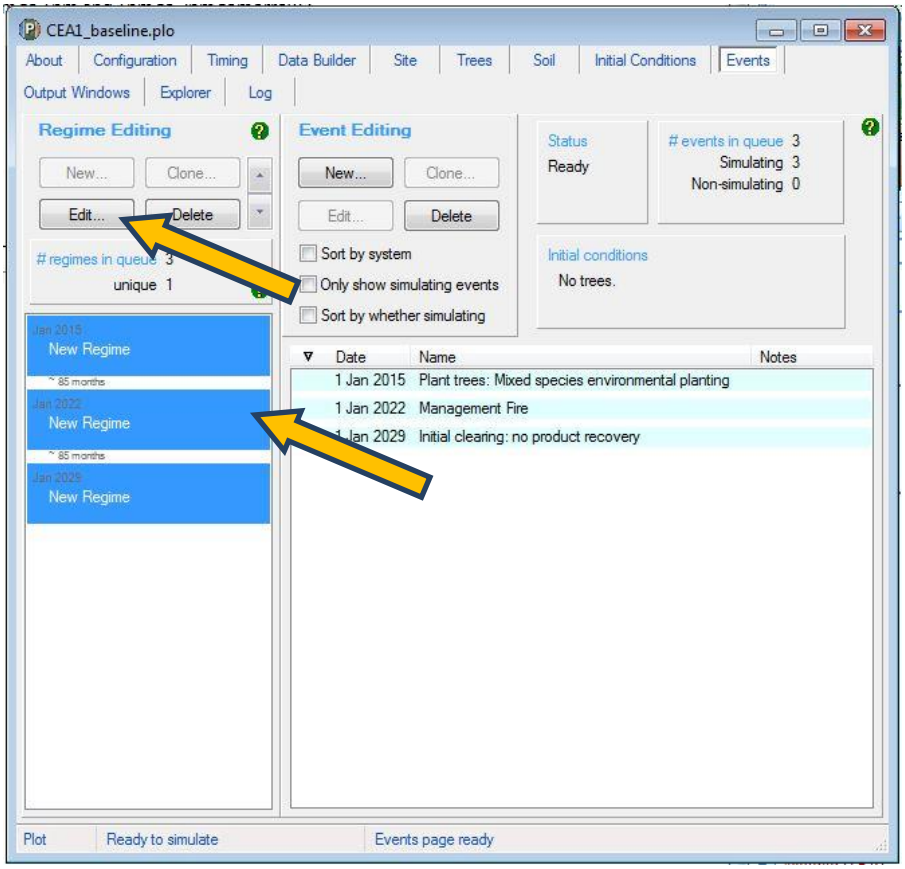
3.10.7 Creating and cloning regimes

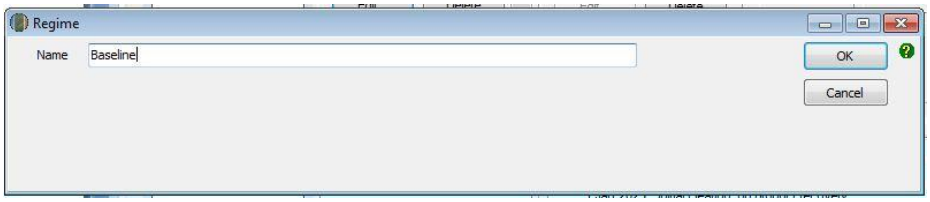
For default, historic and hybrid baselines, the entire events queue that includes all simulated events for the entire baseline management event scenario (see section 4.12 of the Determination) must be cloned to cover the 100 year baseline forecast period.

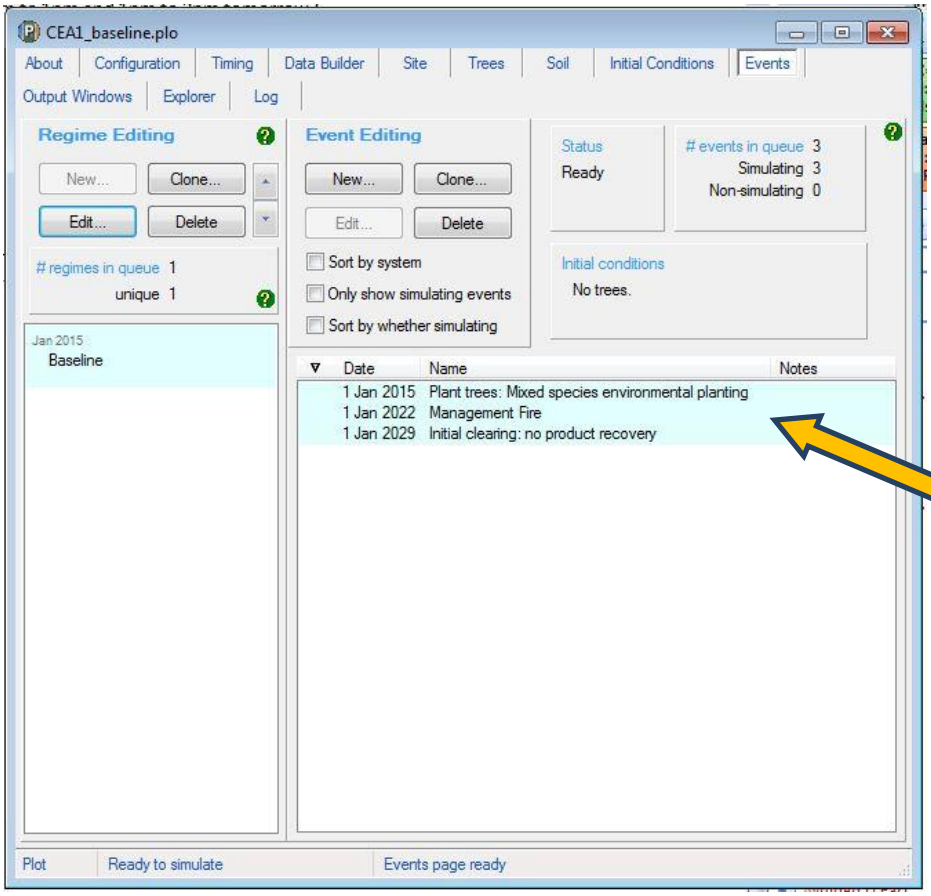
Simulation Type	Steps required
Default baseline	• Follow the above steps to create a plot and the events forming a single clearing interval of 15 years (regeneration, management fire where applicable and clearing). By default, FullCAM will create a new regime for each event added. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Press the 'Clone' button under the Regime Editing header. • Enter '15' for calendar years and ~~'6'~~ for 'number of times', a value high enough to clone events over the entirety of the 100-plus year baseline period and click 'ok'. • Any events that are highlighted grey towards the bottom of the events queue fall beyond the 100-plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation. • ~~The last 'initial clearing: no product recovery' event will fall beyond the 100-year baseline period and will need to be deleted (will appear highlighted in grey).~~

	• ~~Click on it to select it, and then press the 'Delete' button under the Event Editing header and click 'yes'.~~
Historic baseline	• Follow the above steps to create a plot and the events forming the two clearing intervals of the durations supported by historical evidence. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Calculate the number of years between the first event of the first interval and the last event of the second interval. Add 1 to this number. Ie. years between initial regeneration event modelled and the last clearing event modelled plus 1. • Press the 'Clone' button under the Regime Editing header. • Enter the number calculated above for 'calendar years' and ~~'10'~~ for 'number of times' ~~(or at least enough to clone events over a 100 years)~~, a value high enough to clone events over the entirety of the 100-plus year baseline period and click 'ok'. • Any ~~The~~ events that are highlighted grey towards the bottom of the events queue fall beyond the 100-plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
Hybrid baseline	• Follow the above steps to create a plot and the events forming the first clearing interval of 15 years, and the second clearing interval of the duration supported by historical evidence. By default, FullCAM will create a new regime for each event added. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Calculate the number of years between the first event of the first interval and the last event of the second interval. Add 1 to this number. Ie. years between initial regeneration event modelled and last clearing event plus 1. • Press the 'Clone' button under the Regime Editing header. • Enter the number calculated above for 'calendar years' and ~~'10'~~ for 'number of times' ~~(or at least enough to clone events over a 100 years)~~, a value high enough to clone events over the entirety of the 100-plus year baseline period and click 'ok'. • Any ~~The~~ events that are highlighted grey towards the bottom of the events queue fall beyond the 100-plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
C10 C100_5% Project carbon	• Not applicable

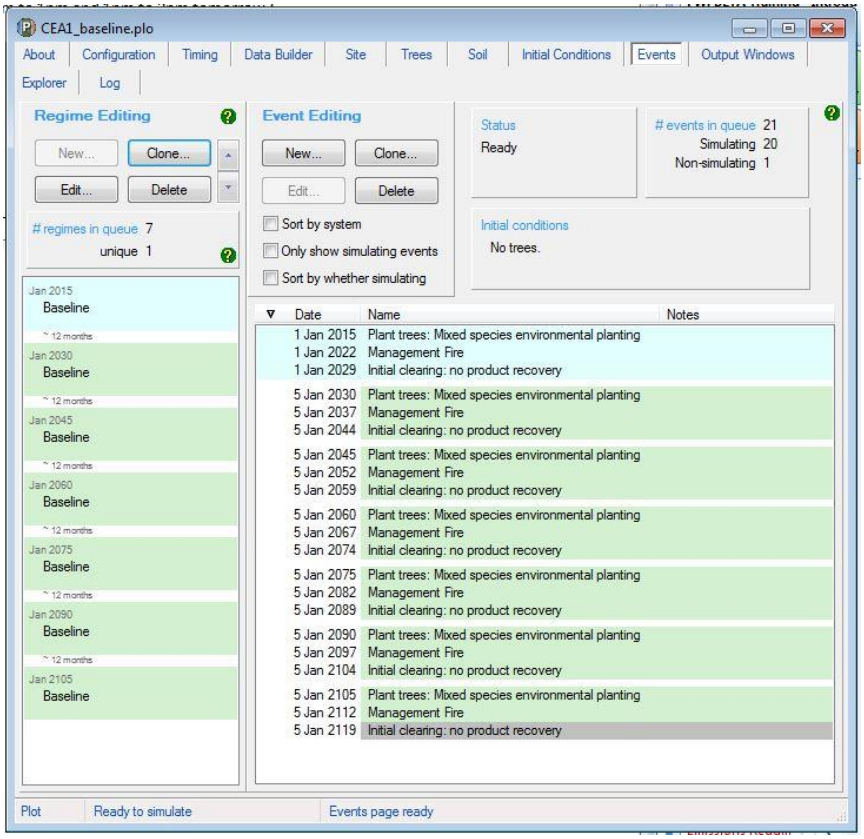

CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 3
unique 1
Jan 2015
New Regime
~ 85 months
Jan 2022
New Regime
~ 85 months
Jan 2029
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 3
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015
Plant trees: Mixed species environmental planting
1 Jan 2022
Management Fire
1 Jan 2029
Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready


CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
unique 1
New Regime
~ 85 months
New Regime
~ 85 months
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 3
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015
Plant trees: Mixed species environmental planting
1 Jan 2022
Management Fire
1 Jan 2029
Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready

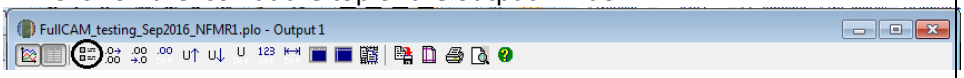

Regime
Name
Baseline
OK
Cancel

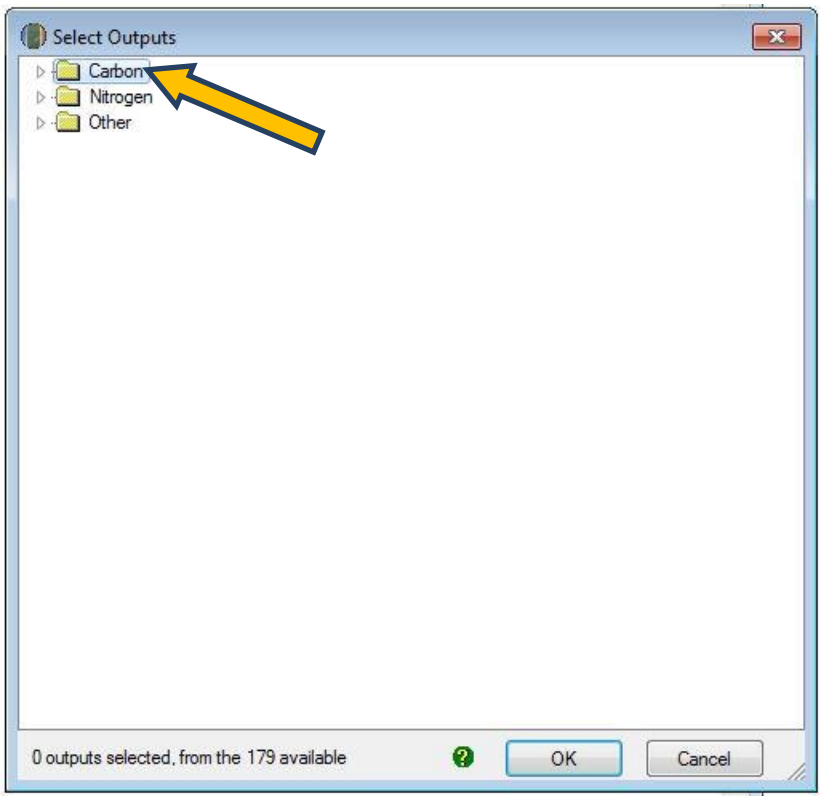

CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 1
unique 1
Jan 2015
Baseline
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 3
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015 Plant trees: Mixed species environmental planting
1 Jan 2022 Management Fire
1 Jan 2029 Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready

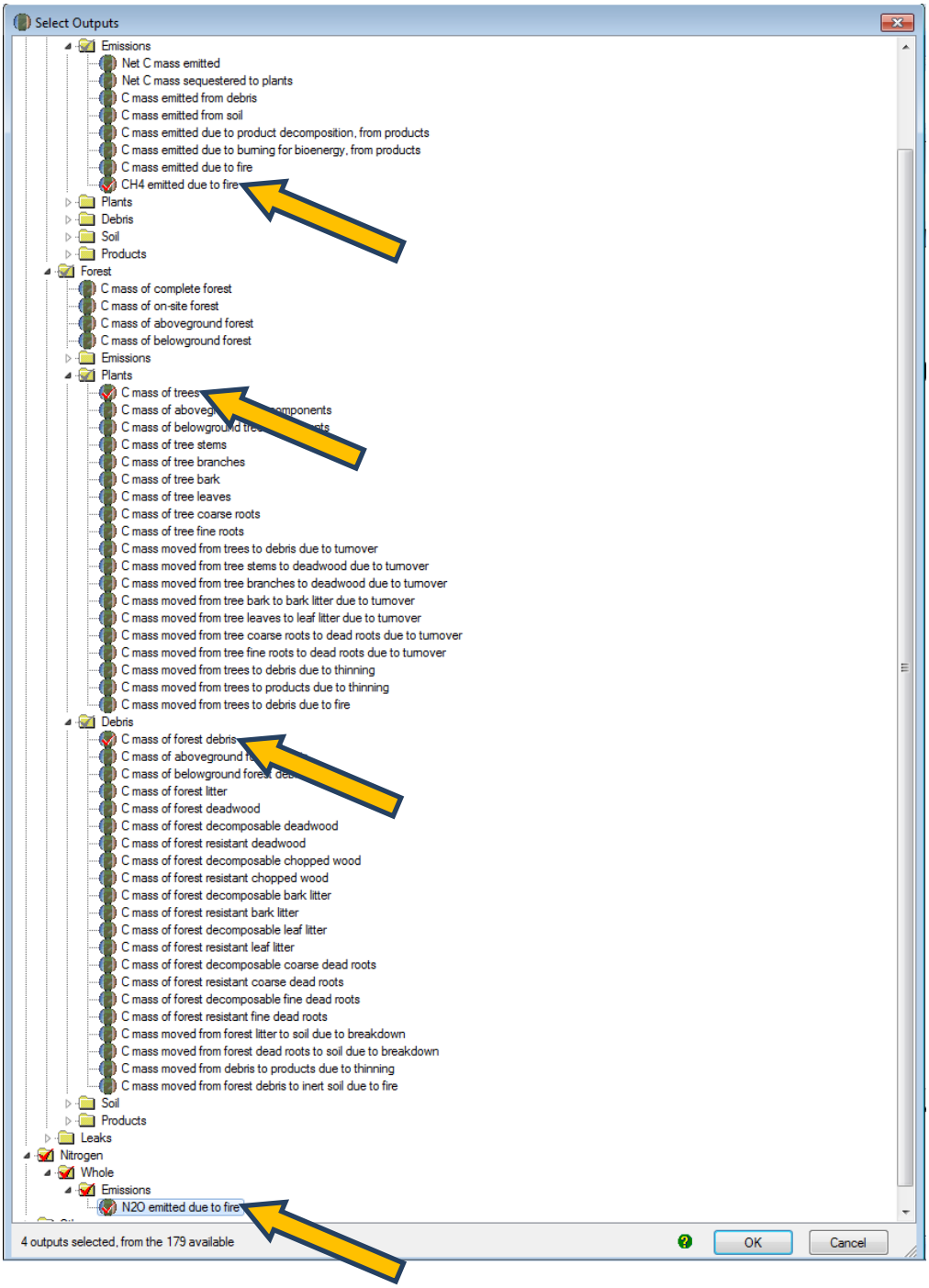

Clone Regimes
Timing Offset for Cloned Regimes
Calendar years
15
Number of times
6
OK
Cancel



3.11 The Output Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Double click on 'Output1' listed in the Output Window. • Click on the icon at the top of the output window:  • Selected outputs have a tick next to their entry, and on the folder(s) where they are located. Unselect all items so that the text reads '0 outputs selected'.
C100_5% C10	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Click 'OK'.
Default baseline Hybrid baseline Historic baseline	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Select the debris carbon pools: Carbon / Forest / Plants / C mass of debris. • Click 'OK'.
Project carbon	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Select the debris carbon pools: Carbon / Forest / Debris / C mass of forest debris. • Select the CH_4 emissions from fire: Carbon / Whole / Emissions / CH4 emitted due to fire. • Select the N_2O emissions from fire: Nitrogen / Whole / Emissions / N2O emitted due to fire. • Click 'OK'.


Select Outputs
Carbon
Nitrogen
Other
0 outputs selected, from the 179 available
OK
Cancel



3.12 Running Simulations

To run the simulation, press the icon in the top menu bar: 

3.13 Viewing outputs

Outputs can be viewed by clicking the icon (circled) at the top of the Output window as either:

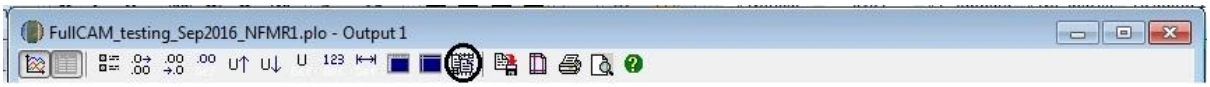
1. *Graph*

2. Tabular form

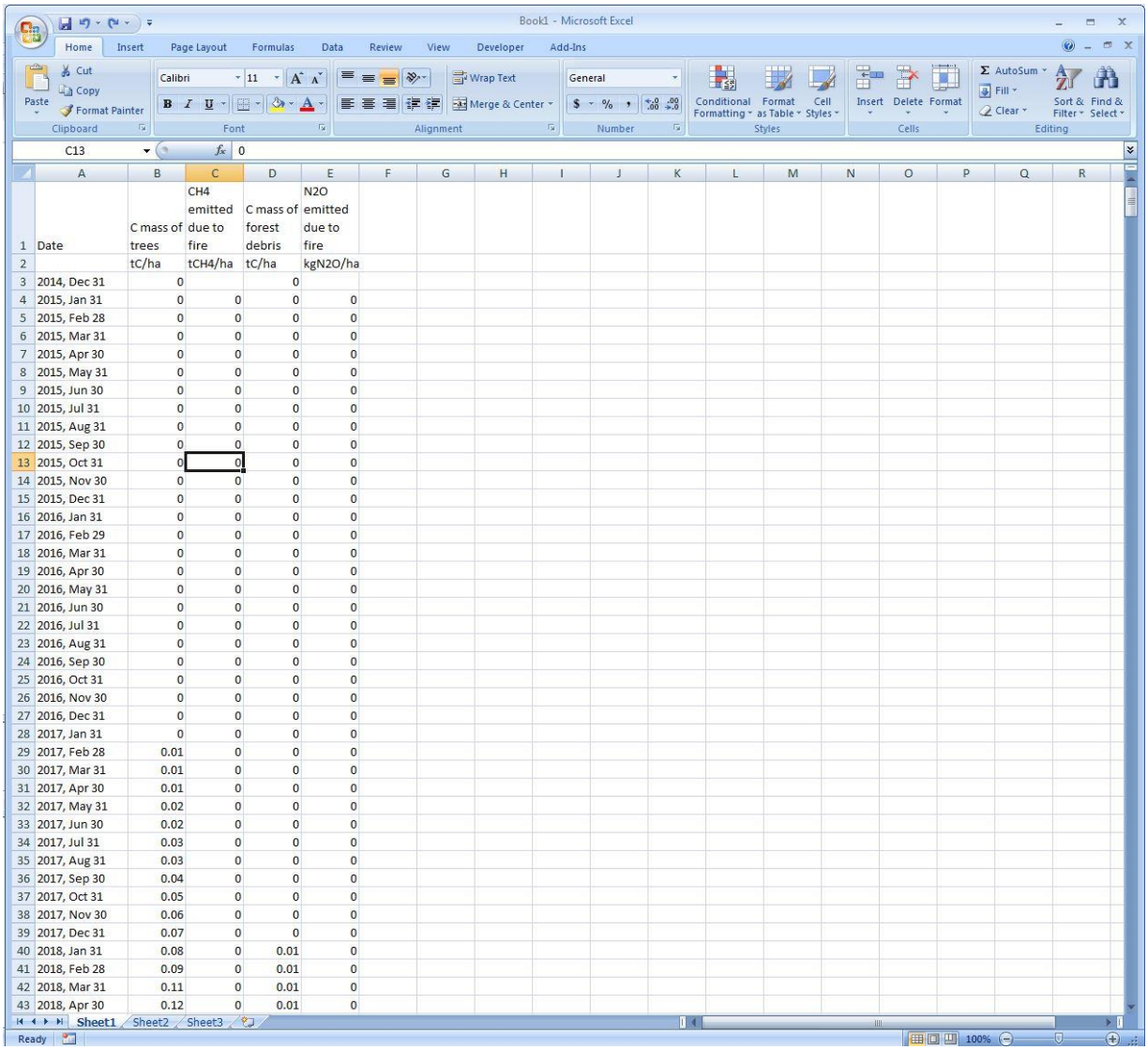
3.14 Transferring outputs into a spreadsheet

To transfer data into a Microsoft Excel or equivalent spreadsheet for analysis:

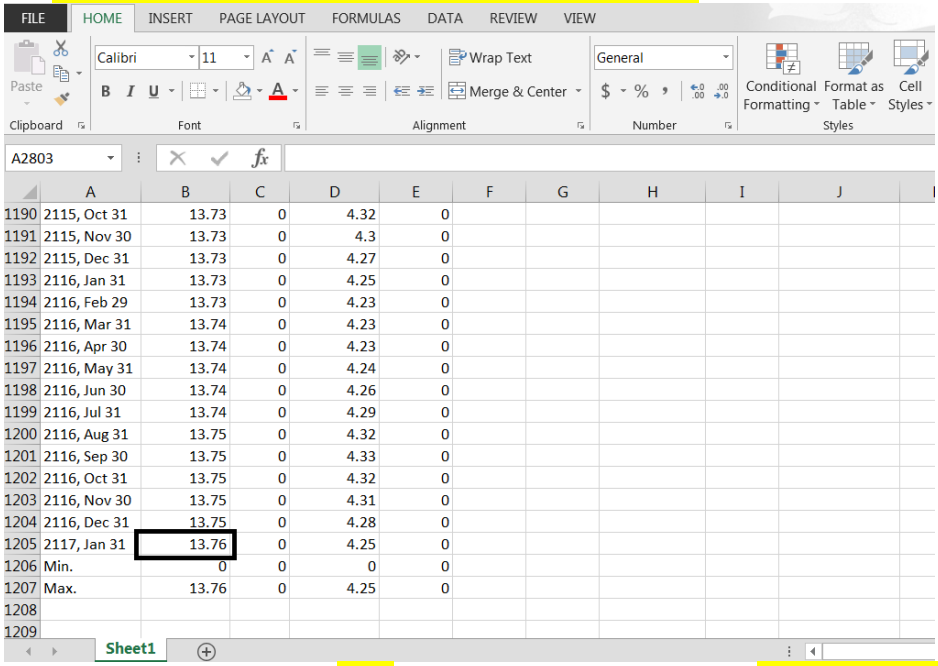
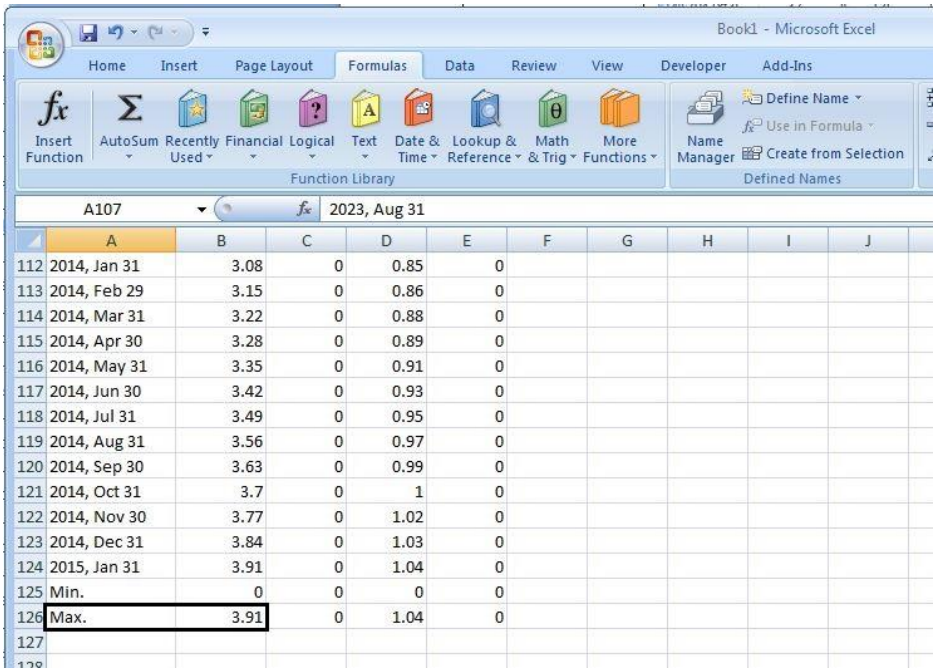
Copy all the output data by clicking on the icon (circled) in the top of the Output window.



Open Microsoft Excel (or equivalent spreadsheet software), and 'Paste' the data copied from FullCAM into the spreadsheet. For example:



	A	B	C	D	E
1	Date	C mass of trees	CH4 emitted due to fire	C mass of forest debris	N2O emitted due to fire
2		tC/ha	tCH4/ha	tC/ha	kgN2O/ha
3	2014, Dec 31	0		0	
4	2015, Jan 31	0	0	0	0
5	2015, Feb 28	0	0	0	0
6	2015, Mar 31	0	0	0	0
7	2015, Apr 30	0	0	0	0
8	2015, May 31	0	0	0	0
9	2015, Jun 30	0	0	0	0
10	2015, Jul 31	0	0	0	0
11	2015, Aug 31	0	0	0	0
12	2015, Sep 30	0	0	0	0
13	2015, Oct 31	0	0	0	0
14	2015, Nov 30	0	0	0	0
15	2015, Dec 31	0	0	0	0
16	2016, Jan 31	0	0	0	0
17	2016, Feb 29	0	0	0	0
18	2016, Mar 31	0	0	0	0
19	2016, Apr 30	0	0	0	0
20	2016, May 31	0	0	0	0
21	2016, Jun 30	0	0	0	0
22	2016, Jul 31	0	0	0	0
23	2016, Aug 31	0	0	0	0
24	2016, Sep 30	0	0	0	0
25	2016, Oct 31	0	0	0	0
26	2016, Nov 30	0	0	0	0
27	2016, Dec 31	0	0	0	0
28	2017, Jan 31	0	0	0	0
29	2017, Feb 28	0.01	0	0	0
30	2017, Mar 31	0.01	0	0	0
31	2017, Apr 30	0.01	0	0	0
32	2017, May 31	0.02	0	0	0
33	2017, Jun 30	0.02	0	0	0
34	2017, Jul 31	0.03	0	0	0
35	2017, Aug 31	0.03	0	0	0
36	2017, Sep 30	0.04	0	0	0
37	2017, Oct 31	0.05	0	0	0
38	2017, Nov 30	0.06	0	0	0
39	2017, Dec 31	0.07	0	0	0
40	2018, Jan 31	0.08	0	0.01	0
41	2018, Feb 28	0.09	0	0.01	0
42	2018, Mar 31	0.11	0	0.01	0
43	2018, Apr 30	0.12	0	0.01	0

Simulation Type	Steps required
C100_5%	• Scroll down to the bottom rows of the data in the spreadsheet~~, where the 'Min' and 'Max' values for each column will be shown~~.  • Record the 'Max' value in~~for~~ the 'C Mass of Trees' column for the last row of data pertaining to a date. This is C100 or the value of C at 100 years. To determine C100_5%, or 5% of this value, multiply C100 by 0.05. This value is used for the materiality test at section 4.7 of the Determination, calculated in accordance with section 4.8 of the Determination.
C10	• Scroll down to the bottom of the spreadsheet, where the 'Min' and 'Max' values for each column will be shown.  • Record the 'Max' value for the 'C Mass of trees' column, as this is the value at 10 years (=C10). This value is used for the materiality test at section 4.7

	of the Determination, calculated in accordance with section 4.9 of the Determination.
Default baseline Historic baseline Hybrid baseline	• Refer to Division 4.4 of the Determination for calculating baselines, specifically Equation 4 at section 4.24. Section 5 of these Guidelines details how each FullCAM output in the spreadsheet data corresponds to the equation parameters.
Project carbon	• Refer to Division 4.4 of the Determination for calculating end of reporting period Project carbon stocks, specifically Equation 2 at section 4.22. Section 5 of these Guidelines details how each FullCAM output in the spreadsheet data corresponds to the equation parameters.

4. FullCAM simulations and offsets reporting

Project proponents must calculate the project net abatement by completing the equations in sections 4.21 to 4.29 of the Determination. Parameters generated in FullCAM are used in Equations in the Determination.

Note that for some of the equations the average of the FullCAM output over the simulation period will be required, whereas for others the value of the FullCAM output at the end of the simulation period will be used. Refer to the equations within the Determination to determine which value to use. Averages can be calculated using the average function within your spreadsheet software.

Table 7: FullCAM outputs and Corresponding Parameters as defined in the Determination

FullCAM Output	Parameter as defined in the Determination	Scenario	Equation in the determination
C mass of debris	$CD_{CEA,i}$	Project	3
	$BCD_{CEA,i,k}$	Baseline	4
C mass of trees	$CT_{CEA,i}$	Project	3
	$BCT_{CEA,i,k}$	Baseline	4
CH_4 emitted from debris due to fire	$E_{CH_4,i}$	Project	7
N_2O emitted due to fire	$E_{N_2O,i}$	Project	8

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Document 10a

Australian Government

Department of the Environment and Energy

FullCAM Guidelines

Requirements for using the Full Carbon Accounting Model (FullCAM) in the Emissions Reduction Fund (ERF) methodology determination:

Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013

Version 2.1~~0~~

(published and in force from ~~xx~~16~~22~~ Dec 2017~~2016~~)

Disclaimer

This document has been developed to assist project proponents to calculate abatement in FullCAM as required by the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013.* This document is incorporated by reference in sections 1.3, 4.8, 4.9, 4.12, 4.14, 4.16, 4.18, 4.19, 4.30 and 5.3 of that determination. Project proponents should not use this document as a substitute for complying with the requirements in the Methodology Determination.

Before relying on any material contained in this document, project proponents should familiarise themselves with the requirements of the following legal documents: Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013, Carbon Credits (Carbon Farming Initiative) Act 2011, Carbon Credits (Carbon Farming Initiative) Rule 2015 and Carbon Credits (Carbon Farming Initiative) Regulations 2011. Project proponents are also advises to obtain professional advice suitable to their particular circumstances.

This document does not displace relevant legislative provisions or other laws. All users are encouraged to read this document in conjunction with the relevant legislation, including the methodology determinations, referenced throughout this document. Where any inconsistencies are apparent, please be aware that the legislative provisions will take precedence.

This document will be updated periodically and users should note that some inputs and values may change over time. It is the user's responsibility to ensure that they are using the version of this document and any tool/s required in association as in force at the applicable offsets report submission date (consistent with the definitions in section 1.3 of the Methodology Determination).

The Department of the Environment and Energy and the Commonwealth of Australia will not be liable for any direct, indirect or consequential loss arising out of, or in connection with, or reliance on, information on, or produced by, using this document.

Contents

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1. Introduction

1.1 Use of FullCAM with the Native Forest from Managed Regrowth Methodology Determination 2013

The calculation of carbon abatement under the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* (the Determination) is dependent upon the use of the Full Carbon Accounting Model (FullCAM) consistently with the requirements of this document. In particular, sections 4.8, 4.9, 4.12, 4.14, 4.16, 4.18 and 4.19 of the Determination require that the materiality test, baseline scenario and project scenario for each carbon estimation area (CEA) must be modelled in FullCAM in accordance with the requirements in both the Determination and this document.

Section 4.18 of the Determination requires that any project specific inputs specified in this document must be used to determine the project carbon stocks for a CEA. Note that each of the simulations and modelling events detailed in this document have specific inputs that must be used. Section 4.19 also specifies that the relevant events that reflect actual management events and the relevant species setting specified in the document must be used to model the project period.

Sections 4.30 and 4.31 of the Determination also require~~Section 4.30 and 4.31 of the Determination also requires~~ key input and output data to be produced using FullCAM in accordance with the requirements in the Determination and this document. Where content of this document relates to provisions of the Determination, references are given to the location of those provisions.

Project proponents must only change FullCAM default settings as indicated in this document, and all other settings must not be changed. This is to ensure that defaults will apply where relevant (see subsections 4.14(3) and 4.18(3) of the Determination).~~.~~

The latest version of FullCAM is available for download from www.environment.gov.au/climate-change/greenhouse-gas-measurement/land-sector. You should check the Determination to determine which version of FullCAM you are required to use for your applicable offsets report. If you determine that you must use a version of FullCAM that is unavailable on the website, please contact the Department at erfforests@environment.gov.au to obtain a copy.

1.2 Format of this document

This document provides:

- an overview of FullCAM relevant to the Determination;
- an overview of the simulations you must run in FullCAM as per the Determination;
- a step-by-step walkthrough of using FullCAM to run the simulations correctly; and
- an overview of the FullCAM outputs as they relate to equations within the Determination.

Section 1 of this document provides an overview of FullCAM, its features relevant to users and important requirements for using this document. Section 2 outlines the process used to determine which type of baseline proponents must use in accord with the Determination. Section 3 provides a step-by-step walkthrough of how to run FullCAM 'simulations' for the materiality test, baselines, and project reporting.

Section 2 includes tables summarising the simulations that users may be required to run in FullCAM. These tables summarise the objective, time period and outputs for each simulation, as well as the project activities that may need to be simulated. Where settings differ between different simulation types for the step-by-step process, section 3 outlines the separate parameters required. Users should familiarise themselves with the simulations in section 2 before following the steps in section 3 to run the simulations. Section 4 provides an overview of the FullCAM outputs needed to complete the equations within the Determination.

1.3 FullCAM background

FullCAM is used in Australia's National Greenhouse Gas Accounts for the land sector. FullCAM provides fully integrated estimates of carbon pools in forest and agricultural systems for Australia's land sector reporting. In addition, it accounts for human-induced changes in emission and sequestration of major greenhouse gases. FullCAM was developed under the National Carbon Accounting System (NCAS) at the then Australian Greenhouse Office to provide a dynamic account of the changing stocks of carbon in Australia's land systems since 1970 by integrating data on land cover change, land use and management, climate, plant productivity, and soil carbon over time. FullCAM estimates carbon stock change and greenhouse gas emissions at fine spatial and temporal scales, and uses a wide range of spatially referenced data.

Users of FullCAM can determine estimates of carbon stock change and greenhouse gas emissions for ERF projects on a similar basis to that used for land use and land use change in Australia's National Greenhouse Gas Inventory.

1.4 FullCAM plots and running simulations

FullCAM can run simulations on a 'plot'. A plot, for modelling purposes, is defined as a piece of land for which the event history, when modelled in FullCAM, is the same across that area of land. Separate plot files are created for each CEA.

In FullCAM, there are several types of plots that can be selected. Only 'forest system' is relevant to this Determination. This document provides overviews of the simulations that users may be required in Section 2, and the steps to run these simulations in Section 3.

FullCAM models using a single 'model point' location. Proponents do not need to define plot boundaries within FullCAM, rather proponents must input the coordinates for a single location within the plot boundaries that is at the approximate centre of the plot (the model point – see paragraph 3.3(1)(c) of the Determination). The latest spatial data for a plot must be downloaded using the 'Data Builder' tab each time the software is run. This process is described in section 3.5 of this document.

Separate plot files must be created for each carbon estimation area (CEA) (see section 3.3 of the Determination). In order to ensure all settings are correct, including defaults, we recommend creating new plot files each time a new version of FullCAM or these Guidelines is used. Plot files created under previous versions may contain different settings that will affect outputs and users are responsible for any inconsistencies.

For each CEA, separate plot files must be created for:

- determining whether a zero baseline or non-zero baseline must be used (initial reporting period only);
- estimating carbon stocks under a non-zero baseline (if a zero baseline is not appropriate); which may be either a 'default' baseline, an 'historic' baseline or an 'hybrid' baseline;
- estimating carbon stocks for the current reporting period; and
- determining if a disturbance event must be reported prior to the next reporting period.

1.5 Overview of the FullCAM interface

The FullCAM software user interface displays menus and a series of tabs. Each tab has a suite of fields in which information may either be required to complete as instructed in section 3 or left unchanged. The program is designed so that certain tabs in a plot file are made available only if required fields have valid information entered in earlier tabs. If the text of a tab or field is red, then FullCAM requires information in that tab or field before a simulation can be run. When all the required fields within a tab have valid information entered, the tab text will become blue. Help is provided within FullCAM by clicking on the  symbol available in most windows. A general overview of each tab follows.

There are only three tabs users see when they create a new FullCAM plot:

Tab	Explanation
About	Includes a free text field where users can enter information about the plot file that they have created. This is a good space to keep track of changes that have been made or editing of event parameters.
Configuration	Users select the system (e.g. forest, agricultural) they want to simulate in the plot.
Timing	Enter the timing for starting and ending the simulation and the time steps required for output data.

Once fields in the above three tabs are populated users can access the following additional tabs:

Tab	Explanation
Data Builder	In this tab users enter the latitude and longitude of the 'Model Point Location' where they wish to simulate a plot file. Internet access is required to complete this tab. By choosing to 'Download Spatial Data' the associated soil and climate data for that latitude and longitude are automatically loaded into relevant parts of the remaining tabs. In the tab users can then download tree and/or crop species information and management regimes as appropriate. This information is also automatically loaded into relevant parts of the remaining tabs.
Site	Specific parameters (e.g. water [rainfall], temperature, productivity) are described.
Trees	Description of the properties of the tree species.
Crops	Description of the properties of crop or pasture species (only displays if agricultural system selected).
Soil	Description of soil properties.
Initial Conditions	In this tab the values for carbon at the start of the simulation are described. Values will automatically be populated by **Data Builder** using data downloaded from the FullCAM server.
Events	All of the events for the entire simulation period are listed in this tab. Users can add or remove events. Care must be taken not to violate requirements for modelling 'management events' within the Determination. The names on the event list are

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	colour-coded to indicate whether they are ready, whether they are simulating or not, and what system they affect. The colour codes are: Red: Event not ready (renders event queue not ready); Grey: Event non-simulating (outside simulation period, will not affect simulation); Green: Forest; Yellow: Agricultural; and Brown: Mixed. Finally, the events users select with the cursor are coloured in the usual highlight colour.
Output Window	Defines what outputs are presented in output windows.
Explorer	Display of the parameter settings for each tab.
Log	This tab records changes made to the file to assist with analysis and error tracking.

1.6 Development and updates to this document

This document has been developed by the Department to give effect to the Determination and assist the Determination to continue to be effective and meet the offsets integrity standards in section 133 of the *Carbon Credits (Carbon Farming Initiative) Act 2011*. One of the most relevant offsets integrity standards for the Determination and this document to meet is that 'to the extent to which a method specified in, or ascertained in accordance with, a methodology determination in accordance with paragraph 106(1)(c) involves an estimate, projection or assumption—the estimate, projection or assumption should be conservative'. The use of estimates, projections or assumptions is inherent to the calculation method of the Determination which uses a computer model (FullCAM) to estimate levels of carbon in both baseline and project scenarios.

The input of events and parameters into the FullCAM software is structured to help ensure that the method ultimately results in a conservative estimate of the net abatement amount. The need for conservativeness can have a different impact on how assumptions are used for baseline scenarios and project scenarios. For example, for a baseline scenario to be 'conservative', assumptions are needed which avoid underestimating the amount of carbon in an area of land. Conversely, in a project scenario, assumptions are needed which avoid overestimating the amount of carbon in an area of land.

Another important offsets integrity standard is that the method results in 'eligible carbon abatement from the project' such that it contributes to meeting Australia's international emissions reduction obligations and complies with internationally accepted accounting rules. The development of both the FullCAM software and this document is mindful of the role of the Determination in meeting this offsets integrity standard and remaining consistent with international accounting rules. In particular, it is important that carbon abatement from each method is reflected in Australia's National Inventory Report.

The Emissions Reduction Assurance Committee plays an important role in assessing, reviewing and monitoring methodology determinations for compliance with the offsets integrity standards. In particular, if the Committee considers that there is reasonable evidence that a Determination (with

its incorporated models and documents) does not comply with one or more offsets integrity standards, the Committee can make a legislative instrument suspending the processing of applications to apply the method. The Department takes into account the views of the Committee on the need to update this document over time and how best to achieve the offsets integrity standards. Where possible, the Department also considers the views of project proponents to ensure that the requirements in this document are practical to use and fair.

2. Simulations overview

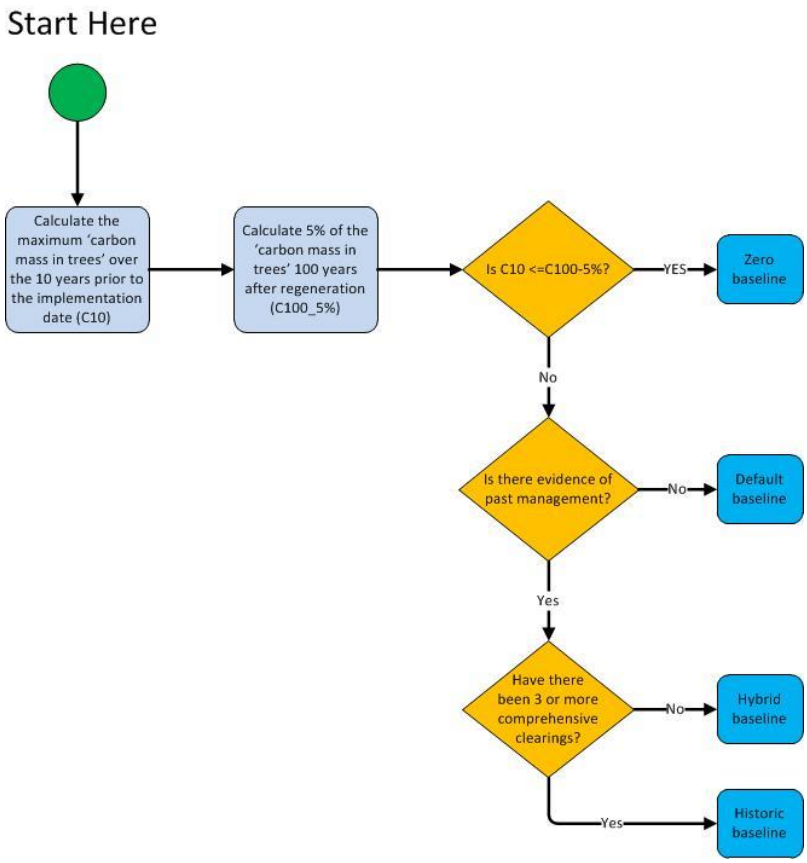
Sections 4.8, 4.9, 4.12, 4.14, 4.18 and 4.19 of the Determination require that the materiality test, baseline scenario and project scenario for each carbon estimation area (CEA) must be modelled in FullCAM in accordance with the requirements in both the Determination and this document.

2.1 Baseline scenarios

The baseline for each CEA will be either of two categories depending on the materiality test below (Section 2.2) – a zero baseline or a non-zero baseline.

Within the non-zero baseline category there are three possible baselines depending on the extent of historical information available regarding the clearing history – default, hybrid or historic. The decision flowchart below gives an overview of the process for determining which baseline to use.

Figure 1: Decision tree for determining the type of baseline to be used for each Carbon Estimation Area (CEA). See section 4.12 of the Determination for the relevant provisions.



2.2 Baseline materiality test

To determine whether a zero baseline may apply in a CEA, project proponents must complete the materiality test explained by this section and to be undertaken by following Section 3 of this document. Proponents must also comply with the provisions given for the materiality test in sections 4.7-4.9 of the Determination.

Completing the materiality test involves calculating two factors:

Factor	Explanation	Process for Calculating
C100_5%	5 per cent of the 'carbon mass of trees' at 100 years after the implementation date	see (a) below for how to calculate
C10	the maximum 'carbon mass of trees' over the ten years prior to the implementation date	see (b) below for how to calculate

Note: 'Implementation date' is defined in section 1.3 of the Determination. It is the date when the project mechanism (a change in land management enabling native vegetation to achieve forest cover) was implemented in a CEA. Each CEA may have a different implementation date.

The values calculated for these factors will allow you to determine which baseline to use:

Result	Baseline to use
C10 is less than or equal to C100_5%	Zero baseline
C10 is greater than C100_5%	Non-zero baseline (default, hybrid or historic)

Overview of simulation for calculating C100_5%

Table 1: Overview of simulation for calculating C100_5%

Objective	Calculate 5 per cent of the 'C mass of trees' at 100 years after the implementation date.
Simulation period	From the implementation date to 100 years after the implementation date.
Events permitted	Regeneration
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees)

Overview of simulation for calculating C10

Note: When calculating C10, project proponents must have documentary evidence for each event that is entered into the FullCAM event queue.

Table 2: Overview of simulation for calculating C10

Objective	Calculate the maximum carbon mass of trees reached duringover the 10 years before the implementation date.
Simulation period	From the day after the last comprehensive clearing before the 10 year period that ends on the implementation date to the implementation date.
Events permitted	Regeneration Clearing Thinning Management fireFire Windrow and burnBurn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees)

Note: 'comprehensive clearing' is defined in section 1.3 of the Determination. It means the destruction of trees or saplings, or both, by mechanical or chemical means that may be accompanied by use of fire, leaving the land in a non-forested state for pastoral land use.

2.3 Non-zero baselines

Non-zero baselines must be calculated if, according to the materiality test under the previous section, the maximum carbon stock during the ten years prior to the implementation date has reached a material level (i.e. C10 > C100_5%).

Overview of simulation for calculating a Default Baseline

A default non-zero baseline is suitable for project proponents whose records are not sufficient to model either an historic or a hybrid baseline. For further information about default non-zero baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the Explanatory Statement for the original Determination. A default non-zero baseline is modelled in FullCAM by repeating the default baseline management event scenario over the baseline forecast period. This scenario consists of a sequence of comprehensive clearings that occur at 15 year intervals (refer to Table 3).

If project proponents can demonstrate that fire was used to suppress regrowth on land that is part of the same pastoral property as the CEA then:

- a management fire event may be added occurring 7 years after each regeneration eventincluded in each 15 year interval; and
- a windrow'Windrow and burnBurn' fire event may be added occurring 6 months after eacha comprehensive clearing event.

Table 3: Overview of simulation for calculating a Default Baseline

Objective	Calculate the default non-zero baseline which estimates. Estimate average carbon stocks in athe carbon estimation area (CEA)over 100 years in the absence of an eligible offsets project. Averages are estimated from tThe average carbon stocks over the 100 years from the implementation date are used in the calculations within the methodimplementation date until 100 years after the implementation date (1200 monthsthe baseline forecast period), but the simulation period commences at an earlier date (see below).

Simulation period	From one day after the last comprehensive clearing event that occurred before the implementation date. Simulations end 100 years after the implementation date ~~(the baseline forecast period)~~.
Events permitted	Cycled every 15 years: • Regeneration~~;~~ • ~~Clearing;~~ • Management fire 7 years after regeneration~~Regeneration~~ event – where sufficient evidence~~; and~~ Clearing • Windrow and burn fire 6 months after clearing event~~Burn~~ – where sufficient evidence~~.~~
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris)

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Overview of simulation for calculating a Hybrid Baseline

A hybrid baseline is suitable for project proponents who have evidence of two comprehensive clearings that occurred less than 15 years apart and before the implementation date. For further information about hybrid baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the Explanatory Statement for the original Determination.

A hybrid baseline is modelled in FullCAM by repeating the hybrid baseline management event scenario over the baseline forecast period. This scenario consists of a sequence of comprehensive clearings that occur at two alternating intervals, one default interval of 15 years, followed by~~and~~ one historic interval matching the interval between the last two clearings before the implementation date. ~~(refer to Table 4).~~

If project proponents can demonstrate that fire was used to suppress regrowth on land that is part of the same pastoral property as the CEA, then:

- a management fire event may be included 7 years after the regeneration event in the 15 year default interval; and
- a windrow~~'Windrow~~ and burn~~Burn'~~ fire event may be included 6 months after the ~~comprehensive~~ clearing event in~~at~~ the ~~beginning of the~~ 15 year default interval.

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If project proponents can demonstrate that fire was used in the ~~second~~ historic interval, ~~–~~then corresponding ~~that~~ fire events set out in these Guidelines ~~event~~ may be included in modelling that interval.

If documentary evidence shows, to the satisfaction of the Regulator, that a management event other than a comprehensive clearing occurred in the carbon estimation area during the historic interval, that management event may be included in the historic interval if it is a permitted event in Table 4 below.

Overview of simulation for calculating a Historic Baseline

Project proponents wishing to model a~~an~~ historic baseline must have evidence for at least three comprehensive clearings that occurred in the carbon estimation area (CEA) before the

implementation date. For further information about historic baselines, see sections 4.12 and 4.15 of the Determination, and pages 19 to 21 and Appendix A of the original Explanatory Statement.

A historic ~~non-zero~~ baseline is modelled in FullCAM by repeating the historic baseline management event scenario over the baseline forecast period. There are stringent evidentiary requirements for modelling a~~an~~ historic baseline. Project proponents must have documentary evidence for each event modelled in the scenario (refer Table 4).

If documentary evidence shows, to the satisfaction of the Regulator, that a management event other than a comprehensive clearing occurred in the carbon estimation area before the implementation date, that event may be included in the historic baseline scenario if it is a permitted event in Table 4 below.

Table 4: Overview of simulation for calculating a Historic or Hybrid Baseline

Objective	Calculate historic and hybrid non-zero baselines which estimate average carbon stocks in a carbon estimation area ~~over 100 years~~ in the absence of an eligible offsets project. ~~Averages are estimated from the implementation date until 100 years after the implementation date.~~
Simulation period	One day after the most recent comprehensive clearing event. Simulations end 100 years after the implementation date (the baseline forecast period).
Events permitted	Regeneration Clearing Thinning Management fire Windrow and burn ~~Burn~~
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris)

2.4 Overview of simulation for calculating project carbon stocks

To determine the project carbon stocks, project~~Project~~ proponents must model all events listed in the table below that reflect the actual management~~fire, thinning and regeneration~~ events that occurred in the CEA during the entirety of the simulation period (from one day after the last comprehensive clearing before the implementation date until the end of the ~~in the~~ current ~~and previous~~ reporting period) ~~(s) to determine the project carbon stocks as per section 4.18 of the Determination.~~

Table 5 Overview of simulation for calculating project carbon stocks

Objective	Calculate total carbon stocks in each CEA at the end of each reporting period. These carbon stocks will reflect the age of the regrowth within the CEA, observed climate, and activities and disturbance subsequent to the establishment of the offsets project.

Simulation period	From one day after the last comprehensive clearing before the implementation date. Simulations end at the end of the current reporting period.
Events permitted	Regeneration Clearing Thinning Prescribed fire – to reduce fire risk Wildfire~~Wildfires~~ – trees not killed Wildfire~~Wildfires~~ – trees killed Management fire Windrow and burn
Outputs	Monthly totals for 'C mass of trees' (FullCAM Output = Carbon / Forest / Plants / C mass of trees) Monthly totals for 'C mass of debris' (FullCAM Output = Carbon / Forest / Debris / C mass of forest debris) Monthly totals for emissions of CH_4 from fire (FullCAM Output = Whole / Emissions / CH_4 emitted due to fire) Monthly totals for emissions of N_2O from fire (FullCAM Output = Nitrogen / Whole / Emissions / N_2O emitted due to fire)

3. Setting up simulations for carbon estimation areas

The following steps must be followed for entering data into each tab in a FullCAM plot file. Each table provides a sequential list of steps in the right hand column. The left hand column indicates the Simulation Type that the steps are relevant to. Screenshots relevant to each set of steps, directly follow each table.

3.1 Opening a file

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Open a new plot under the 'File' menu. Enter a name for the plot that reflects the identifier for the CEA and model scenario, e.g. 'CEA1_baseline'.

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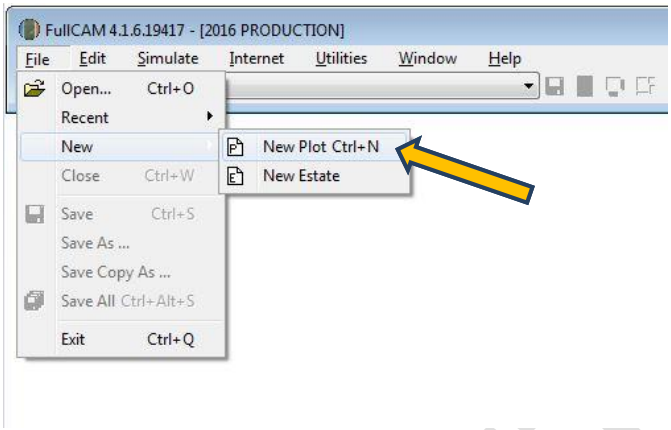
FullCAM 4.1.6.19417 - [2016 PRODUCTION]
File
Edit
Simulate
Internet
Utilities
Window
Help
Open... Ctrl+O
Recent
New
Close Ctrl+W
Save Ctrl+S
Save As ...
Save Copy As ...
Save All Ctrl+Alt+S
Exit Ctrl+Q
New Plot Ctrl+N
New Estate

3.2 Saving a plot file

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Save the plot file using the 'File' menu on the FullCAM toolbar. • Save the plot file regularly when setting up and running simulations.

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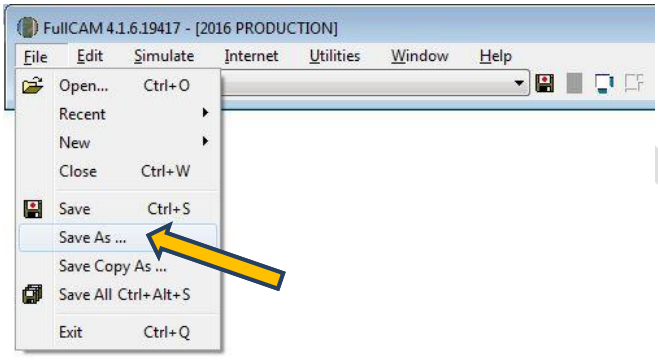

3.3 The Configuration Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• From the 'Plot' drop down menu, select 'Forest system'. • Do NOT change any other settings.

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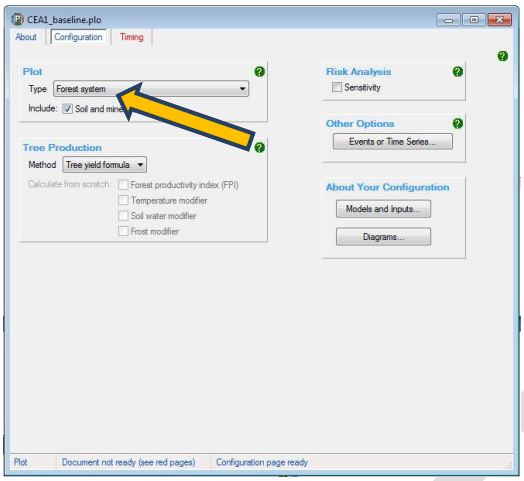

3.4 The Timing Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Set the Simulation Timing to 'calendar'. • Set the Output Steps to 'months'.
C100_5%	• Enter the date to start simulations as the implementation date. • Enter the date to end the simulation as 100 years after the implementation date.
C10	• Enter the date to start simulations as the day after the last comprehensive clearing that occurred before the 10 year period that ends on the implementation date. Enter the date to end the simulation as the implementation date.
Default baseline Historic baseline Hybrid baseline Project carbon	• Enter the date to start simulations as one day after the last comprehensive clearing before the implementation date. • Enter the date to end the simulation as 100 years after the implementation date.
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any other settings. • New tabs will appear once this tab has been completed.

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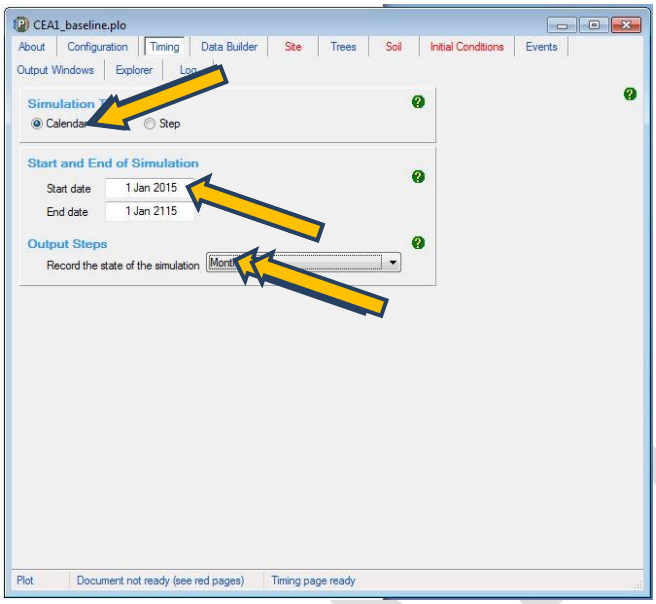

3.5 The Data Builder Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Check the box to turn on the Data Builder (this requires an internet connection). • Enter the latitude and longitude (in decimal degrees) of the model point location central to the CEA being modelled and not in an exclusion area. • Click the button to 'Download Spatial Data' and click 'OK' on the information box that pops up. • Select 'Mixed species environmental plantings' from the dropdown box for 'Tree species' and then click the button to 'Download This Species' and 'Yes' to 'Make mixed species environmental plantings the initial tree species'. NB: Do NOT use the 'Mixed species environmental plantings temperate' setting. • Do NOT download a regime (and therefore the events associated with the regime) for this species. • Do NOT change any other settings.

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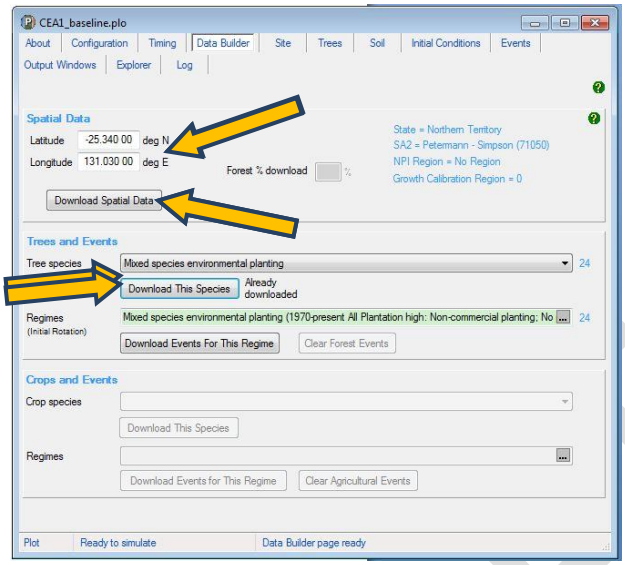

3.6 The Site Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any settings.

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3.7 The Tree Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Do NOT change any settings.

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3.8 The Soil Tab

Simulation Type	Steps required
C100_5% C10 Default baseline	• Do NOT change any settings.

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Historic baseline Hybrid baseline Project carbon	

3.9 The Initial Conditions Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Click the button labelled 'Trees' and uncheck the box under 'Existence' to show that the site did not have trees growing on it at the start of the simulation. Click 'OK'. • Click the button labelled 'Debris' and change all the default settings for each debris pool to zero. • Do NOT change any other settings.

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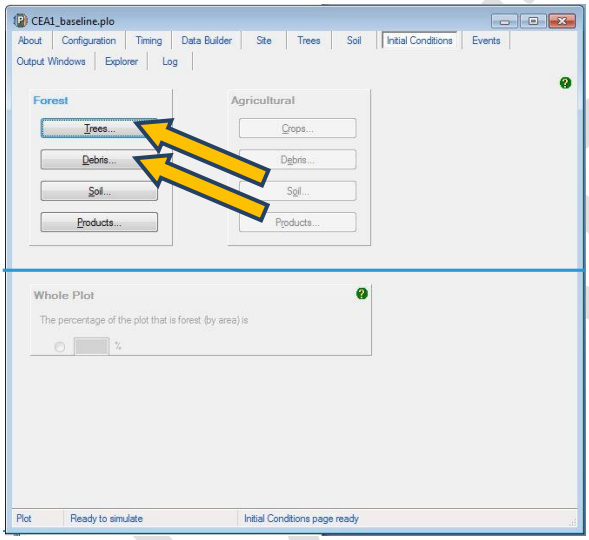
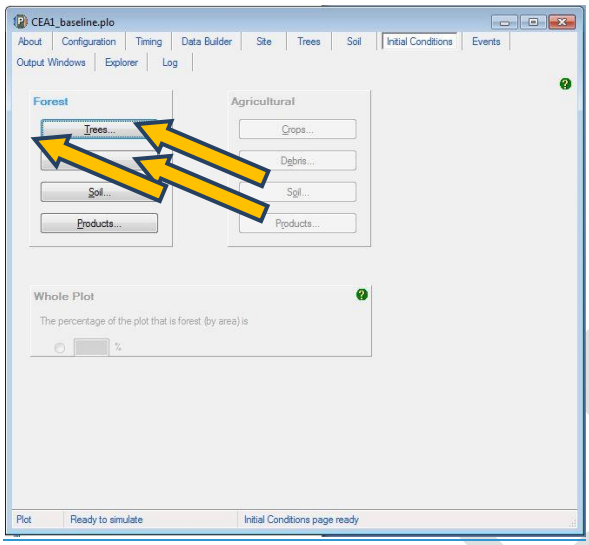
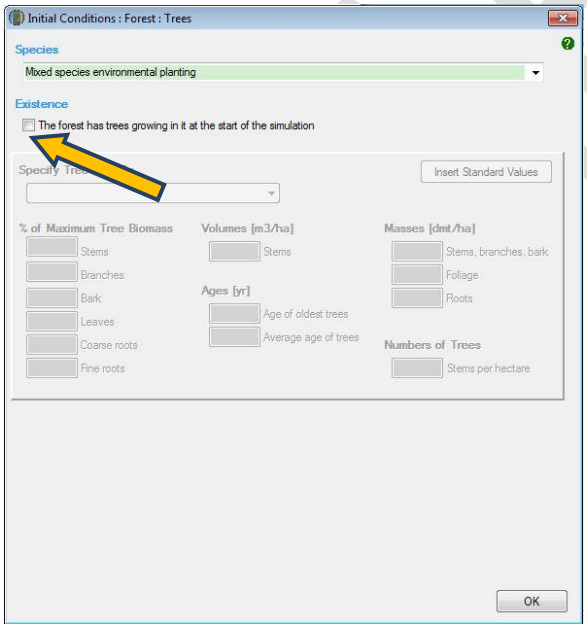
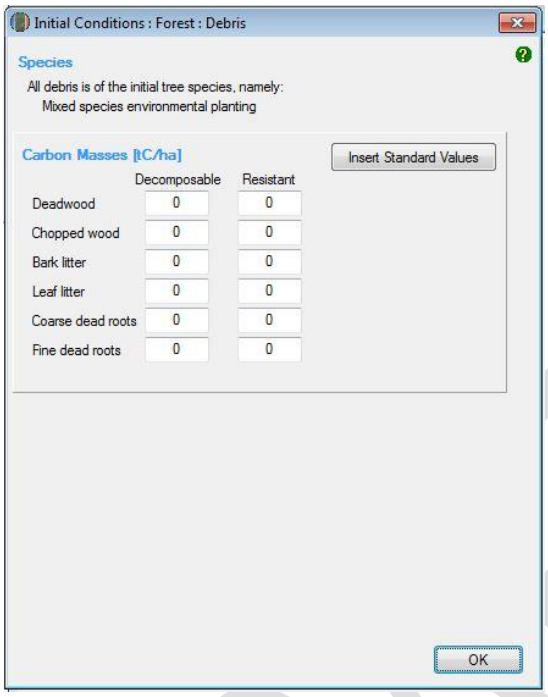



CEA1_baseline.plo
About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Forest
Trees...
Soil...
Products...
Agricultural
Crops...
Debris...
Soil...
Products...
Whole Plot
The percentage of the plot that is forest (by area) is
%
Plot
Ready to simulate
Initial Conditions page ready


Initial Conditions : Forest : Trees
Species
Mixed species environmental planting
Existence
The forest has trees growing in it at the start of the simulation
Insert Standard Values
% of Maximum Tree Biomass
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Volumes [m3/ha]
Stems
Ages [yr]
Age of oldest trees
Average age of trees
Masses [dmt/ha]
Stems, branches, bark
Foliage
Roots
Numbers of Trees
Stems per hectare
OK



3.10 The Events Tab

The Events Tab is where events for a simulation can be added and displayed in sequence.

Table 6: Permitted Events for each Simulation Type

Simulation Type	Permitted Events
C100_5%	Regeneration
C10	Regeneration Clearing Thinning Management fire Windrow and burn fire
Default baseline	Regeneration Clearing Management fire – where sufficient evidence (see s 4.12 of the Determination) Windrow and burn fire – where sufficient evidence (s 4.12 of the Determination)
Historic baseline Hybrid baseline	Regeneration Clearing Thinning Management fire – where sufficient evidence (see s 4.12 of the Determination) Windrow and burn fire – where sufficient evidence (s 4.12 of the Determination)
Project carbon	Regeneration Clearing Thinning

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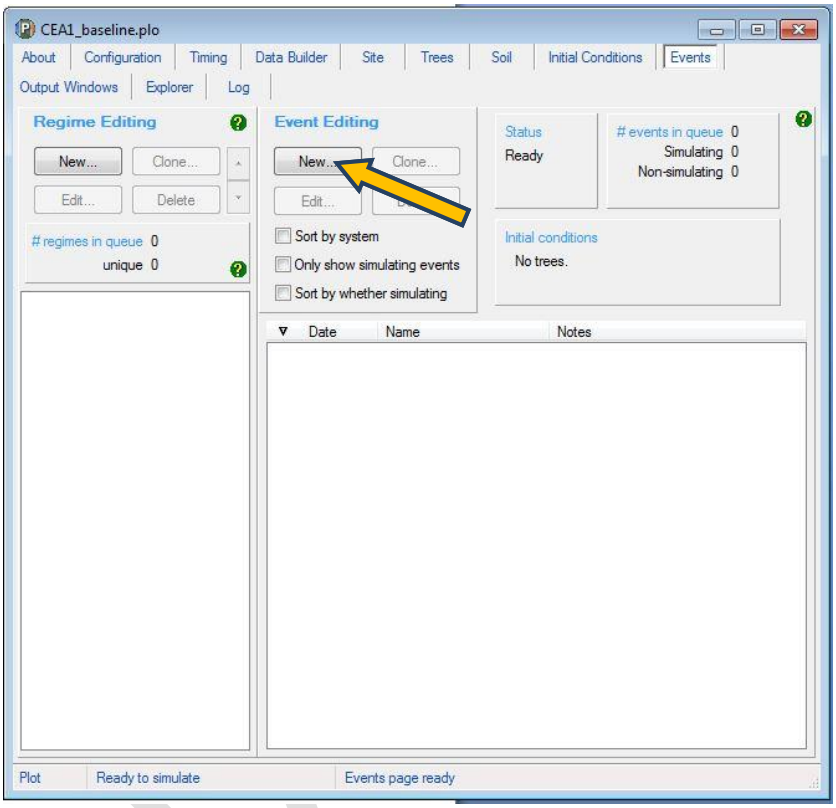
	Management fire Windrow and burn fire Prescribed fire – to reduce fire risk Wildfire – trees not killed Wildfire – trees killed



3.10.1 Adding a regeneration event

The below steps and notes must be followed to add a regeneration event. There are different requirements for modelling a regeneration event according ~~Regeneration events must be added~~ to the scenario type.

Where a regeneration event must be added following a comprehensive clearing or a wildfire - trees killed event, also follow~~FullCAM event queue for each CEA to model~~ the below steps and notes.

Notes on timing for different scenario types

For the project carbon scenario, the timing~~establishment~~ of a regeneration event must be supported by evidence (subsection 4.19(2) and paragraph 5.5(b) of the Method), as well as conform with the

input requirements specified here (paragraph 4.18(2)(a) of the Method). The timing of a regeneration event must correspond with the establishment of forest potential within the CEA.

Unless the project area is a ***pre-existing project area***, t~~T~~he timing of a regeneration event in the project carbon scenario cannot be more than 14 years prior to the project registration date, or where the land comprising the CEA was added to the project area through a project area variation, cannot be more 14 years prior to the date of that variation. For the purposes of this paragraph, a ***pre-existing project area*** is a project area that was:

- on 13 December 2017 a project area of an eligible offset project applying the Determination; or
- a project area included in an application under section 22 of the Act to be an eligible offsets project to which the Determination would apply received by the Regulator before 13 December 2017; or
- an area of land proposed to be included in an eligible offsets project which applied the Determination on 13 December 2017 in an application under section 23 of *the Carbon Credits (Carbon Farming Initiative) Rule 2017* received by the Regulator before 13 December 2017.

This limitation aims to ensure the estimation of project carbon stocks is conservative. Permitting the modelling of longer periods of regeneration prior to registration may yield carbon stock levels inconsistent with the land not having forest cover at the project registration or variation date (as required for eligibility under section 2.4 of the Method). The limitation also aligns with an assumption of the default baseline scenario of the Method. The default baseline contains the assumption that after 14 years of regeneration the vegetation on the land would have been cleared again for pastoral purposes. Permitting the modelling of shorter periods of regeneration under the default baseline (14 years) than under the project scenario (>14 years) could underestimate the baseline amount and not provide a conservative estimate of the overall project carbon abatement eligible for crediting.

For the default baseline scenario, a regeneration event occurs 12 months ~~potential after each comprehensive clearing. In the absence of evidence to the contrary, the timing of attainment of forest potential is deemed to occur one year~~ after each comprehensive clearing. See subsection 4.12(6) and paragraph 4.15(2)(b) ~~event. Evidence is required to set the date of regeneration to any other time after clearing. See section 4.6~~ of the Determination ~~for details~~.

For the C10, hybrid and historic~~default~~ baseline scenarios, ~~regeneration events and clearing events should recur on a 15 year cycle for~~ the timing~~duration~~ of ~~the simulation (i.e. 12 months from clearing to regeneration plus 14 years of growth prior to re-clearing).~~

~~**Note:** Where there is evidence of regeneration following a wildfire where trees were killed,~~ a regeneration event is ~~must be added to the events queue~~ 12 months after each comprehensive clearing, ~~wildfire – trees killed event,~~ unless ~~there is specified~~ evidence supports setting~~to set~~ the date to another~~of regeneration to some other~~ time. ~~after clearing (~~See section 4.6, and subsections 4.8(5), 4.12(9) and 4.12(15) of the Determination.~~)~~.

Steps for the Project Carbon Scenario Modelling

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Note: Where there is evidence of regeneration following a windrow and burn following clearing, a regeneration event must be added to the events queue 6 months after each windrow and burn event.

Simulation Type	Steps required
Project carbon	• Click the 'New' button under 'Event Editing' to create a new event.
Project carbon	• Enter the date in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. The timing of a regeneration event in the project carbon scenario cannot be more than 14 years prior to the project registration date, or where the land comprising the CEA was added to the project area through a project variation, cannot be more 14 years prior to the date of that variation.
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Click the 'New' button under 'Event Editing' to create a new event. In the drop down menu next to 'Type', select 'Plant trees'. • Click 'Insert standard values'. Select the row with the 'Event Name' of 'Plant trees: natural regeneration' and then click 'OK' and 'Yes' to insert the name of the standard event. • Do NOT change any other setting. • Click 'OK' to finish adding the event to the event queue.

Steps for the Baseline and Materiality Test Modelling

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline	• Click the 'New' button under 'Event Editing' to create a new event.
C100_5%	• Insert the simulation start date in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy.
Default baseline	• EnterFor the date that is 12 months afterfirst regeneration event, insert the time when regeneration commenced following the most recent comprehensive clearing event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. For all other regeneration events insert the date 15 years after the previous regeneration event.
C10 Historic baseline Hybrid baseline Project carbon	• Enter the date as determined from the above notesFor the first regeneration event, insert the time when regeneration commenced following the most recent comprehensive clearing event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. For all subsequent regeneration events insert the date for each to represent the observed or default interval between regeneration events.
C100_5% C10 Default baseline	• In the drop down menu next to 'Type', select 'Plant trees'.

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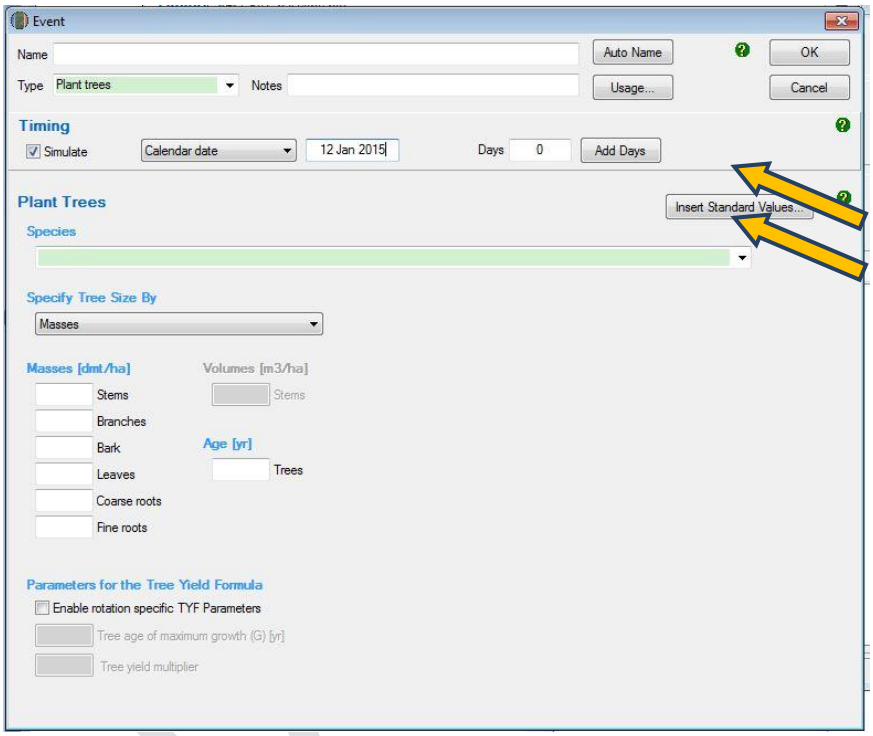
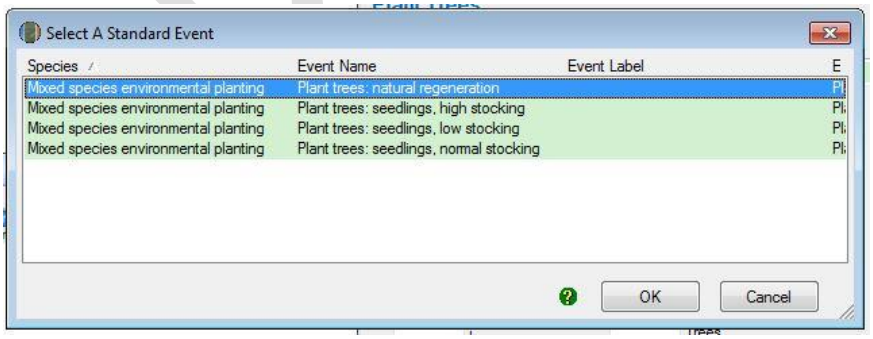
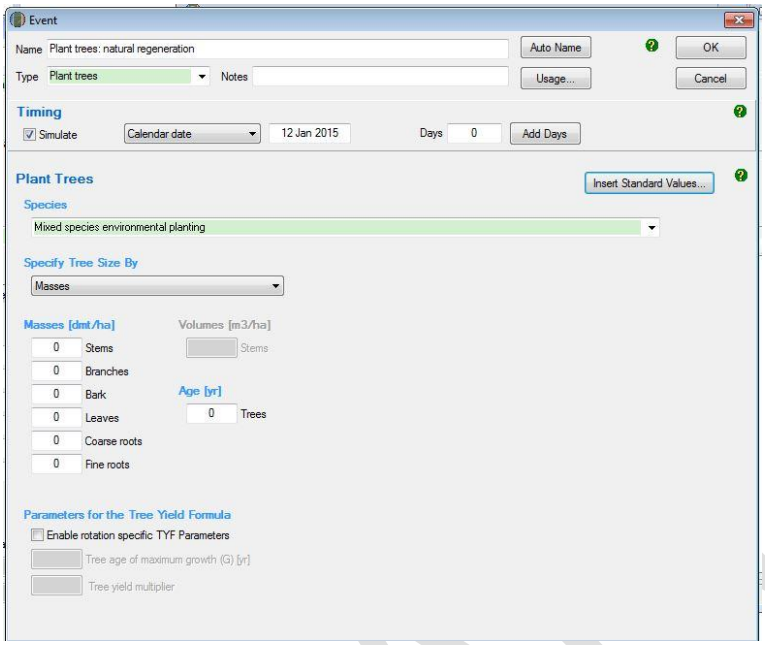
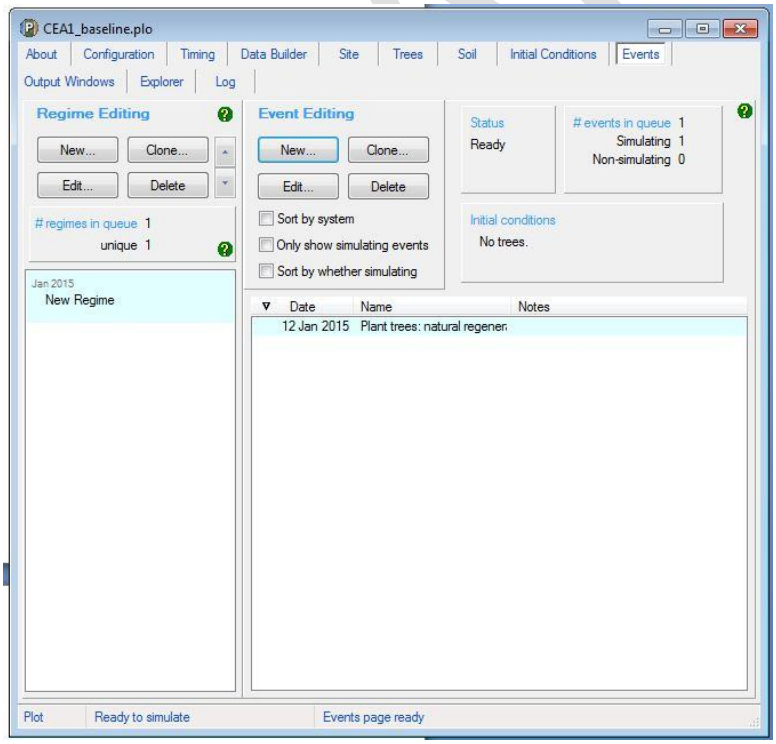
Historic baseline Hybrid baseline ~~Project carbon~~	• Click 'Insert standard values'. Select the row with the 'Event Name' of 'Plant trees: natural regeneration' and then click 'OK' and 'Yes' to insert the name of the standard event. • Do NOT change any other setting. • Click 'OK' to finish adding the event to the event queue.






Event
Name Plant trees: natural regeneration
Auto Name
OK
Type Plant trees
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2015
Days 0
Add Days
Plant Trees
Insert Standard Values...
Species
Mixed species environmental planting
Specify Tree Size By
Masses
Masses [dmt/ha]
Volumes [m3/ha]
0 Stems
Stems
0 Branches
0 Bark
Age [yr]
0 Leaves
0 Trees
0 Coarse roots
0 Fine roots
Parameters for the Tree Yield Formula
Enable rotation specific TYF Parameters
Tree age of maximum growth (G) [yr]
Tree yield multiplier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About
Configuration
Timing
Data Builder
Site
Trees
Soil
Initial Conditions
Events
Output Windows
Explorer
Log
Regime Editing
New...
Clone...
Edit...
Delete
regimes in queue 1
unique 1
Jan 2015
New Regime
Event Editing
New...
Clone...
Edit...
Delete
Sort by system
Only show simulating events
Sort by whether simulating
Status
Ready
events in queue 1
Simulating 1
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
12 Jan 2015
Plant trees: natural regener
Plot
Ready to simulate
Events page ready

3.10.2 Adding a clearing event

These steps must be followed to add a~~repeated for each~~ clearing event, which corresponds to a comprehensive ~~that occurs in each CEA during the simulation period. For each~~ clearing referred to in the Determination~~event the date must reflect the date of that clearing event~~.

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED.~~
Project carbon	• Not permitted~~NOT PERMITTED.~~
C10 Default baseline Historic baseline Hybrid baseline	• Click the 'New' button under 'Event Editing' to create a new event.
C10 Historic baseline Hybrid baseline	• Insert the date of the clearing event in the blank field beside the 'Timing' section. • For the first clearing event, insert the date of the clearing event in the blank field beside the 'Timing' section based on ~~the interval observed historically observation~~what occurred historically. This will need to be entered in the format dd mmm yyyy. • For subsequent clearing events, insert the date of clearing in this field to represent the observed date or default interval between comprehensive clearings as per section 4.6 of the Determination.
Default baseline	• Insert the date of the clearing event in the blank field beside the 'Timing' section. ~~The intervals between events must reflect those that occurred historically. This will need to be entered in the format dd mmm yyyy.~~ Each clearing event will be 14 years after the previous regeneration event.
C10 Default baseline Historic baseline Hybrid baseline	• In the drop down menu next to 'Type', select 'Thin'. • Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'Yes' to insert the name of the standard event. • Ensure that the box next to 'Affected portion' contains the value '100' to indicate a clearing event. • Do NOT change any other settings. • Click 'OK' to finish adding the event to the event queue.

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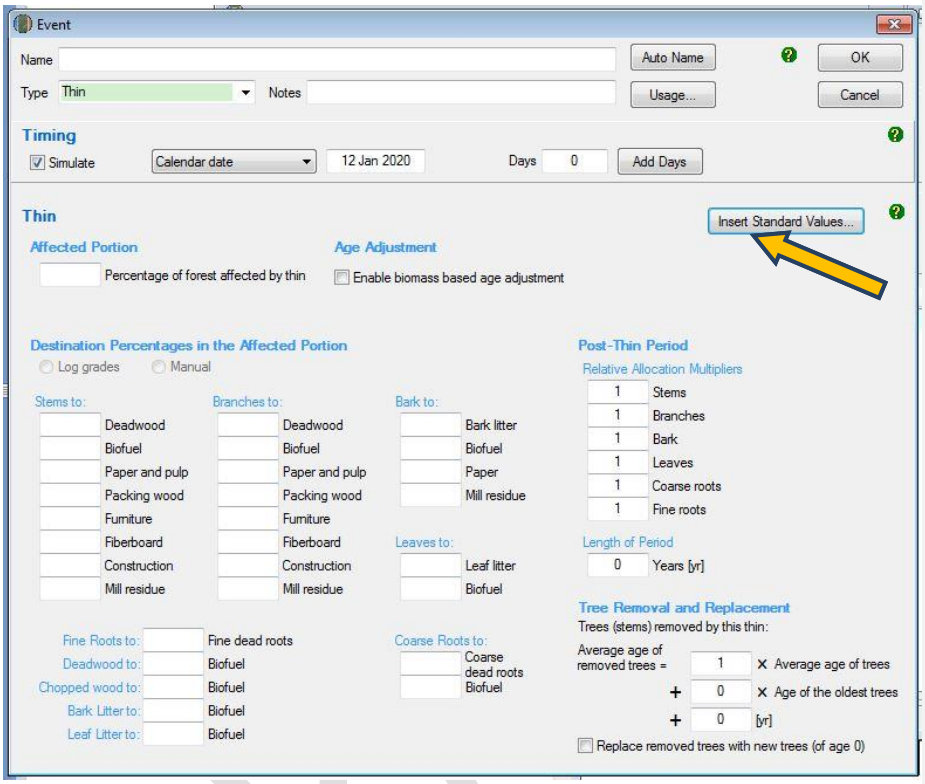
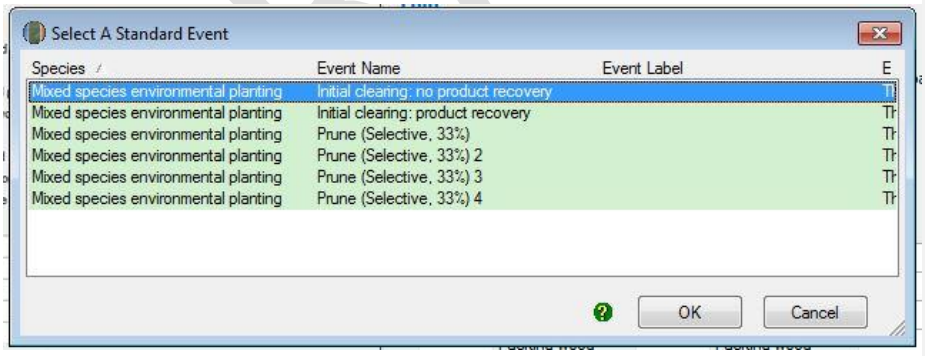
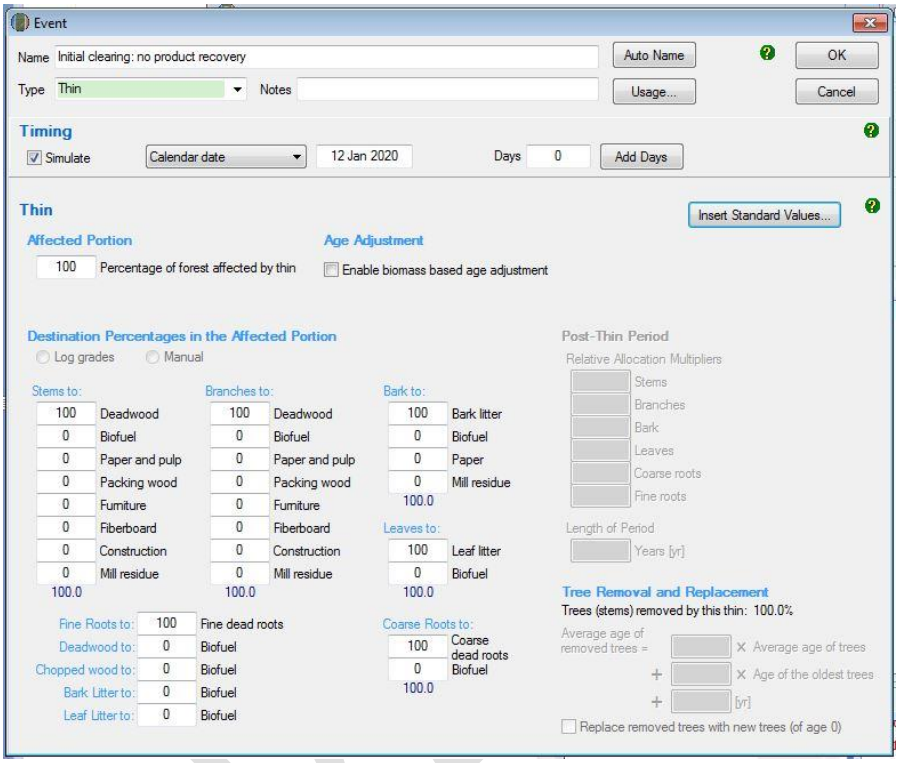

Event
Name
Auto Name
OK
Type Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
12 Jan 2020
Days 0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees = 1 X Average age of trees
+ 0 X Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)


Select A Standard Event
Species
Event Name
Event Label
E
Mixed species environmental planting
Initial clearing: no product recovery
Mixed species environmental planting
Initial clearing: product recovery
Mixed species environmental planting
Prune (Selective, 33%)
Mixed species environmental planting
Prune (Selective, 33%) 2
Mixed species environmental planting
Prune (Selective, 33%) 3
Mixed species environmental planting
Prune (Selective, 33%) 4
OK
Cancel



3.10.3 Adding a thinning event

These steps must be followed to add a~~repeated for each thinning event that occurs in each CEA during the simulation period. For each thinning event the date must reflect the date of the~~ a thinning event.

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED~~
Default baseline	• Not permitted~~NOT PERMITTED~~
C10 Historic baseline Hybrid baseline Project carbon	1. Click the 'New' button to create a new event. 2. Insert the date of the thinning event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. The intervals between events must reflect those that occurred historically. 3. In the drop down menu next to 'Type', select 'Thin'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Initial clearing: No product recovery' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. In the box next to 'Affected portion – the percentage of forest affected by thin' change the number to an estimate of the proportion of the stems that were killed in the thinning. You must report on how the estimate was derived in your project report. 6. Do NOT change any other settings. 7. Click 'OK' to finish adding the event to the event queue.

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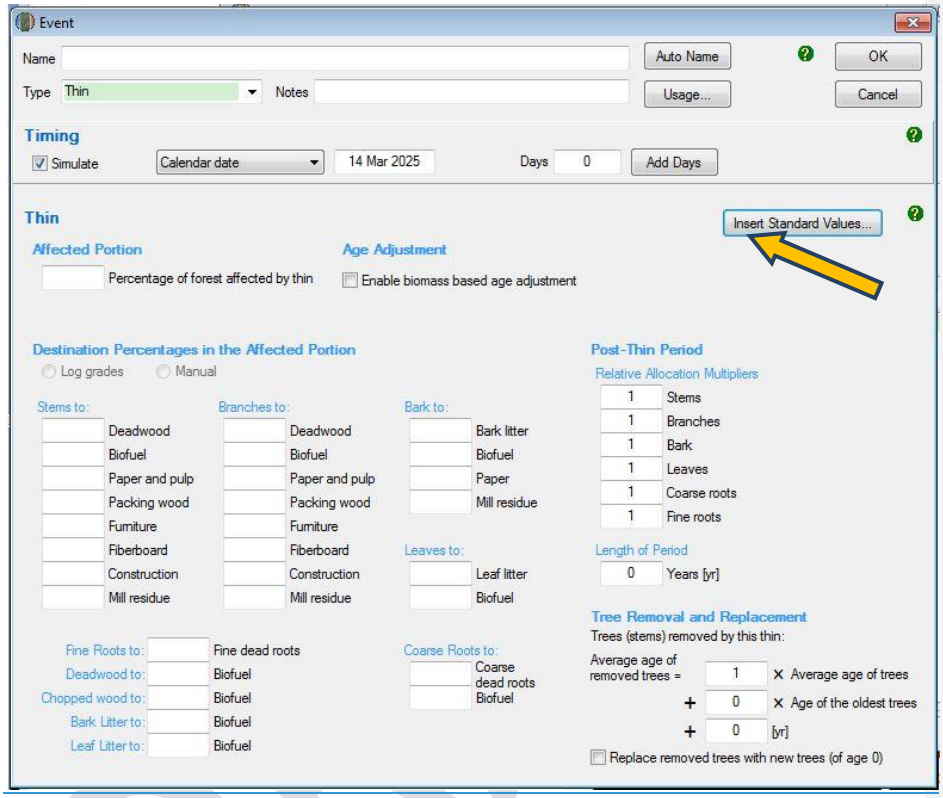
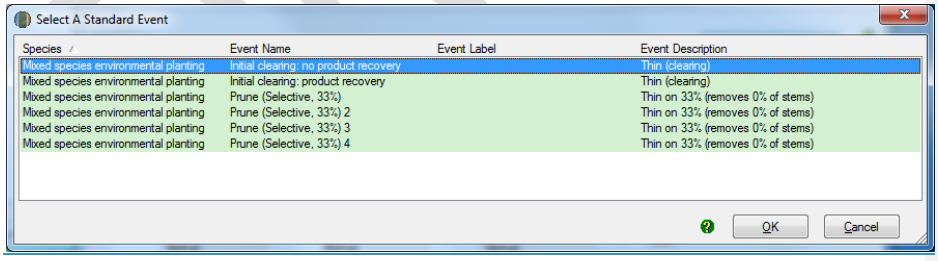
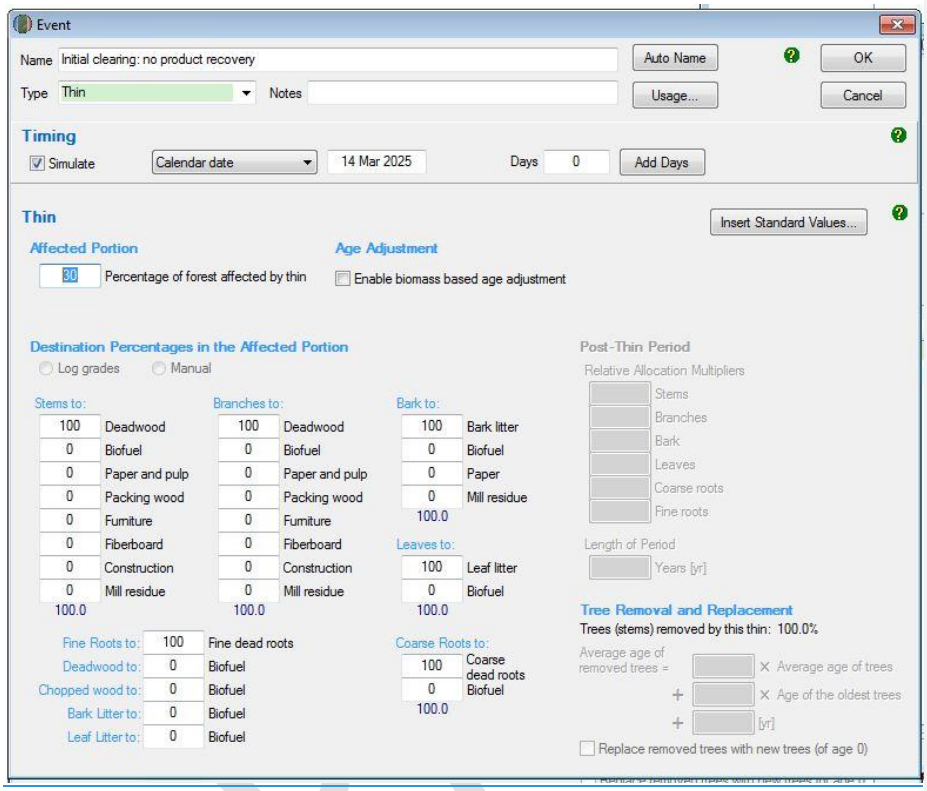
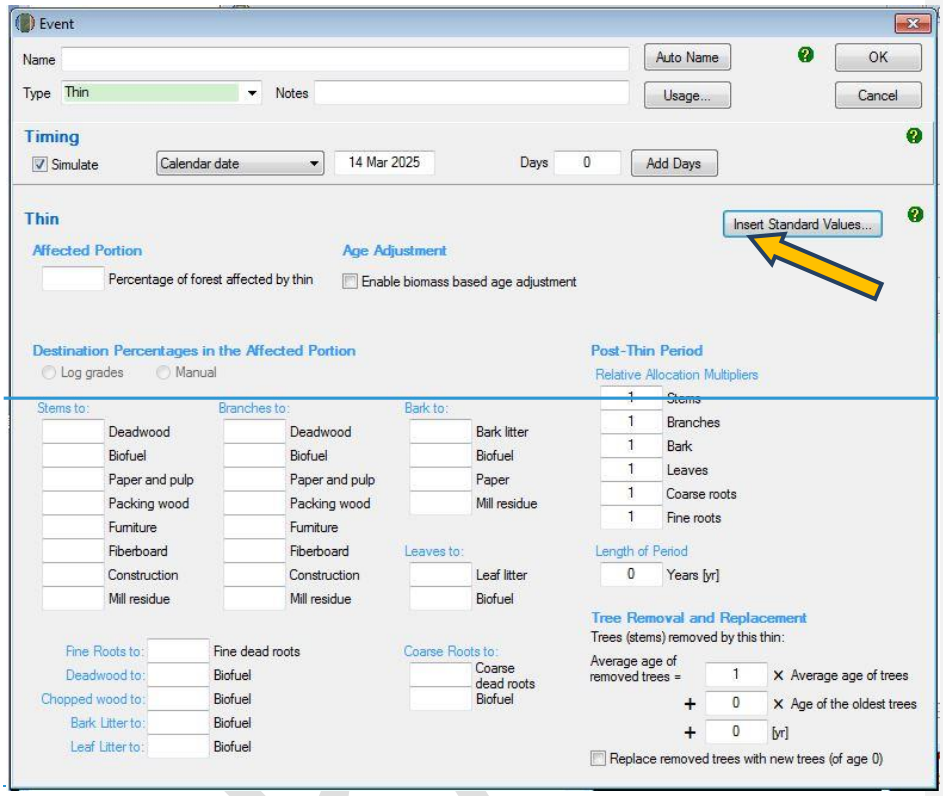
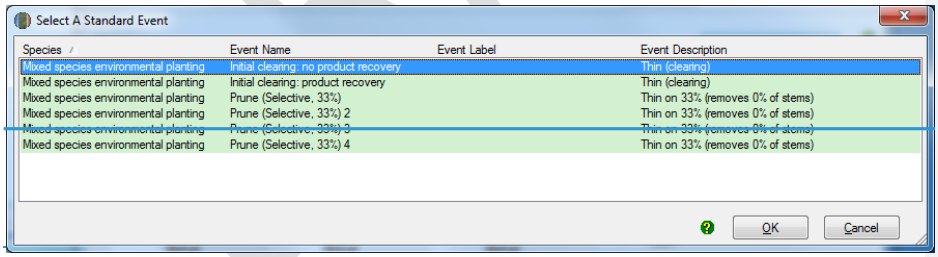
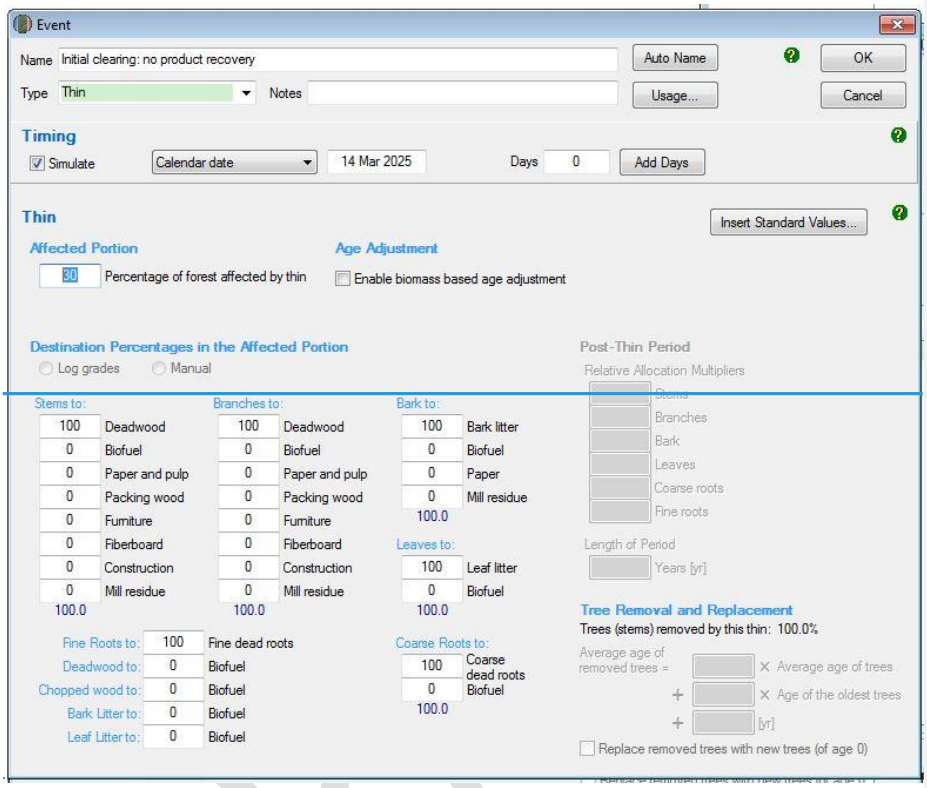

Event
Name
Auto Name
OK
Type Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
14 Mar 2025
Days 0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 × Average age of trees
+ 0 × Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting | Initial clearing: no product recovery | | Thin (clearing)
Mixed species environmental planting | Initial clearing: product recovery | | Thin (clearing)
Mixed species environmental planting | Prune (Selective, 33%) | | Thin on 33% (removes 0% of stems)
Mixed species environmental planting | Prune (Selective, 33%) 2 | | Thin on 33% (removes 0% of stems)
Mixed species environmental planting | Prune (Selective, 33%) 3 | | Thin on 33% (removes 0% of stems)
Mixed species environmental planting | Prune (Selective, 33%) 4 | | Thin on 33% (removes 0% of stems)
OK
Cancel


Event
Name Initial clearing: no product recovery
Auto Name
OK
Type Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
14 Mar 2025
Days 0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
100 Deadwood
0 Biofuel
0 Paper and pulp
0 Packing wood
0 Furniture
0 Fiberboard
0 Construction
0 Mill residue
100.0
Branches to:
100 Deadwood
0 Biofuel
0 Paper and pulp
0 Packing wood
0 Furniture
0 Fiberboard
0 Construction
0 Mill residue
100.0
Bark to:
100 Bark litter
0 Biofuel
0 Paper
0 Mill residue
100.0
Leaves to:
100 Leaf litter
0 Biofuel
100.0
Fine Roots to: 100 Fine dead roots
Deadwood to: 0 Biofuel
Chopped wood to: 0 Biofuel
Bark Litter to: 0 Biofuel
Leaf Litter to: 0 Biofuel
Coarse Roots to:
100 Coarse dead roots
0 Biofuel
100.0
Post-Thin Period
Relative Allocation Multipliers
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Length of Period
Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin: 100.0%
Average age of removed trees =
× Average age of trees
+
× Age of the oldest trees
+
[yr]
Replace removed trees with new trees (of age 0)


Event
Name
Auto Name
OK
Type Thin
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
14 Mar 2025
Days 0
Add Days
Thin
Insert Standard Values...
Affected Portion
Percentage of forest affected by thin
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Log grades
Manual
Stems to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Branches to:
Deadwood
Biofuel
Paper and pulp
Packing wood
Furniture
Fiberboard
Construction
Mill residue
Bark to:
Bark litter
Biofuel
Paper
Mill residue
Leaves to:
Leaf litter
Biofuel
Fine Roots to:
Fine dead roots
Deadwood to:
Biofuel
Chopped wood to:
Biofuel
Bark Litter to:
Biofuel
Leaf Litter to:
Biofuel
Coarse Roots to:
Coarse dead roots
Biofuel
Post-Thin Period
Relative Allocation Multipliers
1 Stems
1 Branches
1 Bark
1 Leaves
1 Coarse roots
1 Fine roots
Length of Period
0 Years [yr]
Tree Removal and Replacement
Trees (stems) removed by this thin:
Average age of removed trees =
1 X Average age of trees
+ 0 X Age of the oldest trees
+ 0 [yr]
Replace removed trees with new trees (of age 0)


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting | Initial clearing: no product recovery | | Thin (clearing)
Mixed species environmental planting | Initial clearing: product recovery | | Thin (clearing)
Mixed species environmental planting | Prune (Selective, 33%) | | Thin on 33% (removes 0% of stems)
Mixed species environmental planting | Prune (Selective, 33%) 2 | | Thin on 33% (removes 0% of stems)
Mixed species environmental planting | Prune (Selective, 33%) 3 | | Thin on 33% (removes 0% of stems)
Mixed species environmental planting | Prune (Selective, 33%) 4 | | Thin on 33% (removes 0% of stems)
OK
Cancel



~~3.10.7~~3.10.4 Adding fire events

~~3.10.7.1~~3.10.4.1 *Adding a management fire event*

These steps must be followed to add a ~~repeated for each~~ management fire event ~~that follows a clearing event that occurs in a CEA during the simulation period~~. A management fire event encourages grass for pasture. It is a fire that occurs within a clearing interval and is used to set back the regrowth, killing a substantial proportion of the above ground plant parts. ~~For each of these events, the date must reflect the date of that event.~~

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED~~
C10	• Not permitted~~NOT PERMITTED~~

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Simulation Type	Steps required
Default baseline Historic baseline Hybrid baseline Project carbon	1. Click on the 'New' button to create a new event. 2. In the blank field besides the 'Timing' section, insert the date of the management fire in the simulation period. The intervals between events must reflect those that occurred historically. For example, for default values used in baselines, this is 7 years after the regeneration event. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Change the name of the event to 'management~~Management~~ fire'. 6. CHANGE THE SETTINGS TO MATCH THOSE IN THE SCREENSHOT BELOW. 7. Tick the 'Enable biomass based age adjustments' box. 8. Click 'OK' to finish adding the event to the event queue.

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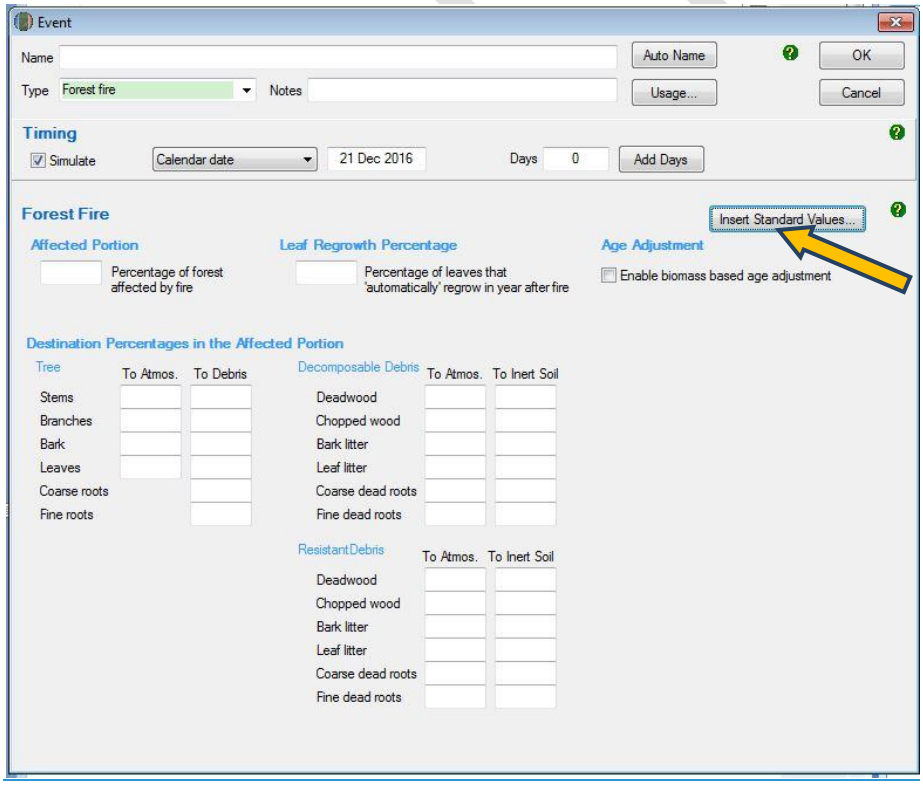
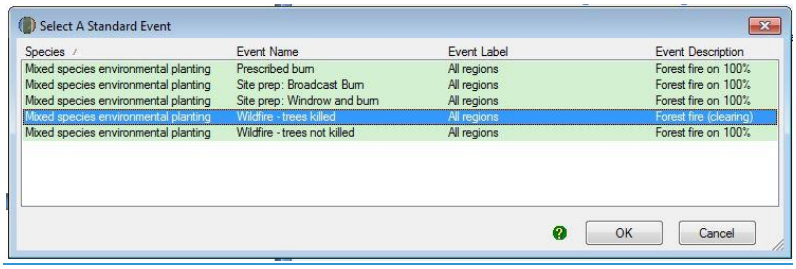
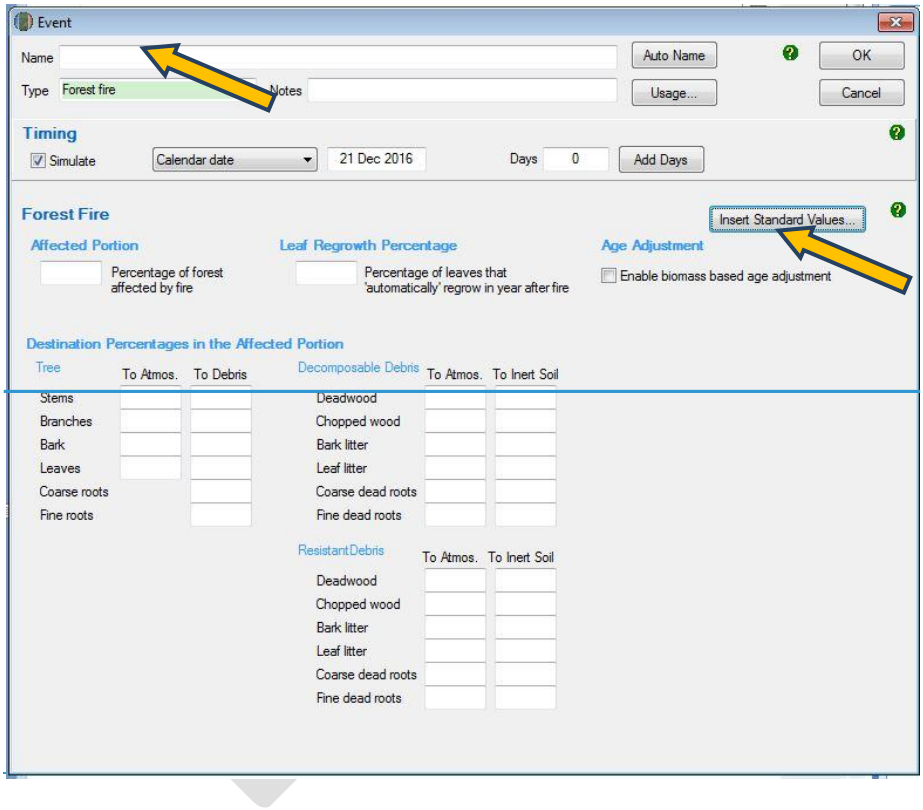
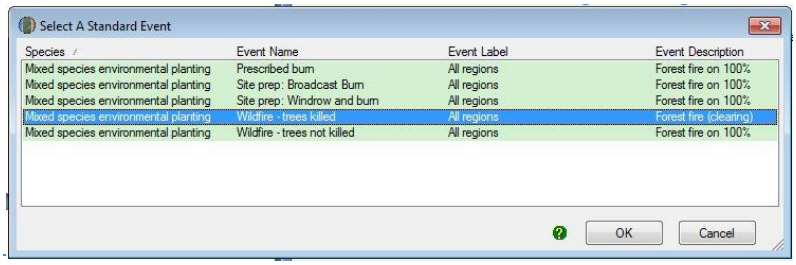
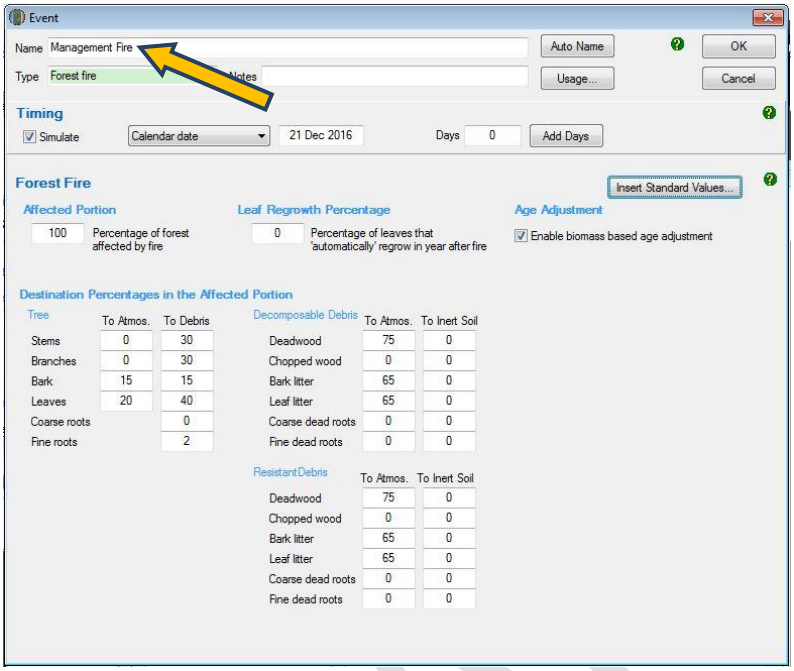



Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel


Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
21 Dec 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
Resistant Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel



~~3.10.7.2~~3.10.4.2 *Adding a windrow and burn fire event*

~~These steps must be repeated for each windrow and burn fire event that follows a clearing event that occurs in a CEA.~~ A windrow and burn fire event reduces the amount of debris that remains after the clearing event. Evidence is required to support modelling a windrow and burn event. See subsection 4.12(5) regarding evidence to support modelling this event under a default baseline scenario, and subsections 4.8(5), 4.12(10) and 4.12(14) for C10, hybrid baseline, and historic baseline scenarios respectively.

For ~~each of these events,~~ the default baseline scenario, where ~~included~~ a windrow and burn event is to be included, it must be modelled as occurring six months after each clearing event~~date MUST reflect the interval between events~~.

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED~~
Project carbon	• Not permitted~~NOT PERMITTED~~

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C10 Default baseline Historic baseline Hybrid baseline	9. Click on the 'New' button to create a new event. 10. Insert the date of the windrow and burn fire in the simulation period in the blank field beside the 'Timing' section. 11. In the drop down menu next to 'Type', select 'Forest fire'. 12. Click 'Insert standard values'. Select the row with 'Event Name' of 'Site prep: Windrow and burn' and then click 'OK' and 'Yes' to insert the name of the standard event. 13. Do NOT change any other setting. 14. Click 'OK' to finish adding the event to the event queue.

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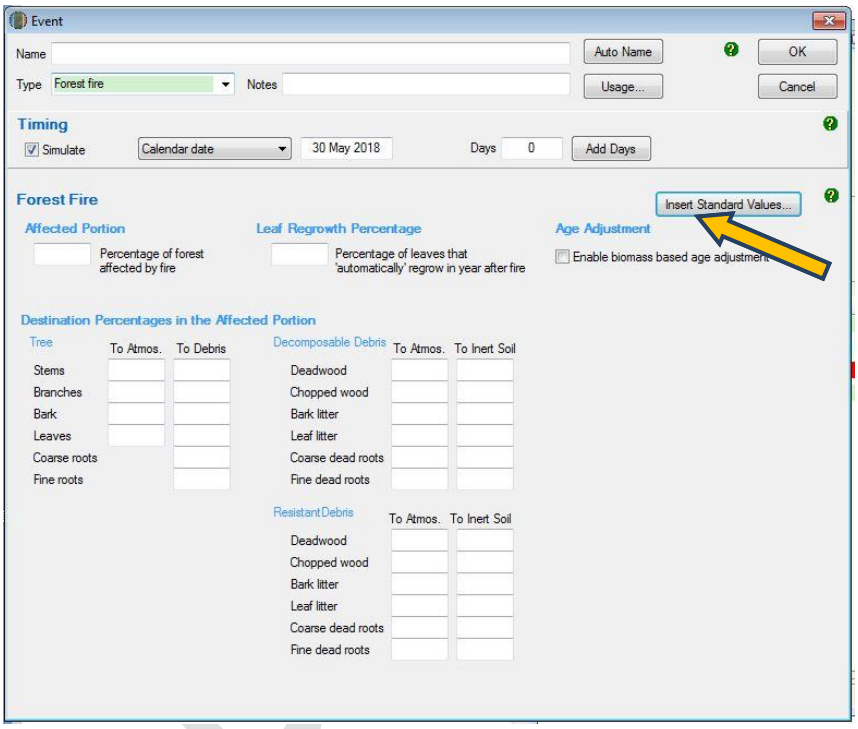

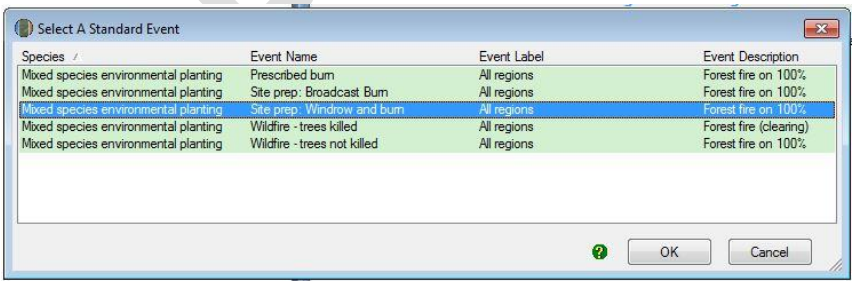

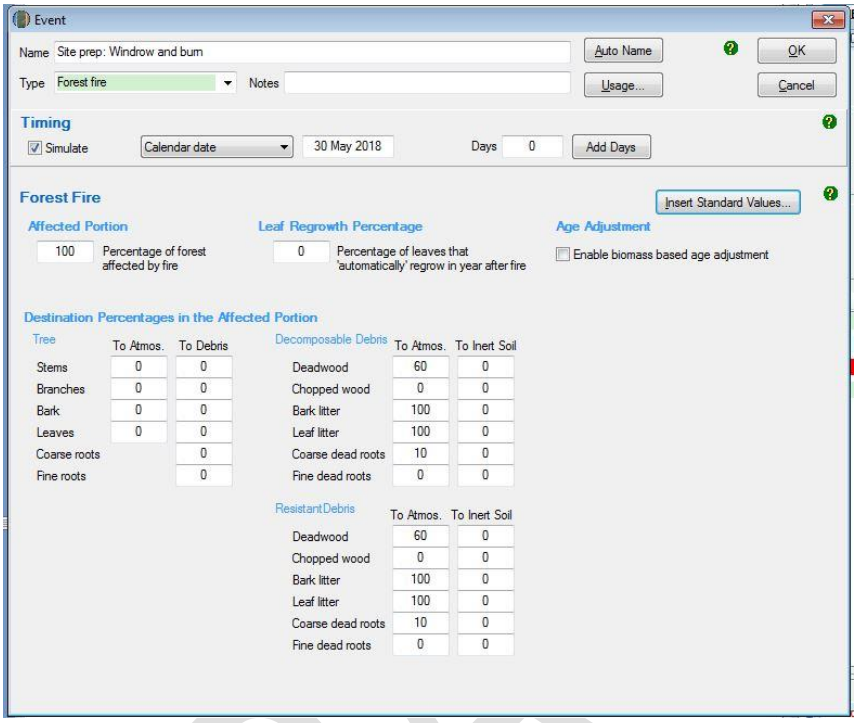

~~3.10.7.3~~3.10.4.3 *Adding a prescribed fire event – to reduce fire risk*

These steps must be followed to add a ~~repeated for each~~ prescribed fire event – to reduce fire risk. These events are aimed at reducing fuel loads and hence fire risk. They~~, that occurs in a CEA during the simulation period. A prescribed fire is used to~~ control the accumulation of the debris pool. The~~For each of these events the~~ date modelled must reflect the actual date of that event.

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED~~
C10	• Not permitted~~NOT PERMITTED~~
Default baseline	• Not permitted~~NOT PERMITTED~~
Historic baseline	• Not permitted~~NOT PERMITTED~~
Hybrid baseline	• Not permitted~~NOT PERMITTED~~
Project carbon	15. Click on the 'New' button to create a new event. 16. Insert the date of the prescribed fire in the simulation period in the blank field beside the 'Timing' section. 17. In the drop down menu next to 'Type', select 'Forest fire'. 18. Click 'Insert standard values'. Select the row with 'Event Name' of 'Prescribed burn' and then click 'OK' and 'Yes' to insert the name of the standard event. 19. Tick the 'Enable biomass based age adjustments' box. 20. Do NOT change any other setting. 21. Click 'OK' to finish adding the event to the event queue.

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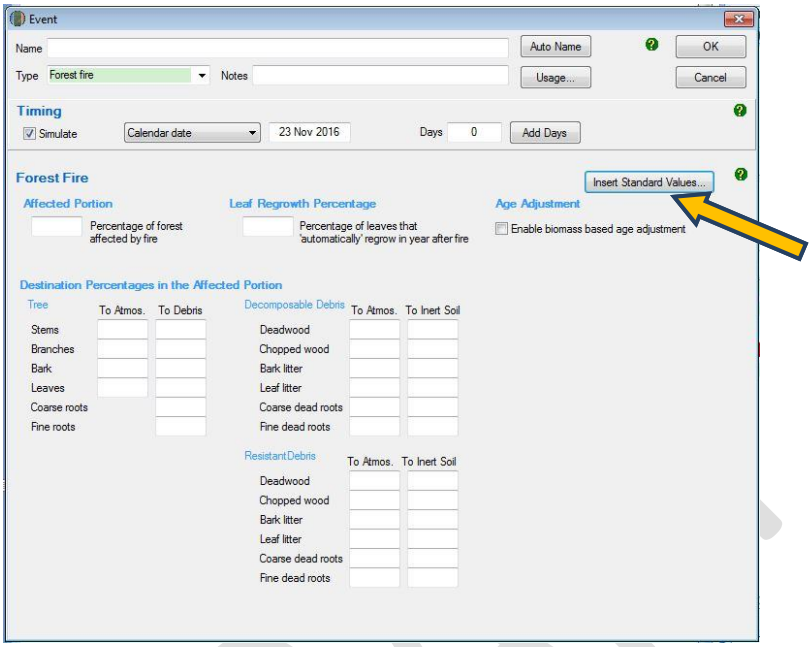
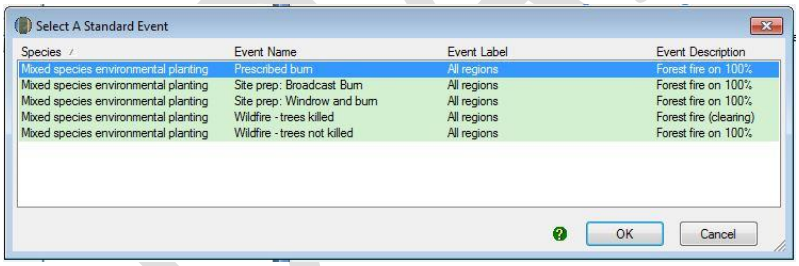
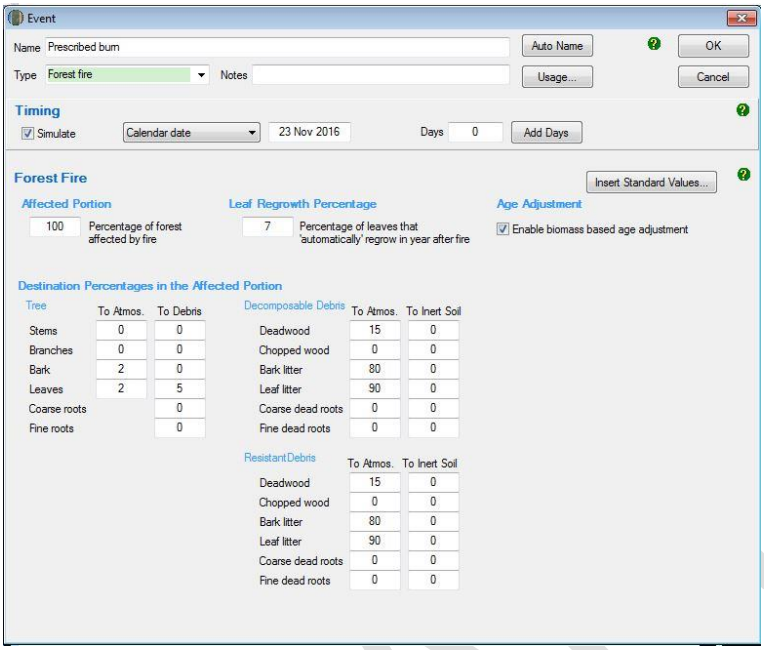

Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
23 Nov 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel



~~3.10.7.4~~3.10.4.4 *Adding a wildfire – trees not killed event*

These steps must be followed to add ~~a repeated for each 'wildfire – trees not killed' event that occurs in a CEA during the simulation period. For each~~ wildfire – trees not killed event ~~the date must be the date on which the event occurred~~.

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED~~
C10	• Not permitted~~NOT PERMITTED~~
Default baseline	• Not permitted~~NOT PERMITTED~~
Historic baseline	• Not permitted~~NOT PERMITTED~~
Hybrid baseline	• Not permitted~~NOT PERMITTED~~
Project carbon	1. Click on the 'New' button to create a new event. 2. Insert the date of the wildfire where trees are not killed in the simulation period in the blank field beside the 'Timing' section. 3. In the drop down menu next to 'Type', select 'Forest fire'. 4. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees not killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 5. Tick the 'Enable biomass based age adjustments' box. 6. Do NOT change any other setting. 7. Click 'OK' to finish adding the event to the event queue.

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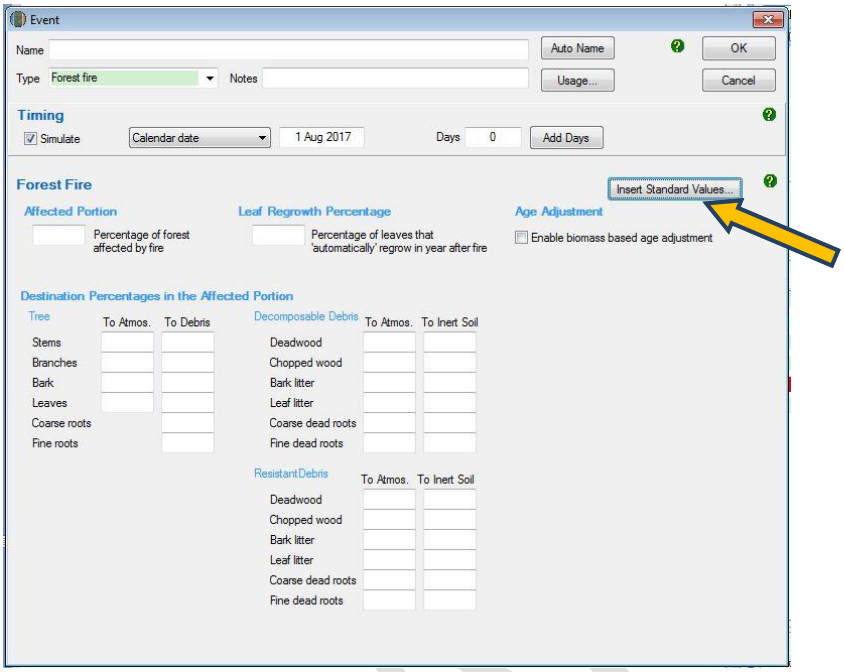
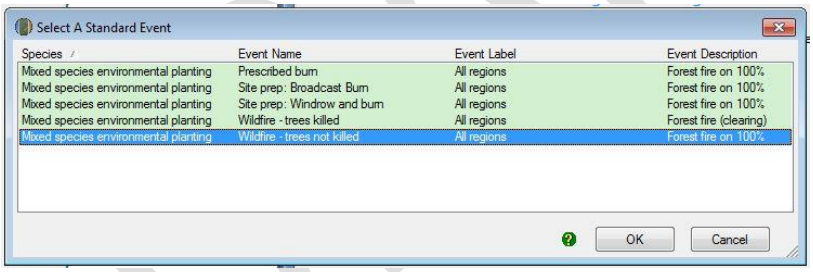
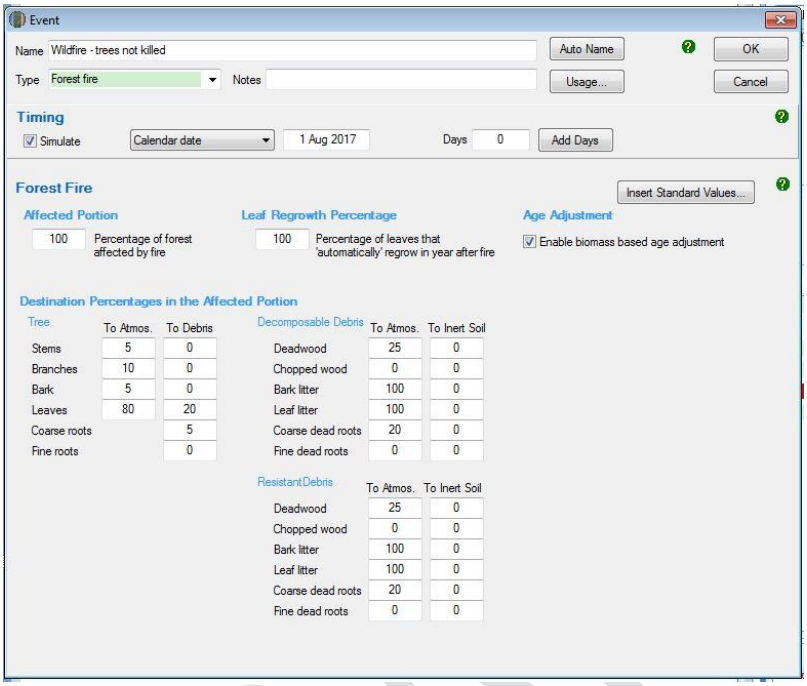

Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
1 Aug 2017
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel



~~3.10.7.5~~3.10.4.5 *Adding a Wildfire~~wildfire~~ – trees killed event*

These steps must be followed to add a~~repeated for each~~ wildfire – trees killed event~~ that occurs during the simulation period and for each wildfire – trees killed event the date must be the date on which the event occurred~~.

Simulation Type	Steps required
C100_5%	• Not permitted~~NOT PERMITTED~~
C10	• Not permitted~~NOT PERMITTED~~
Default baseline	• Not permitted~~NOT PERMITTED~~
Historic baseline	• Not permitted~~NOT PERMITTED~~
Hybrid baseline	• Not permitted~~NOT PERMITTED~~
Project carbon	22. Click the 'New' button to create a new event. 23. Insert the date that the wildfire – trees killed event in the blank field beside the 'Timing' section. This will need to be entered in the format dd mmm yyyy. 24. In the drop down menu next to 'Type', select 'Forest Fire'. 25. Click 'Insert standard values'. Select the row with 'Event Name' of 'Wildfire – trees killed' and then click 'OK' and 'Yes' to insert the name of the standard event. 26. Click 'OK'. 27. Do NOT change any other settings. 28. Click 'OK' to finish adding the event to the event queue.

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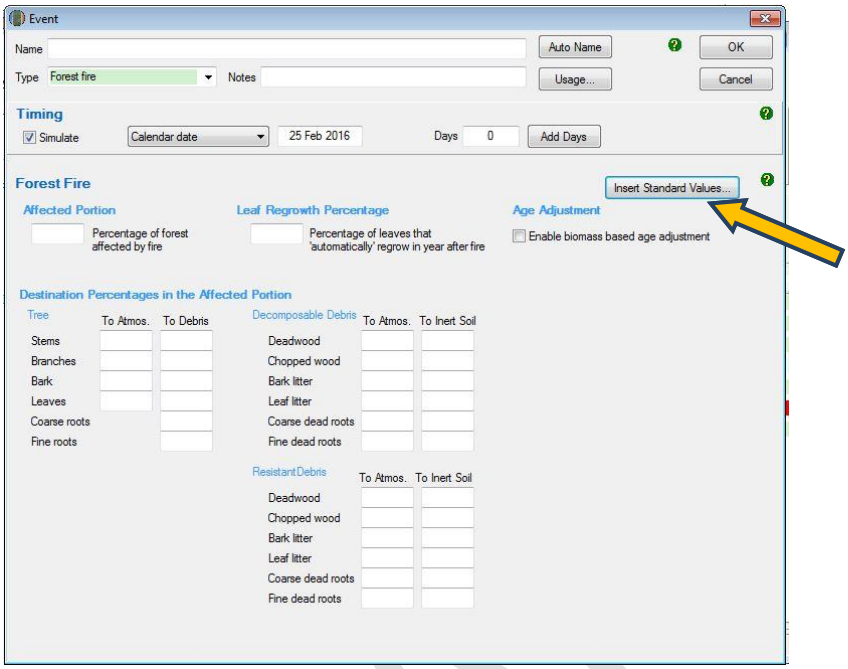
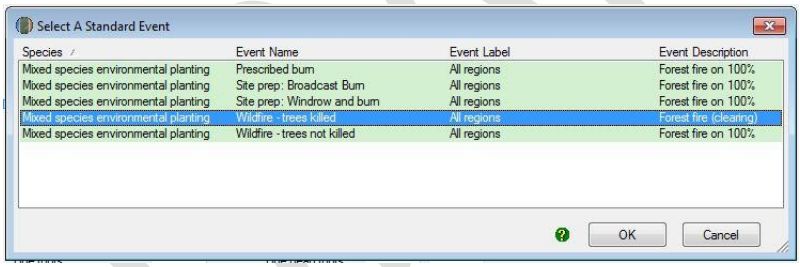
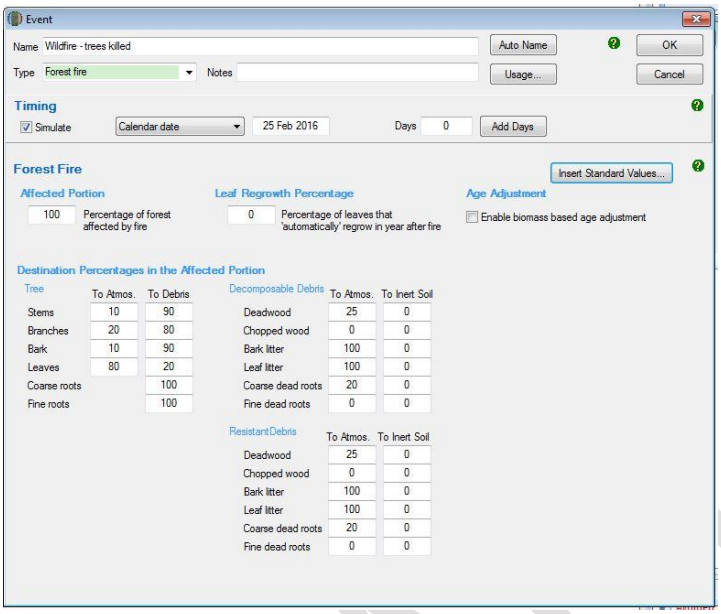

Event
Name
Auto Name
OK
Type
Forest fire
Notes
Usage...
Cancel
Timing
Simulate
Calendar date
25 Feb 2016
Days
0
Add Days
Forest Fire
Insert Standard Values...
Affected Portion
Percentage of forest affected by fire
Leaf Regrowth Percentage
Percentage of leaves that 'automatically' regrow in year after fire
Age Adjustment
Enable biomass based age adjustment
Destination Percentages in the Affected Portion
Tree
To Atmos.
To Debris
Stems
Branches
Bark
Leaves
Coarse roots
Fine roots
Decomposable Debris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots
ResistantDebris
To Atmos.
To Inert Soil
Deadwood
Chopped wood
Bark litter
Leaf litter
Coarse dead roots
Fine dead roots


Select A Standard Event
Species
Event Name
Event Label
Event Description
Mixed species environmental planting
Prescribed burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Broadcast Burn
All regions
Forest fire on 100%
Mixed species environmental planting
Site prep: Windrow and burn
All regions
Forest fire on 100%
Mixed species environmental planting
Wildfire - trees killed
All regions
Forest fire (clearing)
Mixed species environmental planting
Wildfire - trees not killed
All regions
Forest fire on 100%
OK
Cancel



~~3.10.8~~3.10.5 Creating and cloning regimes

For default, historic and hybrid baselines, the entire events queue that includes all simulated events for the entire baseline management event scenario (see section 4.12 of the Determination) must be cloned to cover the 100 year baseline forecast period.

Simulation Type	Steps required
Default baseline	• Follow the above steps to create a plot and the events forming a single clearing interval of 15 years (regeneration, windrow and burn where applicable, management fire where applicable, and clearing). By default, FullCAM will create a new regime for each event added. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Press the 'Clone' button under the Regime Editing header. • Enter '15' for calendar years and for 'number of times', a value high enough to clone events over the entirety of the 100-plus year baseline period~~'6' for number of times~~ and click 'ok'. • ~~Any events that are highlighted grey towards the bottom of the events queue The last 'initial clearing: no product recovery' event will~~ fall beyond the 100-plus year modelling~~baseline~~ period and will not~~need to~~ be simulated. These can be left ~~deleted (will appear highlighted~~ in the event queue as they will not affect the simulation~~grey).~~ • ~~Click on it to select it, and then press the 'Delete' button under the Event Editing header and click 'yes'~~.

Historic baseline	• Follow the above steps to create a plot and the events forming the two clearing intervals of the durations supported by historical evidence. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Calculate the number of years between the first event of the first interval and the last event of the second interval. Add 1 to this number. Ie. years between initial regeneration event modelled and the last clearing event modelled plus 1. • Press the 'Clone' button under the Regime Editing header. • Enter the number calculated above for 'calendar years' and ~~'10'~~ for 'number of times', a value high ~~(or at least~~ enough to clone events over the entirety of the ~~a~~ 100 plus year baseline period ~~years)~~ and click 'ok'. • Any ~~The~~ events that are highlighted grey towards the bottom of the events queue fall beyond the 100 plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
Hybrid baseline	• Follow the above steps to create a plot and the events forming the first clearing interval of 15 years, and the second clearing interval of the duration supported by historical evidence. By default, FullCAM will create a new regime for each event added. • Highlight each of the existing regimes in the left hand column by holding ctrl on the keyboard and clicking on each regime. • Select the 'Edit' button under the Regime Editing header. • In the name field type 'baseline', then click 'ok'. This will combine all existing events under one regime. • Calculate the number of years between the first event of the first interval and the last event of the second interval. Add 1 to this number. Ie. years between initial regeneration event modelled and last clearing event plus 1. • Press the 'Clone' button under the Regime Editing header. • Enter the number calculated above for 'calendar years' and ~~'10'~~ for 'number of times', a value high ~~(or at least~~ enough to clone events over the entirety of the ~~a~~ 100 plus year baseline period ~~years)~~ and click 'ok'. • Any ~~The~~ events that are highlighted grey towards the bottom of the events queue fall beyond the 100 plus year modelling period and will not be simulated. These can be left in the event queue as they will not affect the simulation.
C10 C100_5% Project carbon	• Not applicable

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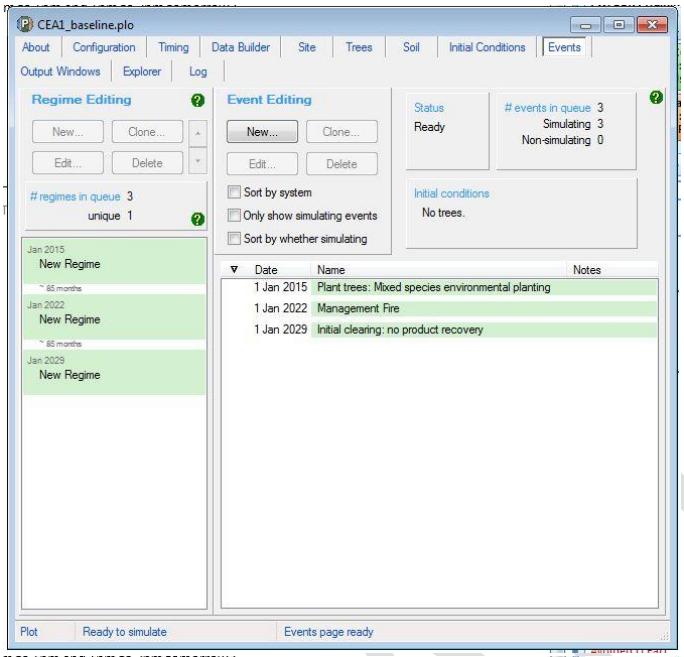
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Trees
Soil
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Sort by whether simulating
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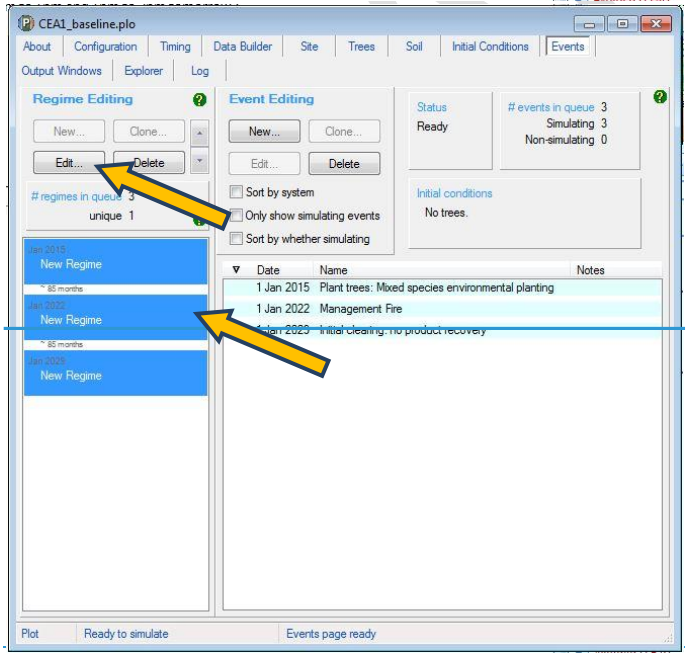
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015 Plant trees: Mixed species environmental planting
1 Jan 2022 Management Fire
1 Jan 2029 Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready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Initial conditions
No trees.
Date
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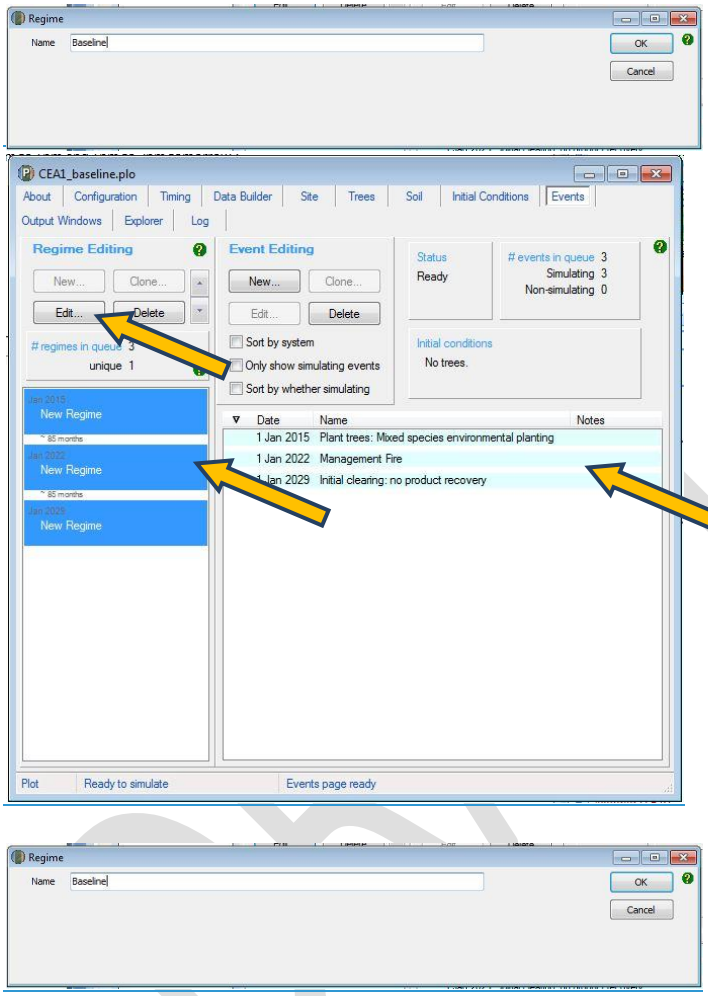
Notes
1 Jan 2015 Plant trees: Mixed species environmental planting
1 Jan 2022 Management Fire
Plot
Ready to simulate
Events page ready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New Regime
~ 85 months
Jan 2022
New Regime
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Jan 2029
New Regime
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No trees.
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Name
Notes
1 Jan 2015 Plant trees: Mixed species environmental planting
1 Jan 2022 Management Fire
1 Jan 2029 Initial clearing: no product recovery
Plot
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Events page ready
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Name
Baseline
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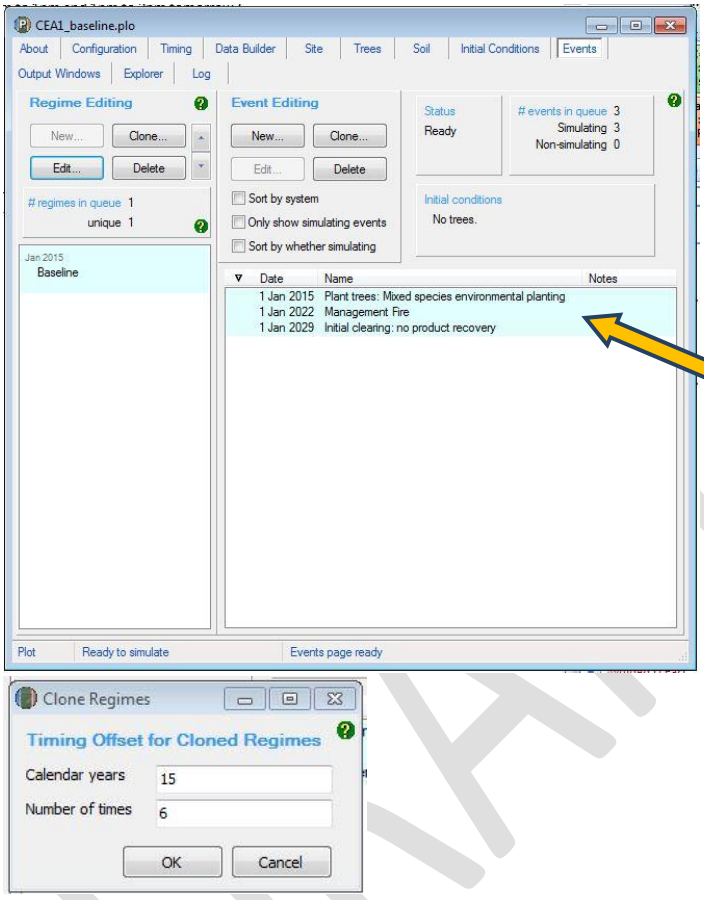
Cancel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Sort by system
Only show simulating events
Sort by whether simulating
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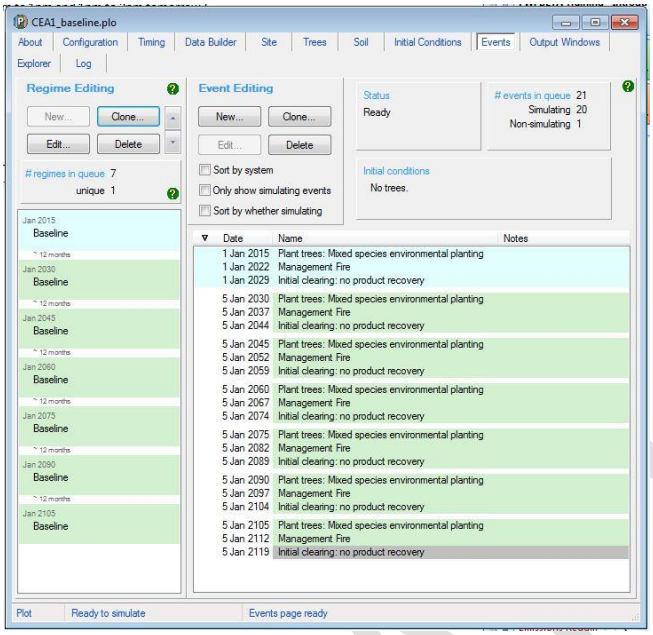
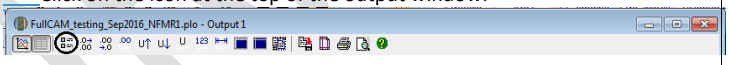
Simulating 3
Non-simulating 0
Initial conditions
No trees.
Date
Name
Notes
1 Jan 2015 Plant trees: Mixed species environmental planting
1 Jan 2022 Management Fire
1 Jan 2029 Initial clearing: no product recovery
Plot
Ready to simulate
Events page ready

Clone Regimes
Timing Offset for Cloned Regimes
Calendar years
15
Number of times
6
OK
Cancel



3.11 The Output Tab

Simulation Type	Steps required
C100_5% C10 Default baseline Historic baseline Hybrid baseline Project carbon	• Double click on 'Output1' listed in the Output Window. • Click on the icon at the top of the output window:  • Selected outputs have a tick next to their entry, and on the folder(s) where they are located. Unselect all items so that the text reads '0 outputs selected'.
C100_5% C10	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Click 'OK'.
Default baseline Hybrid baseline Historic baseline	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Select the debris carbon pools: Carbon / Forest / Plants / C mass of debris. • Click 'OK'.
Project carbon	• Select the tree carbon pools: Carbon / Forest / Plants / C mass of trees. • Select the debris carbon pools: Carbon / Forest / Debris / C mass of forest debris. • Select the CH_4 emissions from fire: Carbon / Whole / Emissions / CH4 emitted due to fire. • Select the N_2O emissions from fire: Nitrogen / Whole / Emissions / N2O emitted due to fire. • Click 'OK'.

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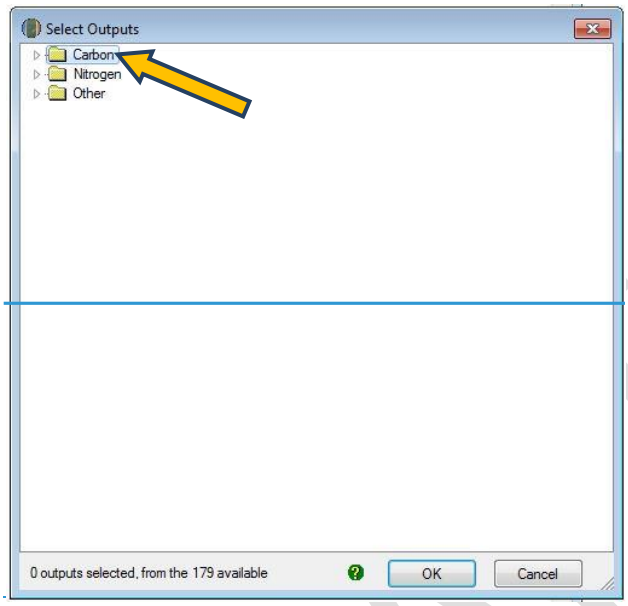
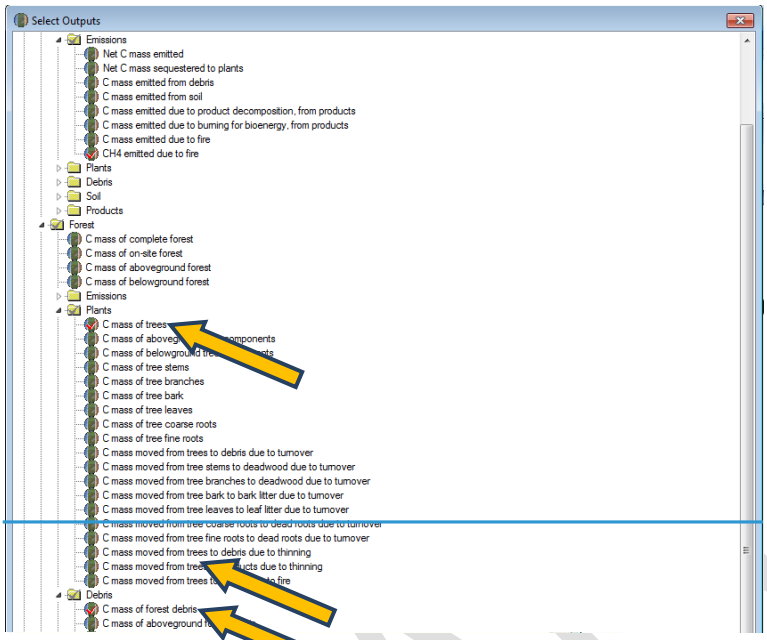
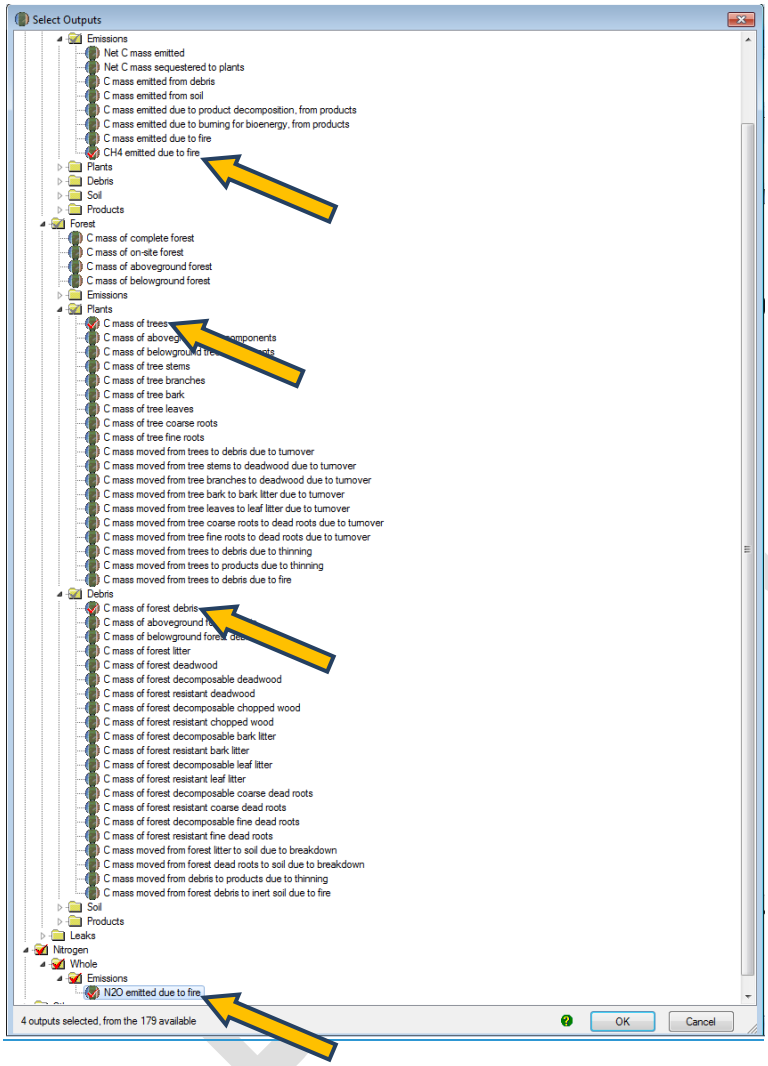

Select Outputs
Carbon
Nitrogen
Other
0 outputs selected, from the 179 available
OK
Cancel


Select Outputs
Emissions
Net C mass emitted
Net C mass sequestered to plants
C mass emitted from debris
C mass emitted from soil
C mass emitted due to product decomposition, from products
C mass emitted due to burning for bioenergy, from products
C mass emitted due to fire
CH4 emitted due to fire
Plants
Debris
Soil
Products
Forest
C mass of complete forest
C mass of on-site forest
C mass of aboveground forest
C mass of belowground forest
Emissions
Plants
C mass of tree stems
C mass of tree branches
C mass of tree bark
C mass of tree leaves
C mass of tree coarse roots
C mass of tree fine roots
C mass moved from trees to debris due to turnover
C mass moved from tree stems to deadwood due to turnover
C mass moved from tree branches to deadwood due to turnover
C mass moved from tree bark to bark litter due to turnover
C mass moved from tree leaves to leaf litter due to turnover
C mass moved from tree fine roots to dead roots due to turnover
C mass moved from trees to debris due to thinning
Debris
C mass of forest debris



3.12 Running Simulations

To run the simulation, press the icon in the top menu bar: 

3.13 Viewing outputs

Outputs can be viewed by clicking the icon (circled) at the top of the Output window as either:

~~1.~~*29. Graph*

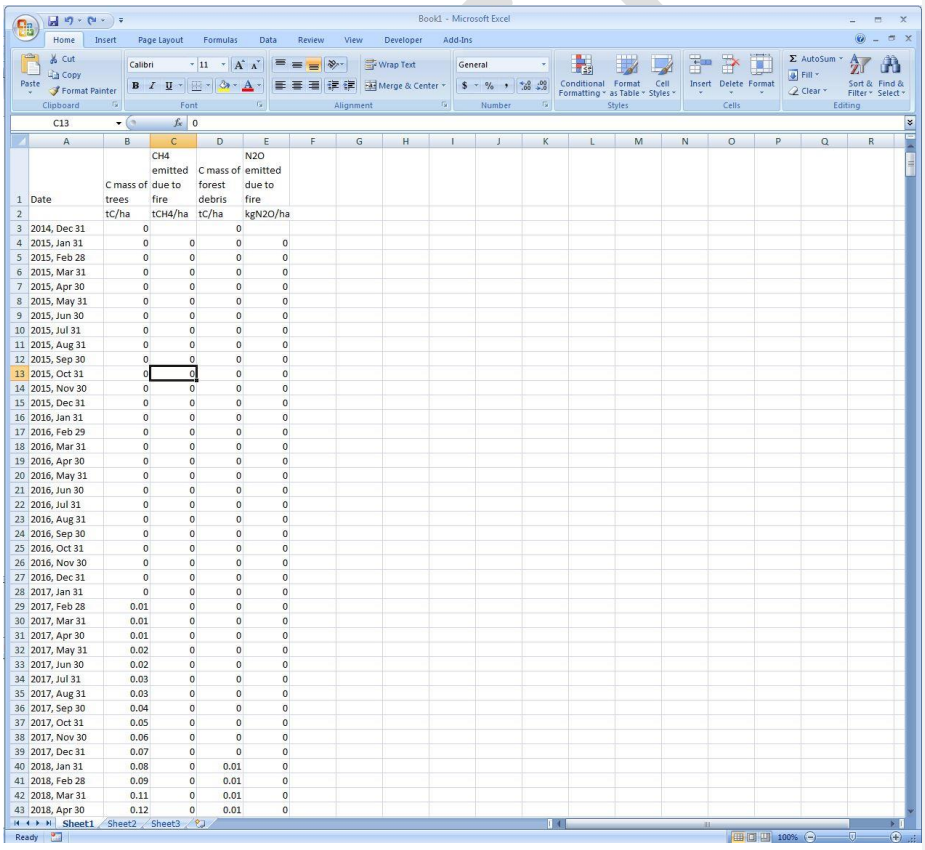
~~2.~~30. Tabular form

3.14 Transferring outputs into a spreadsheet

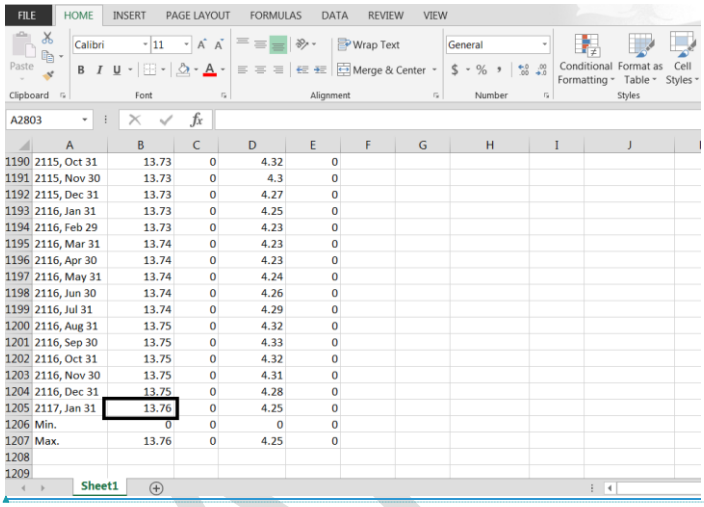
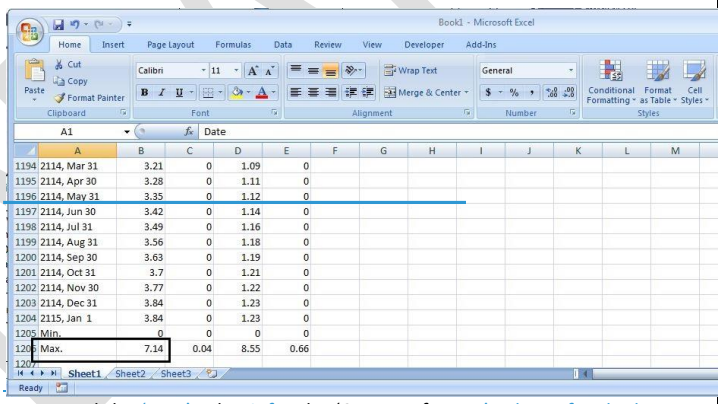
To transfer data into a Microsoft Excel or equivalent spreadsheet for analysis:

Copy all the output data by clicking on the icon (circled) in the top of the Output window.

Open Microsoft Excel (or equivalent spreadsheet software), and 'Paste' the data copied from FullCAM into the spreadsheet. For example:



	A	B	C	D	E
1	Date	C mass of trees	CH4 emitted due to fire	C mass of forest debris	N2O emitted due to fire
2		tC/ha	tCH4/ha	tC/ha	kgN2O/ha
3	2014, Dec 31	0		0	
4	2015, Jan 31	0	0	0	0
5	2015, Feb 28	0	0	0	0
6	2015, Mar 31	0	0	0	0
7	2015, Apr 30	0	0	0	0
8	2015, May 31	0	0	0	0
9	2015, Jun 30	0	0	0	0
10	2015, Jul 31	0	0	0	0
11	2015, Aug 31	0	0	0	0
12	2015, Sep 30	0	0	0	0
13	2015, Oct 31	0	0	0	0
14	2015, Nov 30	0	0	0	0
15	2015, Dec 31	0	0	0	0
16	2016, Jan 31	0	0	0	0
17	2016, Feb 29	0	0	0	0
18	2016, Mar 31	0	0	0	0
19	2016, Apr 30	0	0	0	0
20	2016, May 31	0	0	0	0
21	2016, Jun 30	0	0	0	0
22	2016, Jul 31	0	0	0	0
23	2016, Aug 31	0	0	0	0
24	2016, Sep 30	0	0	0	0
25	2016, Oct 31	0	0	0	0
26	2016, Nov 30	0	0	0	0
27	2016, Dec 31	0	0	0	0
28	2017, Jan 31	0	0	0	0
29	2017, Feb 28	0.01	0	0	0
30	2017, Mar 31	0.01	0	0	0
31	2017, Apr 30	0.01	0	0	0
32	2017, May 31	0.02	0	0	0
33	2017, Jun 30	0.02	0	0	0
34	2017, Jul 31	0.03	0	0	0
35	2017, Aug 31	0.03	0	0	0
36	2017, Sep 30	0.04	0	0	0
37	2017, Oct 31	0.05	0	0	0
38	2017, Nov 30	0.06	0	0	0
39	2017, Dec 31	0.07	0	0	0
40	2018, Jan 31	0.08	0	0.01	0
41	2018, Feb 28	0.09	0	0.01	0
42	2018, Mar 31	0.11	0	0.01	0
43	2018, Apr 30	0.12	0	0.01	0

Simulation Type	Steps required
C100_5%	• Scroll down to the bottom rows of the data in the spreadsheet~~, where the 'Min' and 'Max' values for each column will be shown~~.   • Record the '~~Max'~~ value in~~for~~ the 'C Mass of Trees' column for the last row of data pertaining to a date~~trees' column~~. This is C100 or the value of C at 100 years. To determine C100_5%, or 5% of this value, multiply C100 by 0.05.This value is used for the materiality test at section 4.7 of the Determination, calculated in accordance with section 4.8 of the Determination.
C10	• Scroll down to the bottom of the spreadsheet, where the 'Min' and 'Max' values for each column will be shown.

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	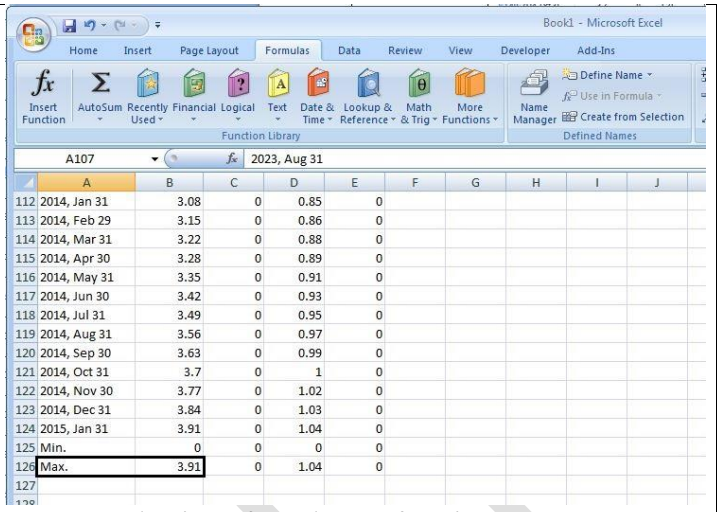 Book1 - Microsoft Excel Home Insert Page Layout Formulas Data Review View Developer Add-Ins Insert Function AutoSum Recently Used Financial Logical Text Date & Time Lookup & Reference Math & Trig More Functions Name Manager Define Name Use in Formula Create from Selection Function Library Defined Names A107 2023, Aug 31 A B C D E F G H I J 112 2014, Jan 31 3.08 0 0.85 0 113 2014, Feb 29 3.15 0 0.86 0 114 2014, Mar 31 3.22 0 0.88 0 115 2014, Apr 30 3.28 0 0.89 0 116 2014, May 31 3.35 0 0.91 0 117 2014, Jun 30 3.42 0 0.93 0 118 2014, Jul 31 3.49 0 0.95 0 119 2014, Aug 31 3.56 0 0.97 0 120 2014, Sep 30 3.63 0 0.99 0 121 2014, Oct 31 3.7 0 1 0 122 2014, Nov 30 3.77 0 1.02 0 123 2014, Dec 31 3.84 0 1.03 0 124 2015, Jan 31 3.91 0 1.04 0 125 Min. 0 0 0 0 126 Max. 3.91 0 1.04 0 127 • Record the 'Max' value for the 'C Mass of trees' column~~, as this is the value at 10 years~~ (=C10). This value is used for the materiality test at section 4.7 of the Determination, calculated in accordance with section 4.9 of the Determination.
Default baseline Historic baseline Hybrid baseline	• Refer to Division 4.4 of the Determination for calculating baselines, specifically Equation 4 at section 4.24. Section 5 of these Guidelines details how each FullCAM output in the spreadsheet data corresponds to the equation parameters.
Project carbon	• Refer to Division 4.4 of the Determination for calculating end of reporting period Project carbon stocks, specifically Equation 2 at section 4.22. Section 5 of these Guidelines details how each FullCAM output in the spreadsheet data corresponds to the equation parameters.

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4. FullCAM simulations and offsets reporting

Project proponents must calculate the project net abatement by completing the equations in sections 4.21 to 4.29 of the Determination. Parameters generated in FullCAM are used in Equations in the Determination.

Note that for some of the equations the average of the FullCAM output over the simulation period will be required, whereas for others the value of the FullCAM output at the end of the simulation period will be used. Refer to the equations within the Determination to determine which value to use. Averages can be calculated using the average function within your spreadsheet software.

Table 7: FullCAM outputs and Corresponding Parameters as defined in the Determination

FullCAM Output	Parameter as defined in the Determination	Scenario	Equation in the determination
C mass of debris	$CD_{CEA,i}$	Project	3
	$BCD_{CEA,i,k}$	Baseline	4
C mass of trees	$CT_{CEA,i}$	Project	3
	$BCT_{CEA,i,k}$	Baseline	4

CH_4 emitted from debris due to fire	$E_{CH_4,i}$	Project	7
N_2O emitted due to fire	$E_{N_2O,i}$	Project	8

Emissions Reduction Assurance Committee review of the native forest from managed regrowth and human-induced regeneration methods

The Emissions Reduction Assurance Committee is reviewing the native forest from managed regrowth and human-induced regeneration methods against the offsets integrity standards in the *Carbon Credits (Carbon Farming Initiative) Act 2011* (CFI Act).

The Committee has identified a pressing concern in relation to whether the methods ensure the rate of crediting of carbon abatement appropriately reflects actual abatement through growth of regenerating forests.

The Committee believes there needs to be a mechanism that complements the Clean Energy Regulator's guidance to provide greater assurance that crediting aligns with on-ground progress of regenerating vegetation towards forest cover. The Committee considers that without such a mechanism, the methods could allow some projects to be issued Australian Carbon Credit Units in excess of actual increases in carbon storage. The Committee's assessment is that such a mechanism is necessary to ensure the methods meet the requirement in the offsets integrity standards for methods to apply conservative estimates, projections and assumptions.

The Committee's findings have been informed by expectations of achieving forest cover within a certain period of time, based on available science. The Committee's concerns around achieving forest cover have also been informed by assessment of data on land within existing projects.

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Document 14c

HIR and NFMR data regarding proposed rule amendment

4 July 2018

Table 2. Historic classification of vegetation status of land (at 1972, 1989, 2010 and 2016) within carbon estimation areas (CEAs) of 85 HIR and NFMR projects

Classification	Hectares
Forest at some stage	355,486
Sparse, but not forest	322,664
Neither sparse nor forest	379,833
Total	1,057,983

Source: National Inventory Forest Monitoring Programme forest mapping layers at 25m² resolution, Australian Government, 2017.

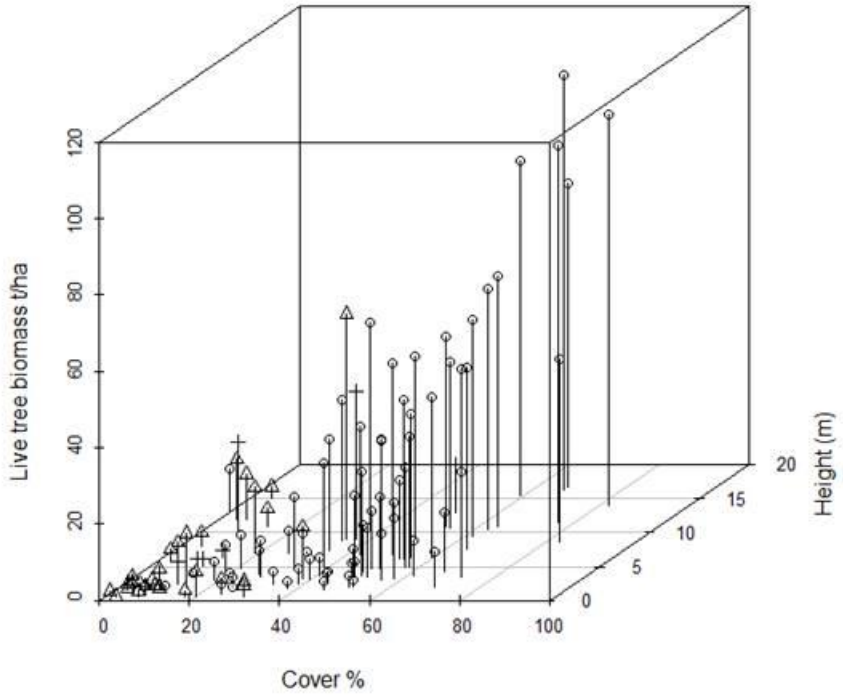
Table 3. Average time between detection of forest loss and regrowth (forest cover attainment) for 1990-2016 for inventory tiles SG55 and SH55 covering Western NSW and Southern QLD

Years	Time between forest loss and regrowth (average)	Notes
1990 to 2007	7 years	
2008 to 2016	12 years	Longer time is this period potentially due to millennial drought prolonging time taken for land deforested in early 2000s to regenerate.

1990 to 2016	**9 years**	

Source: National Inventory Forest Monitoring Programme data on detection of forest loss and regrowth within FullCAM spatial modelling, Australian Government, 2018.

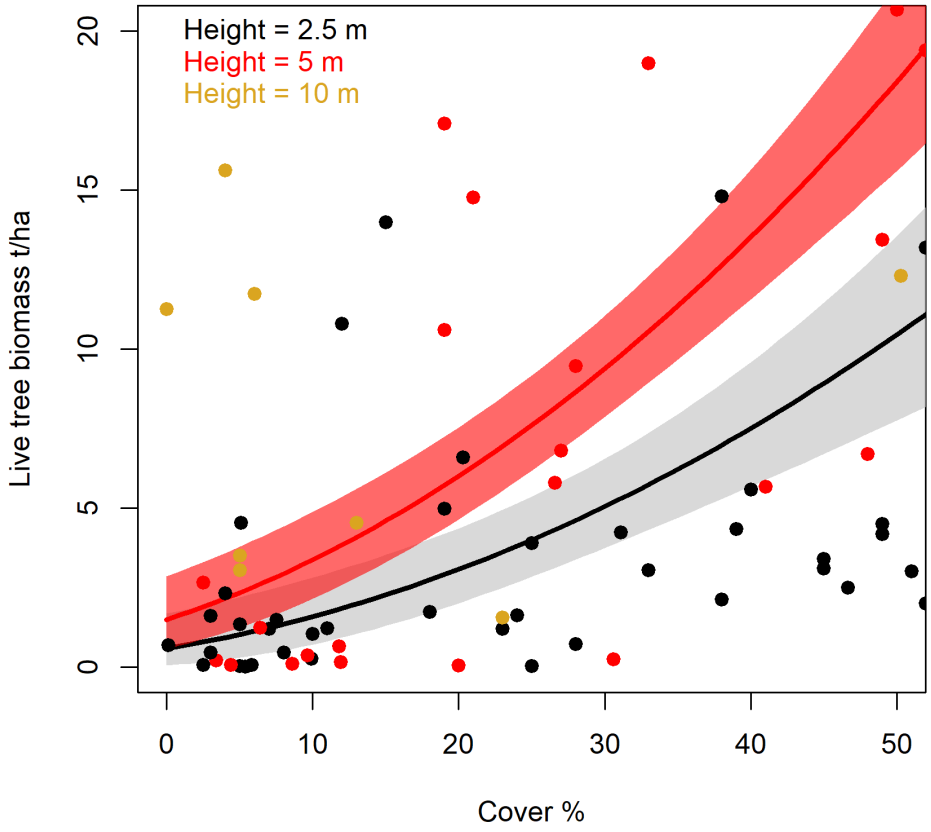
Figure 1. Relationship between above and below ground live tree biomass (tonnes per hectare dry weight equivalent), canopy cover (as percentage) and height (metres) for 110 sites in southern and central Queensland including brigalow (open circles), mulga (triangles) and poplar box (crosses)



Source: Don Butler, unpublished work using Biomass Plot Library data (accessible at http://data.auscover.org.au/xwiki/bin/view/Product+pages/Biomass+Plot+Library), 2018.

- This figure incorporates data from brigalow (71 sites), mulga (30 sites) and poplar box (9 sites).
- The entire dataset doesn't suggest significant differences among dominant species in terms of the relationship between stand biomass, height and cover.

Figure 2. Relationship between live tree biomass (above and below ground tonnes per hectare dry weight equivalent) and canopy cover for 3 subset height classes

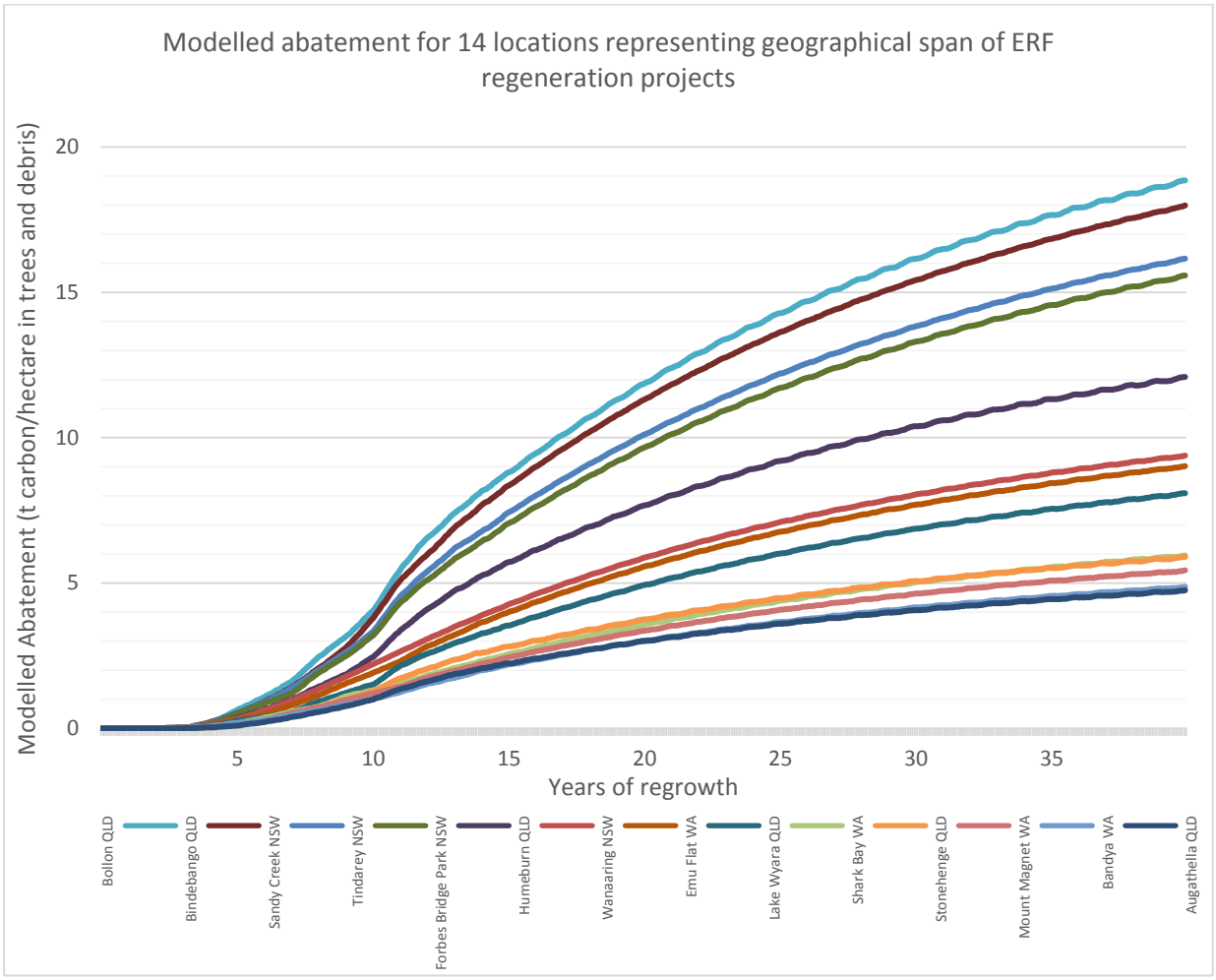


Source: Don Butler, unpublished work using Biomass Plot Library data (accessible at http://data.auscover.org.au/xwiki/bin/view/Product+pages/Biomass+Plot+Library), 2018.

- Statistical modelling of live tree biomass versus height and canopy cover for three subset height classes suggests that regrowth 2.5 metres tall and providing 25 percent canopy cover (i.e. generous view of the forest cover threshold) would rarely be expected to exceed 5.2 tonnes per hectare of live tree biomass (silver highlight shows upper confidence interval for model fit).

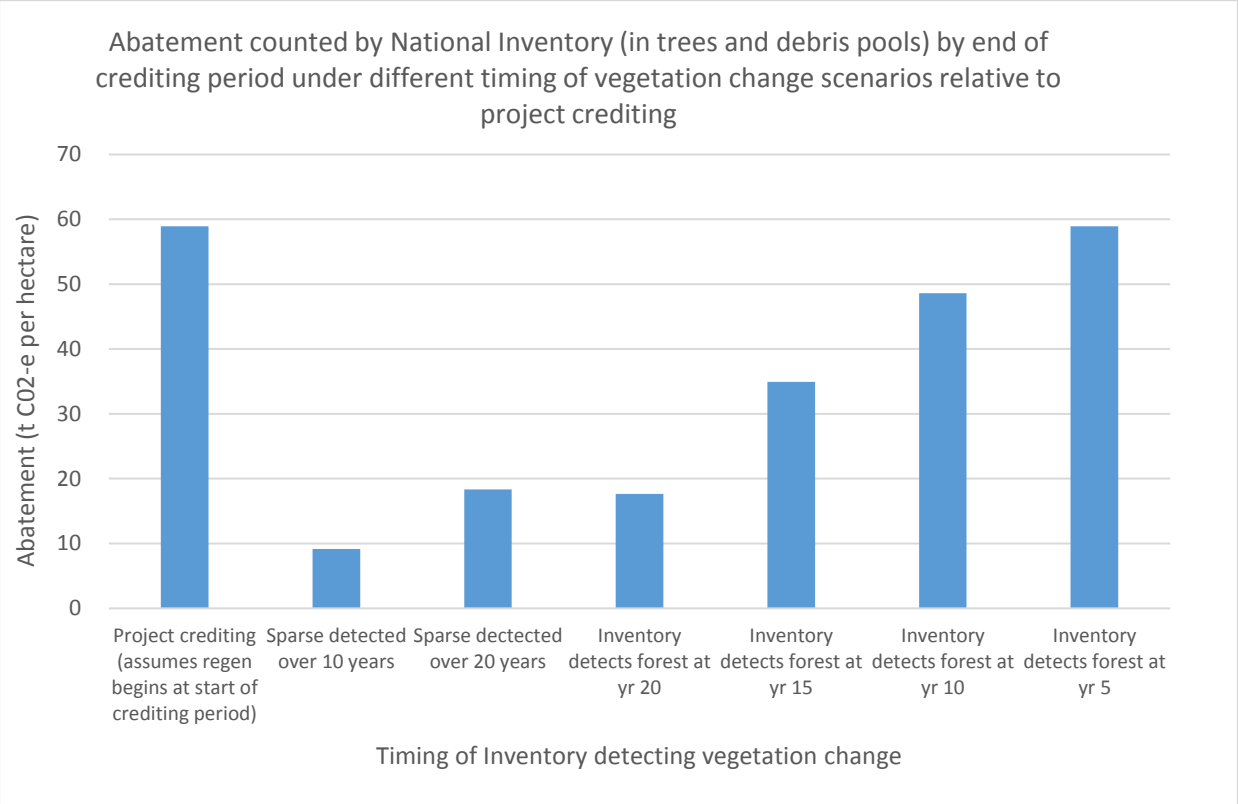
- 5.2 tonnes per hectare of live tree biomass translates to 3.6 tonnes of carbon per hectare in the FullCAM trees and debris pools (5.2 tonnes of biomass per hectare figure multiplied by 0.49 to convert biomass to carbon, and then multiplied by 1.43 to convert tree carbon to tree and debris carbon based on FullCAM ratios).

Figure 3. FullCAM modelled abatement (tonnes carbon per hectare in combined trees and debris pools) for 14 locations representing geographical span of ERF regeneration projects



Source: 2016 Public Release of FullCAM using standard parameters for modelling a regeneration event beginning in 2000 (year 0) as per the HIR or NFMR FullCAM Guidelines. Locations modelled informed by information on actual project locations.

Figure 4. Abatement counted by National Inventory (in trees and debris pools) by end of crediting period under different timing of vegetation change scenarios and relative to project crediting



Source: FullCAM estimates of carbon abatement in a typical ERF regeneration project area, using modelling parameters required under the HIR method, and comparing with modelling parameters used by the National Inventory Forest Monitoring Programme (modelling regeneration as five years old upon detection of change to forest cover; modelling of sparse vegetation at accumulation rate of 0.25 tonnes carbon per hectare for up to 20 years).

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Relating canopy cover and average height to the biomass of the stand

John Larmour, Micah Davies, Keryn Paul, Jacqui England, Stephen Roxburgh

August 2018

Report prepared for the Department of the Environment and Energy

Citation

Larmour, J, Davies, M, Paul, K, England, J, Roxburgh, S, (2018). Relating canopy cover and average height to the biomass of the stand. Report prepared for the Department of the Environment and Energy. CSIRO Land and Water, Canberra.

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Important disclaimer

Contents

Acknowledgments

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1 Background

1.1 Objectives

The aim of this study was to explore the relationship between the above-ground biomass of a stand of woody vegetation and the canopy cover in semi-arid regions of Australia. The specific objective was to develop individual tree- or shrub-based relationships between stem diameter and crown area that could then be applied to plot-based inventories of stem diameter to derive crown areas and scale-up to stand-based estimates of crown cover. The focus of the new field work was on providing additional datasets to build confidence that the relationships derived using existing datasets are more broadly applicable.

2 Methods

2.1 Individual-level measurements of shrub and tree stem diameter and crown area

We identified existing datasets of 1,677 individual shrubs, multi-stemmed trees or single-stemmed trees where stem diameter and crown area were measured in semi-arid regions of Western Australia (WA), New South Wales (NSW) and Queensland (Qld) (Table 1). Just over half of these measurements (59%) were taken especially for this study from locations near Bourke and Charleville (Fig. 1).

Table 1: Type and number of shrubs and trees that were measured for both stem diameter and crown area within semi-arid regions of Australia.

Plant Functional Type & Genus	Region	*N*
Shrubs		
Atriplex spp.	Near Canna, Central West, WA	54
Rhagodia spp.	Near Canna, Central West, WA	52
Melaleuca spp.	Near Canna, Central West, WA	47
Acacia tree spp.[2]	Near Canna, Central West, WA	124
Melaleuca spp.	Near Ravensthorpe, South-West WA	40
Dodonaea spp.	Near Cobar, W NSW	46
Eremophila sturtii (turpentine bush)	Near Cobar, W NSW	50
Dodonaea viscosa	SW of Bourke, NSW	195
Eremophila sturtii	SW of Bourke, NSW	106
Multi		
Acacia shrub spp.[1]	Near Canna, Central West, WA	124
*Eucalyptus horistes (*mallee)	Near Canna, Central West, WA	152
Acacia aneura (mulga)	Near Bourke, W NSW	198
Acacia aneura (mulga)	Near Charleville, Qld	54
Trees		
Allocasuarina cristata	Near Bourke, W NSW	47
Flindersia maculosa	Near Bourke, W NSW	27
Eucalyptus populnea (poplar box)	Near Bourke, W NSW	39
Corymbia intermedia	Near Charleville, Qld	42
Corymbia tessellaris	Near Charleville, Qld	58
Callitris glaucophylla	Near Charleville, Qld	57
Eucalyptus melanoploia	Near Charleville, Qld	47
Eucalyptus coolabah	Near Charleville, Qld	57
Eucalyptus populnea (poplar box)	Near Charleville, Qld	61
Total		***1,677***

[1]*A. acuminata, A. saligna*
[2]*A. hemiteles, A. murrayana, A. victoriae*

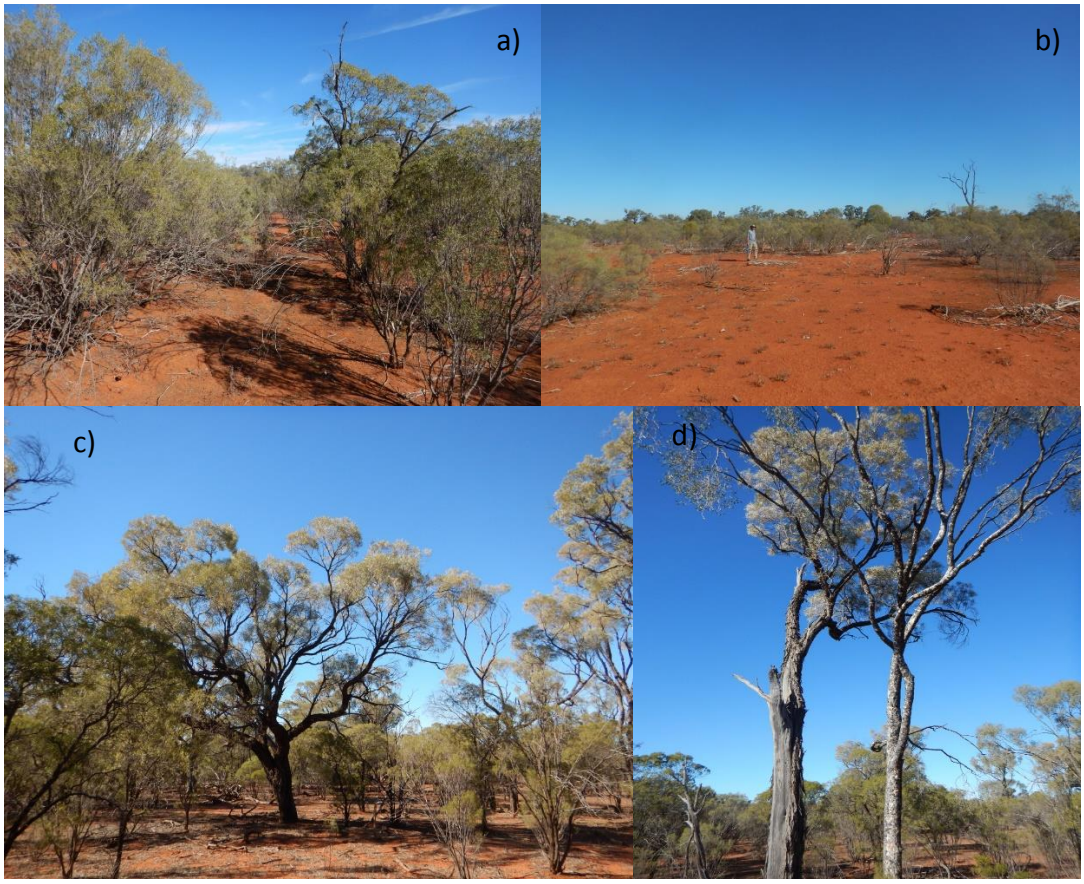

Figure 1: Examples of some of the individuals measured for stem diameter and crown area: a) & b) shrub-dominated plots measured at Bourke; c) & d) tree-form species from Bourke region.

For all 1,677 individuals measured, crown area was calculated as pi times half the crown length (diameter) measured in an East-West orientation, and times half the crown length measured in a North-South orientation. The stem diameter was measured at 10 cm height above the ground (*D10*). Given all of the shrubs and trees measured were from semi-arid regions of Australia, most of the individuals measured were multi-stemmed (Fig. 2). All measurements of multi-stemmed individuals (D_i) were converted to a single value (equivalent stem diameter, $D_e = \sqrt{\sum D_i^2}$, cm), such that the total basal area (cm^2) for all stems was equal to the basal area of an individual with this equivalent single diameter.

Figure 2: Examples of multi-stemmed individuals measured for stem diameter.

These datasets were used to determine if there was a generic relationship between *D10* and crown area across all datasets, as well as across only datasets where *D10* < 30 cm given this subset of data better represented smaller regenerating individuals. We also used ANCOVA analysis to assess whether this relationship was dependent on the plant functional type; namely whether the individual was a shrub, multi-stemmed tree, or single-stemmed tree.

2.2 Individual-level measurements of shrub and tree stem diameter and height

Empirical relationships that relate height to stem diameter of key plant functional types in Australia have been reported previously by Paul et al. (2016; see Table S2 of Supplementary Material). Here we used the same dataset of Paul et al. (2016) and derived relationships for shrubs, multi-stemmed trees (namely multi-stemmed acacias and mallees) and single-stemmed trees excluding relatively large (*D10* > 30 cm) individuals from the analysis. For all plant functional types, heights were related to the stem diameter measured at 10 cm above the ground. A further 738 and 142 individuals with *D10* >30 cm were also included in the dataset from the recent survey at Bourke and Charleville, respectively. Therefore the total dataset included 2,800 shrubs, 3,493 multi-stemmed trees, and 2,994 single-stemmed trees. These datasets were used to determine if there was a generic relationship between *D10* and height of an individual shrub, multi-stemmed tree or single-stemmed tree.

2.3 Stand-level estimates of biomass, canopy cover and height

Plot-based surveys of woody biomass traditionally use plot- or transect-based inventories of stem diameter. These inventory datasets are then used to estimate woody biomass through the application of allometric relationships for above-ground biomass (Paul et al. 2016) and below-ground biomass (Paul et al. 2018). Using the diameter-based relationship for prediction of crown area (Section 2.1) or height (Section 2.2), these same inventories may also be utilised to provide corresponding estimates of stand-based canopy cover and stand-based estimates of average height of the woody vegetation.

Here we collated plot-based inventories of stem diameter from 790 existing datasets, the primary focus being semi-arid regions of Australia (Table 2). To be included in the data analysis the inventory datasets were required to meet the following criteria:

1. Estimated total (above-ground and below-ground) biomass carbon, TBC <10 t C ha^{-1};
2. Plot size > 0.04 ha, and;
3. >10 individuals measured per plot.

As outlined in Table 2, there were three types of stands assessed:

1. Natural regeneration, where remnant trees within the measured plots were excluded from the analysis (Fig. 3);
2. Environmental plantings, where remnant trees within the measured plots were excluded from the analysis (Fig. 4), and;
3. Other native vegetation (Fig. 5).

The latter group generally included sites where the management history was not well known, and/or where it was difficult to distinguish the remnant vegetation from that which has been recently regenerated. A total of 14 new plots were measured in the Bourke region for individual canopy areas, heights and stem diameters of trees/shrubs. This region of western NSW typically has large areas dominated by shrubs (hop and turpentine bush) with limited natural regeneration of trees, typically as a consequence of competition from shrubs and high levels of grazing pressure from feral goats. Based on the types of stands available, it was necessary to modify the plot measurement methodology in order to measure enough individual trees for

crown area and height. Thus only five of the 14 plots were included in the dataset for stand-level estimates; the other plots did not meet the criteria above of having a TBC < 10 t C ha^{-1}.

Table 2: Number of stem-diameter inventory plots (*N*) collated from stands under regeneration, environmental plantings or other native vegetation in semi-arid areas of Australia. NBL refers to the National Biomass Library.

Type of stand	Source	*N*
Natural regeneration		
Canegrass and Wallal sites, near Charleville	CSIRO	209
Curra and Meadows sites, near Cobar	CSIRO	16
Conservation areas, near Bourke	CSIRO	5
Gidgee sites	NBL	2
Mulga sites	NBL	108
Environmental plantings		
22 sites, SE Australia	CSIRO	47
9 sites, Central West, WA	CSIRO	326
Other native vegetation		
9 studies	NBL	63
9 studies	CSIRO	103
Total		***879***

The datasets in Table 2 were used to explore whether there was a relationship between stand-average height and stand-average TBC, and whether this relationship differed between the three types of stands. Similarly, the collated datasets were used to explore whether there was a relationship between stand-average woody canopy cover and the stand-average TBC, and whether this relationship differed between stand types.

Stand-average TBC (t C ha^{-1}) was calculated as the sum of the above- and below-ground biomass of all individuals in the plot, multiplied by 0.5, and divided by the area of the plot. Stand-average woody canopy cover (m^2 m^{-2}) was calculated by summing the crown areas of all individuals within the plots and dividing this total crown area by the area of the plot.

The 14 plots measured at Bourke were the only stands where both measured and predicted canopy cover and average height were available. Therefore these plots provided a test of how well predictions of canopy cover and average height matched that observed.

Figure 3: Example of natural regeneration stands where inventories of stem diameter were undertaken.

Figure 4: Example of environmental planting stands where inventories of stem diameter were undertaken.

Figure 5: Example of 'other native vegetation' where inventories of stem diameter were undertaken.

3 Results and Discussion

3.1 Relationship between stem diameter and crown area of individuals

The empirical relationship between stem diameter (*D10*) and crown area of individual shrubs and trees (see Section 2.1) was best described by a power relationship (Canopy area = $0.0807D_{10}^{1.7626}$), with an R^2 of 0.867 and RMSE of 19.9 (*N* = 1,677) (Fig. 6). This relationship appeared to be generic, with no indication that it differed between shrubs and trees. However for this study, our interest was mostly in the smaller regenerating individuals with D_{10} < 30 cm. For these individuals, the best power relationship describing this smaller subset of data (Canopy area = $0.1699D_{10}^{1.5161}$; *N* = 1,387) gave and R^2 of 0.663 and RMSE of 4.9 (Fig. 6).

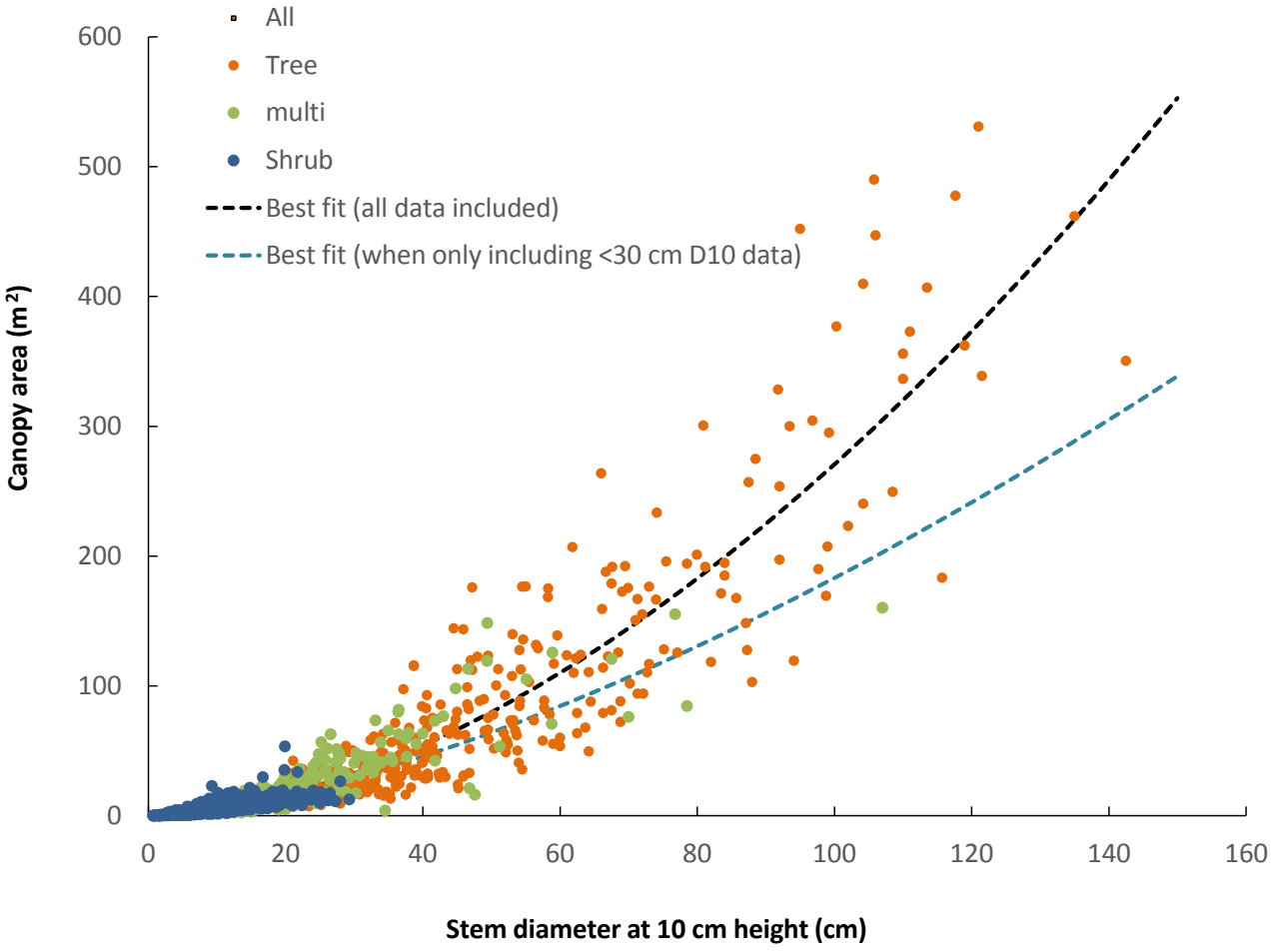

Figure 6: Relationship between stem diameter and the canopy area of an individual shrub or tree (N = 1,677). Datasets used are given in Table 1.

3.2 Relationship between stem diameter and height of individuals

The individual shrub and tree datasets compiled by Paul et al. (2016) and the additional data from Bourke were used to determine an empirical relationship between stem diameter (*D10*) and height as described in Section 2.2. A power relationship could be fitted to the dataset, but with the relationship clearly differing between trees and shrubs (Fig. 7). The power relationship for single-stemmed trees had an R^2 of 0.7496 (*N* =

2,994), for multi-stemmed trees had an R^2 of 0.5916 (*N* = 3,493), while for shrubs the relationship had an R^2 of 0.6862 (*N* = 2,800).

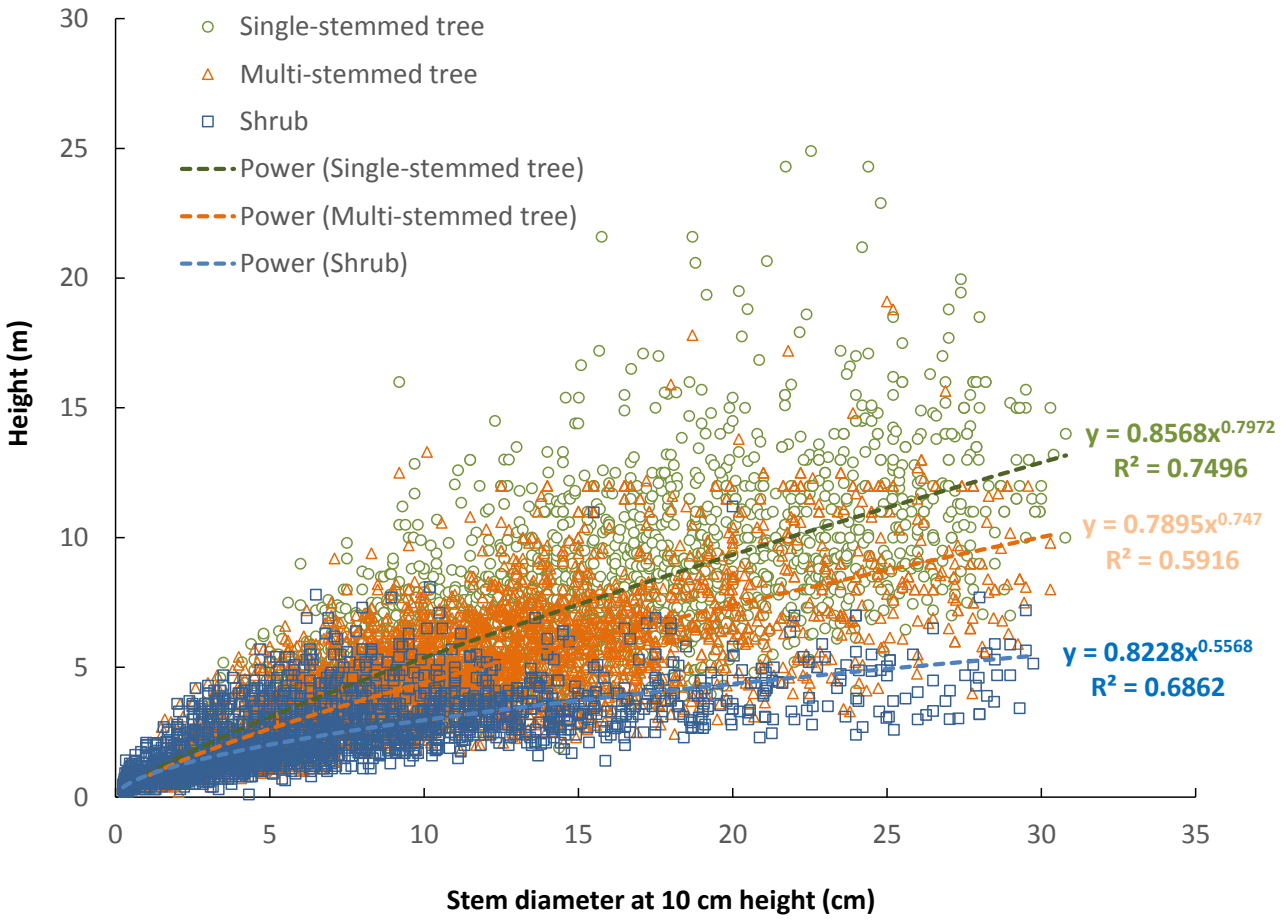

Figure 7: Relationship between stem diameter and the height of an individual shrub, single- or multi-stemmed tree. Datasets used are from Paul et al. (2016) and the new data from Bourke, and excluded shrubs and trees of relatively large size (*D10* >30 cm).

3.3 Relationship between stand-level above-ground biomass and canopy cover

Although there was large variation between plots, there was nevertheless a clear relationship between TBC and the crown cover of a stand. A power relationship could be fitted to these datasets, with an R^2 of 0.8269 (*N* = 892) (Fig. 8). This relationship appeared to be generic, with no clear indication that it differed between the different types of stands. However, there was a large amount of prediction error for 'Other native vegetation', probably due to variation in remnant trees included within their inventory assessments. For environmental plantings, these TBC-crown relationships are anticipated to vary largely based on the configuration in which the shrubs and trees are established, e.g. rows with wide inter-row spaces cf. dense block plantings. Of most interest is the TBC-crown relationship for stands of natural regeneration. For datasets from stands of natural regeneration, the power relationship could be fitted with an R^2 of 0.7865 (*N* = 349) (Fig. 8).

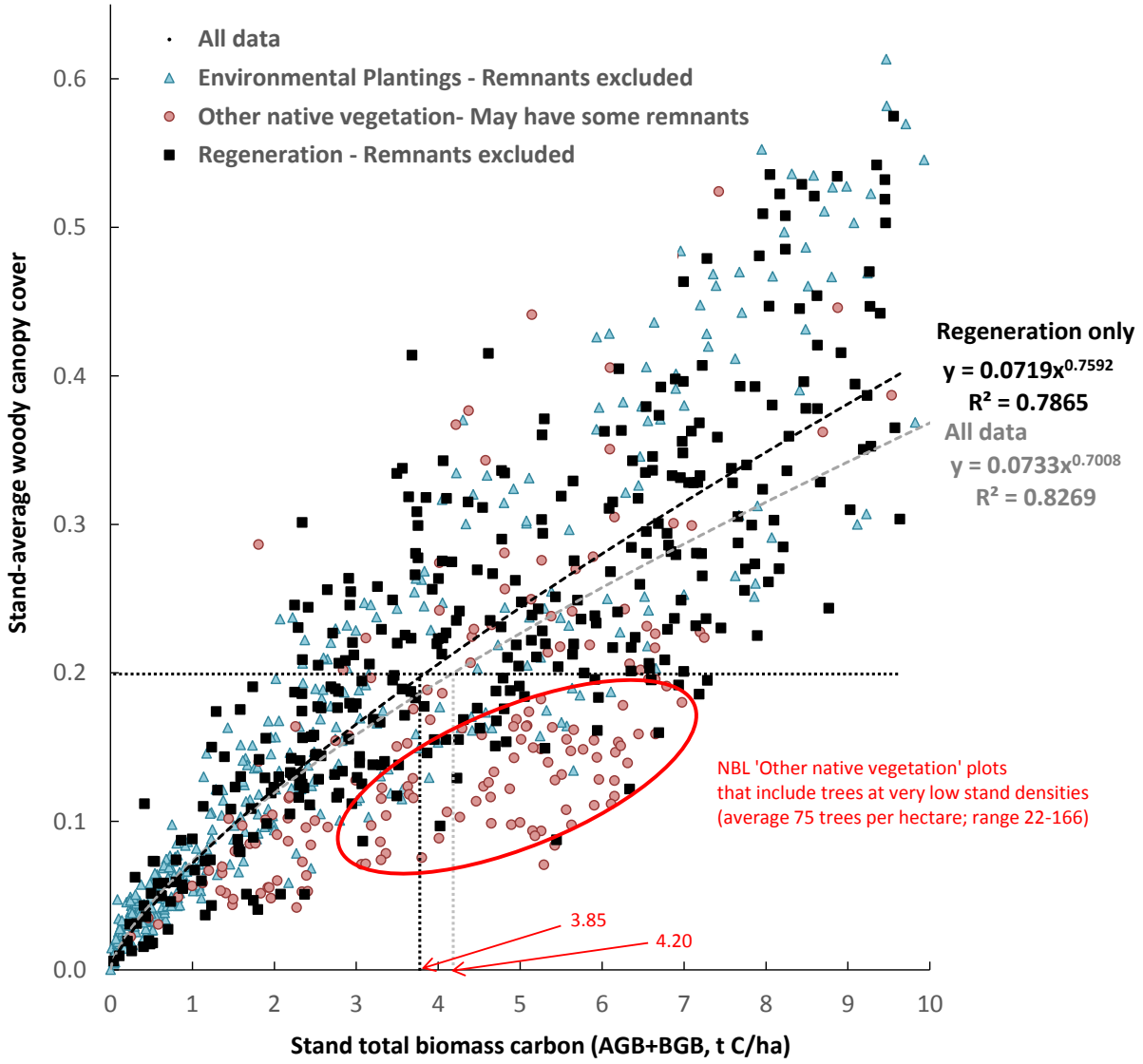

Figure 8: Relationship between the above- and below-ground total biomass carbon (TBC) and woody canopy cover of a stand (m^2 m^{-2}) in moderate-low rainfall and semi-arid regions of Australia. Datasets used are given in Table 2.

3.4 Relationship between stand-level above-ground biomass and average height

The stand-level relationship between TBC and average height was relatively poor (Fig. 9). This was particularly the case for 'Other native vegetation' where not all remnant trees were excluded from the inventory assessments given the difficulty in distinguishing remnant trees from those regenerating. Indeed a number of 'Other native vegetation' stands with TBC of 4 to 7 t C ha^{-1} probably contained some remnant trees given their relatively high heights (> 5 m). These same stands also contributed to the relatively high TBC for a given canopy cover of only about 0.05-0.08. See sites circles in red in Fig. 8 and 9.

For regenerating stands, the fitted power relationship had an R^2 of only 0.1596 (Fig. 9), with typical heights of regenerating stands being 1.0 to 5.5 m. However, it appeared that there were still a proportion of regenerating stands that did not attain an average height of 2 m at the 3.85 t C ha^{-1} of TBC required to reach a canopy cover of 0.2 (Fig. 8).

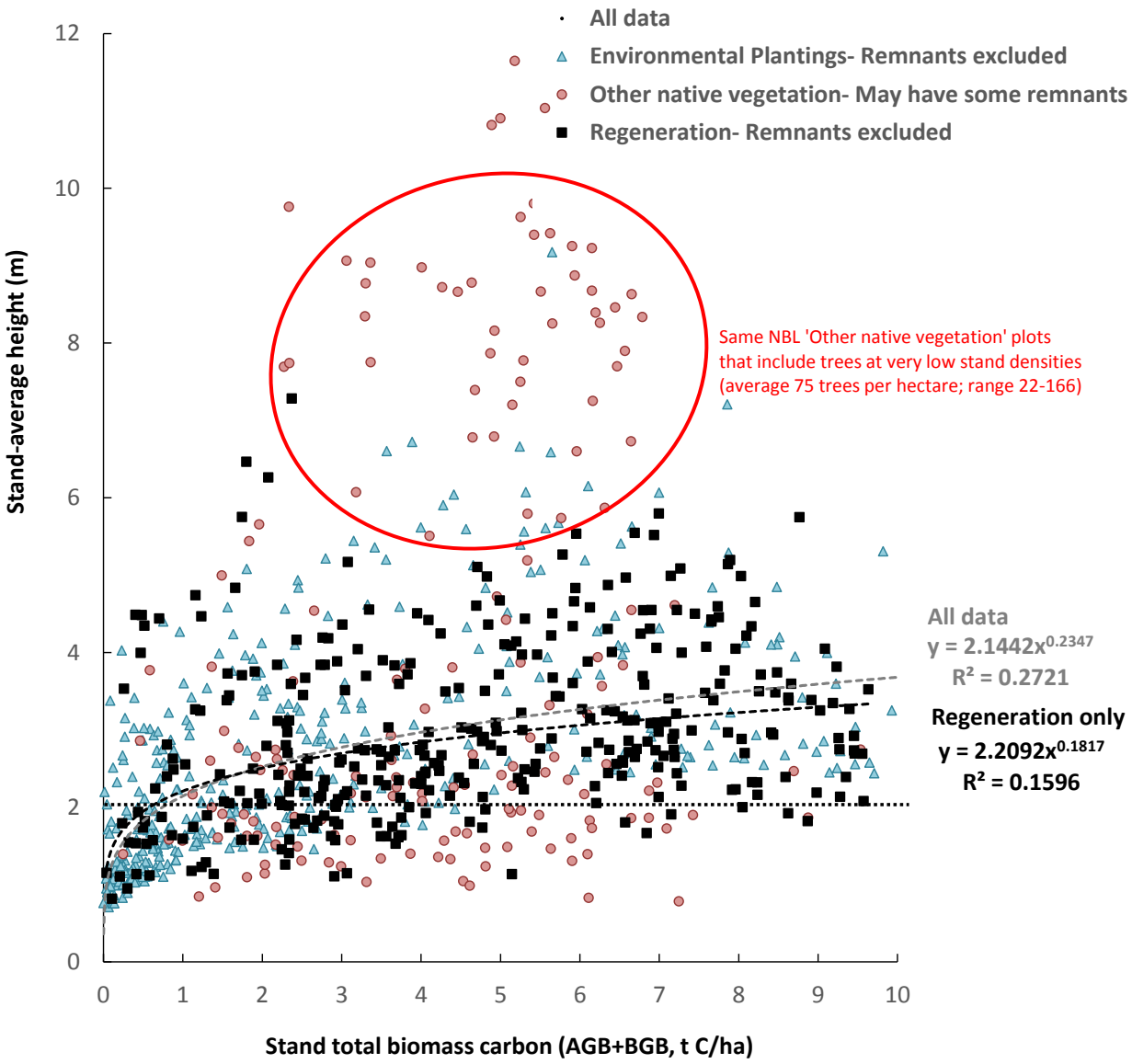

Figure 9: Relationship between the above-ground biomass (AGB) and average height of a stand in moderate-low rainfall and semi-arid regions of Australia. Datasets used are given in Table 2.

3.5 Comparison of observed versus predicted canopy cover and height

The 14 plots measured at Bourke were the only stands where both measured and predicted canopy cover and average height were available. Therefore these plots provided a test of how well predictions of canopy cover and average height matched that observed. Our results showed that when applying the power relationship shown in Fig. 6, there was negligible bias in prediction of canopy area of individual trees and shrubs measured (Fig. 10a), and hence, there was also negligible bias in the plot-based estimates of canopy cover (Fig. 10c). Similarly, when applying the power relationships shown in Fig. 7, there was negligible bias in prediction of the height of individual trees and shrubs measured (Fig. 10b), and hence, there was also negligible bias in the plot-based estimates of average stand height (Fig. 10d).

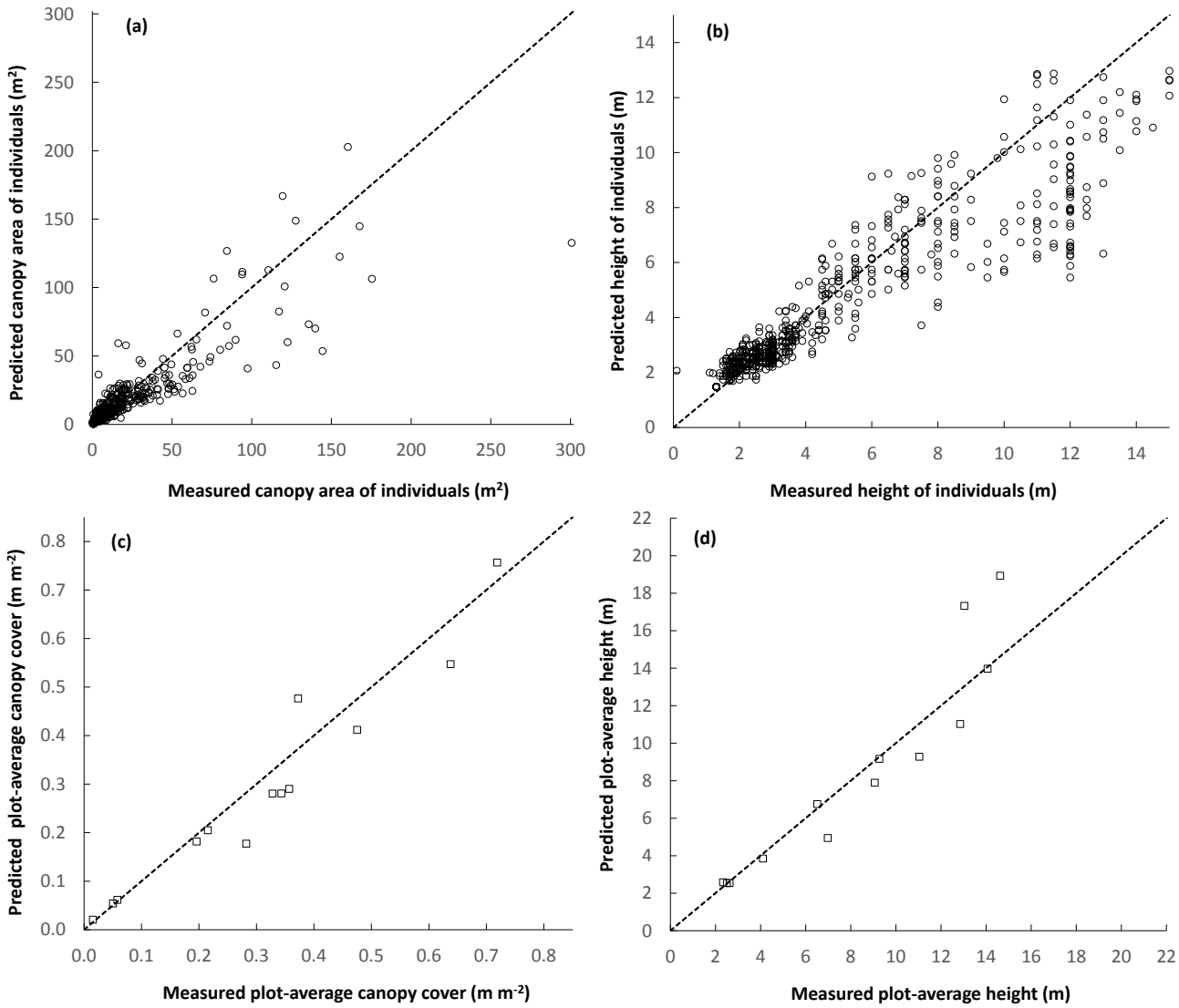

Figure 10: For the study sites near Bourke, a comparison between observed and predicted: (a) canopy area of individual trees and shrubs, when applying the power relationship fitted to data shown in Fig. 6; (b) height of individual trees and shrubs measured, when applying the power relationships fitted to data shown in Fig. 7; (c) plot-average canopy cover at the 14 plots measured, when applying the power relationship fitted to data shown in Fig. 6 and accounting for the area of the plots, and (d) plot-average height at the 14 plots measured, when applying the power relationships fitted to data shown in Fig. 7 and accounting for the area of the plots.

4 Conclusions

The relationship between stem diameter and crown area of individual trees and shrubs appears to be robust (R^2 = 0.83) for the semi-arid woodland and shrubland regions included in this study. Further work is required to test if this relationship holds for different climatic regions. A reasonable relationship between stand-level estimates of canopy cover and above-ground biomass was found, particularly for natural regeneration, although this varied according to the extent to which stands included remnant trees. If this relationship can be validated more broadly, crown areas could be utilised to estimate biomass from aerial surveys, either from detailed plot-based drone surveys or from broad-scale airborne or satellite imagery. Crown areas shown on current imagery and compared to historic images, could be an effective method to estimate changes in biomass over varying time scales. We suggest additional tree crown area studies in a broader range of woodland systems, such as those in the southern tablelands of NSW and south western Queensland, to further test the relationship between crown area and stem diameter.

5 References

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Emissions Reduction Fund:

Proposed amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015* relating to native vegetation regeneration projects

Consultation paper

August 2018

Making a submission

The Australian Government invites written submissions from all interested businesses and members of the community on the Emissions Reduction Fund Consultation Paper - Proposed amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015* relating to native vegetation regeneration projects.

Submissions are due by 5:00pm AEST, Thursday 13 September 2018. Any submissions received after this date will be considered at the Government's discretion.

Submission guidelines

Where possible, submissions should be sent electronically, preferably in Microsoft Word or other text-based formats, to the email address listed below. Alternatively, submissions may be sent to the postal address below to arrive by 5:00pm AEST on the above due date.

All submissions must include a cover sheet, available at www.environment.gov.au. The submission and coversheet should be provided as separate files if sent electronically.

Submissions can be forwarded to:

Email: ERFforests@environment.gov.au (preferred)

Postal: Forests Section
Department of the Environment and Energy
GPO Box 787
CANBERRA ACT 2601

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A request made under the *Freedom of Information Act 1982* for access to a submission, including those treated as confidential, will be determined in accordance with that Act.

CONTENTS

Introduction

The Australian Government is considering amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015* (the rule) to:

- ensure the Clean Energy Regulator has the information necessary to assess compliance with requirements in Emissions Reduction Fund methods for native vegetation regeneration projects; and
- provide clarity around the timeframes within which land under regeneration methods must attain forest cover to obtain further carbon credits.

Purpose of the proposed amendments

The proposed rule amendments would clarify the intent of the ~~*Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* (as varied in 2018) (the Human-Induced Regeneration Method)~~ *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013*.

The method provides opportunities for projects involving changes in land management to regenerate native vegetation to attain forest cover. The amendments are designed to support robust implementation and ongoing integrity of the method over the long term. They would provide assurance that crediting aligns with on-ground progress of regenerating vegetation towards forest cover.

The Clean Energy Regulator is developing guidance on stratification, evidence and records for projects under the method. The proposed rule amendments and the guidance are complementary. For example, the guidance requires that at five-yearly intervals proponents must demonstrate that eligible land with forest potential has made progress towards attaining forest cover. Projects that continue to meet the requirements of the Clean Energy Regulator's guidance would be likely to be on track to meet the requirements of the proposed rule amendments later in their crediting period. For this reason, the proposed rule amendments are being released for consultation alongside the draft guidance.

To provide further clarification, the CFI Mapping Guidelines will also be amended following consultation. The method requires use of the CFI Mapping Guidelines when mapping projects. For consultation purposes, geospatial mapping requirements are included in the Clean Energy Regulator's draft guidance. Relevant mapping requirements will be incorporated in the CFI Mapping Guidelines following consultation.

The Government will take submissions on the draft rule amendments into account in considering whether to adopt the rule amendments and make them into law.

Overview of proposed rule amendments

The proposed amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015* are to:

- ensure the Clean Energy Regulator has the information necessary to assess compliance with requirements in Emissions Reduction Fund methods for regeneration projects; and
- provide clarity around the timeframes within which land under regeneration methods must attain forest cover to obtain further carbon credits.

The proposed amendments would apply to the ~~*Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* and its variants. They would also apply to any projects transferring from this method to the~~ *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013*. Thi~~s~~es~~e~~ method~~s~~ provide~~s~~ opportunities for projects involving changes in land management to regenerate native forests. The method~~s~~ define~~s~~ land as having forest cover if it has an area of at least 0.2 of a hectare, with trees that are two metres or more in height and which provide crown cover of at least 20% of the land.

Legislative background

Under the *Carbon Credits (Carbon Farming Initiative) Act 2011* (the Act) the issuance of Australian carbon credit units is separate to the declaration of eligible offsets projects and offsets reporting under the applicable methodology determination. After submitting an offsets report, project proponents can submit an application for a certificate of entitlement in respect of the reporting period covered by the offsets report. Under subsection 15(2) of the Act the Regulator cannot issue a certificate of entitlement unless satisfied of a number of requirements. Paragraph 15(2)(h) includes in that list any additional requirements specified in the regulations or legislative rules.

Under the Act, offsets reports must include both information required by the applicable methodology determination and information required by legislative rules.

Proposed rule amendments

Central to the proposed amendments is a requirement for a certificate of entitlement such that where requirements for attaining forest cover are not met, crediting is restricted for the applicable carbon estimation areas (CEAs).

Amendments are also proposed clarifying the information necessary to demonstrate that the forest potential requirements of the methods are being met. They complement guidance to be published by the Clean Energy Regulator setting out information to be provided by proponents at five-year intervals to demonstrate that land within carbon estimation areas continues to have forest potential and has made progress towards attaining forest cover.

Land under existing projects (those registered before 1 July 2018) would be required to attain forest cover by 15 years after the declaration of the project. The proposed amendments would limit crediting after the 15 year period for CEAs that have not substantially reached forest cover. They would have no effect on crediting for CEAs that have reached forest cover within 15 years. Proponents could re-stratify CEAs so that

crediting would only be limited for areas of CEAs that have not substantially reached forest cover.

For projects registered after 1 July 2018 or land added to an existing project after 1 July 2018, the same rule would apply but the 15 year period would have a different starting point. It would be the 15 years after the commencement of the modelling of forest regeneration.

The proposed amendments make allowances for projects affected by disturbances or growth pauses, by allowing for the date of the test to be extended by up to five years for 'eligible growth disruptions'. This supports the principle that regeneration projects should be undertaken on land with existing forest potential that is capable of attaining forest cover. The rule also ensures that the forest attainment date falls no later than five years prior to the end of the crediting period.

The proposed amendments are supported by data on growth of vegetation in regions where regeneration projects may be undertaken, including the time this vegetation generally takes to reach forest cover. The data shows that forest cover would have been attained if the on-ground regrowth corresponded with the modelled regeneration estimates over the periods set out.

Limiting the crediting of projects yet to meet the forest cover requirements would support consistency between modelled abatement estimates and on-ground project performance. The offsets integrity standards under the Act require that methods provide for conservative estimates of abatement.

Provisions are included that would ensure vegetation in low productivity areas is required to attain forest cover within timeframes realistic for those conditions. In particular, modelling undertaken in accordance with the relevant method would need to show the CEA has more than [5][1] tonnes of carbon per hectare for the forest cover requirement to apply.

[1] The Department of the Environment and Energy will confirm the final value during the consultation period.

Detailed explanation of proposed rule amendments

The legislative text for the proposed rule amendments is presented in blue text.

Strengthened offsets reporting requirements

Sections 70 and 71 of the *Carbon Credits (Carbon Farming Initiative) Rule 2015* are proposed to be amended to specify the information that must be included in offsets reports for demonstrating progress towards forest cover at five-year intervals and the attainment of forest cover once the forest cover assessment date (see below) passes. The information provided would need to take into account any guidelines issued by the Regulator.

Section 70, regarding the information that must be included in offsets reports, would be amended to include the following subsection:

Information for ~~human-induced regeneration~~ NFMR projects

(3A) The offsets report for a ~~human-induced regeneration~~ NFMR project must set out the following information:

(a) if:

(i) a carbon estimation area has never previously been included in an offsets report for a ~~human-induced~~ ~~regeneration~~ NFMR project; or

(ii) the Regulator requests, in writing, the following information in relation to a carbon estimation area,

an explanation, for the carbon estimation area, of how pre-existing forest cover has been excluded from the carbon estimation area taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time;

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

(b) if:

(i) the offsets report is the first offsets report to be submitted after the end of the 5th, 10th, 15th or 20th year of the ~~human-induced regeneration~~ NFMR project's last or only crediting period; or

(ii) the offsets report for the ~~human-induced~~ ~~regeneration~~ NFMR project must be accompanied by a report of a subsequent audit; or

(iii) the offsets report is the first offsets report for a ~~human-induced~~ ~~regeneration~~ NFMR project where there has been modelling of forest regeneration or growth for a total of 5 or more years before the start of the project's crediting period,

an explanation, for each carbon estimation area included in the offsets report that has not already attained forest cover:

(iv) of the progress towards or attainment of forest cover in each such carbon estimation area and evidence supporting that progress or attainment; and

(v) of how the project mechanism has continued to be implemented in each such carbon estimation area and evidence supporting that continued implementation;

taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time;

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

(c) if:

(i) the offsets report includes a carbon estimation area that has passed its forest cover assessment date; and

(ii) the information required by this paragraph has not already been included in an offsets report,

an explanation of the evidence that demonstrates whether or not the requirements of subsection 9AA(3) are satisfied in relation to the carbon estimation area, taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time;

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

(d) for each carbon estimation area included in the offsets report:

(i) the date that the modelling of forest regeneration commenced; and

(ii) the estimated forest cover assessment date; and

(iii) details of any eligible growth disruption; and

(iv) an explanation of whether forest cover has been obtained; and

(v) the total carbon stock at the end of the reporting period, in both tonnes of carbon and tonnes of carbon per hectare, under the modelling undertaken in accordance with the applicable methodology determination for the reporting period; and

(vi) any previous assessment by the Regulator of whether the land included in the carbon estimation area had pre-existing forest cover.

(3B) The Regulator may not make a request under subparagraph (3A)(a)(ii) more than once for the same carbon estimation area.

(6) In this section:

carbon estimation area has the meaning given by subsection 9AA(7).

eligible growth disruption has the meaning given by subsection 9AA(7).

forest cover assessment date has the meaning given by subsection 9AA(6).

~~***human-induced regeneration***~~ ***NFMR project*** has the meaning given by subsection 9AA(7).

pre-existing forest cover, for a carbon estimation area, means forest cover that existed:

(a) if the applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* or an earlier version of that methodology determination applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act—at the time of the decision to implement the project mechanism (within the meaning of those determinations) in the carbon estimation area;

~~(b) if the applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Forest—1.1) Methodology Determination 2013* as in force at any time until 21 March 2016—immediately before project commencement (within the meaning of that determination) for the carbon estimation area;~~

~~(c) if the applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Forest—1.1) Methodology Determination 2013* as in force at any time after 21 March 2016—at any time during the baseline period (within the meaning of that determination) for the carbon estimation area.~~

Section 71, regarding documents that must accompany an offsets report, would be amended to include the following paragraph.

(c) if the offsets report for a ~~human-induced regeneration~~ NFMR project is required to contain information under subsection 70(3A)—documents to support the information, taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time.

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

Eligibility requirements for a certificate of entitlement regarding forest cover attainment

A section 9AA would be introduced to set out eligibility requirements for obtaining a certificate of entitlement applicable when projects have passed their forest cover assessment date and in relation to the information required above. Whether or not this section is satisfied would not affect the declaration of the project, whether the project complies with the applicable methodology determination, any credits already issued for the project or whether a certificate of entitlement will be issued for a subsequent reporting period.

9AA Issue of certificate of entitlement—eligibility requirements for ~~human-induced regeneration~~ NFMR projects

(1) For paragraph 15(2)(h) of the Act, this section specifies eligibility requirements that must be met in order for a certificate of entitlement to be issued in respect of an eligible offsets project that is a ~~human-induced regeneration~~ NFMR project for a reporting period.

Note: The fact that these requirements are not met in relation to a reporting period does not mean that they cannot be met in relation to a subsequent reporting period within the crediting period; for example, if at the end of that subsequent reporting period forest cover has been attained.

Subsection (2) would ensure the information requirements set out in subsections 70(3A)(b) and paragraph 71(c) are adequately met in order for a regeneration project to be eligible for a certificate of entitlement.

(2) If the offsets report for the reporting period was required to include information in accordance with paragraph 70(3A)(b)—it is an eligibility requirement that the information provided in the report, and any documents included in accordance with paragraph 71(c) to support such information, are sufficient to enable the Regulator to determine if the forest potential requirement of the applicable methodology determination for the reporting period is satisfied in relation to all carbon estimation areas that are included in the offsets report.

Subsection (3) is the central proposed additional requirement to ensure that all CEAs that are past their forest cover assessment date must have attained forest cover to be eligible for a certificate of entitlement.

(3) It is an eligibility requirement that all carbon estimation areas that:

(a) are included in the offsets report for the reporting period; and

(b) are past their forest cover assessment date;

have attained forest cover by or before the end of the reporting period.

Note 1: Under the applicable methodology determination for the ~~human-induced regeneration~~ NFMR project a project proponent may choose to re-stratify the carbon estimation areas to ensure that this requirement is met in relation to a reporting period. Under section 77A of the Act a project proponent may also choose to report on all carbon estimation areas that meet this requirement in advance of any carbon estimation areas which do not meet this requirement.

Note 2: It is intended that audit reports provided under section 79A or otherwise provided to the Regulator will be used to assist the Regulator to verify this requirement. Under subsection 9(2) if

an audit report does not set out a reasonable assurance conclusion or qualified reasonable assurance conclusion a certificate of entitlement may not be issued.

Subsection (4) would set out what is required for a CEA to be taken to have attained forest cover. The proposed requirements are designed to ensure only those areas of land within a CEA meeting the methods' definition of forest cover can be taken to have attained forest cover. In order to reliably determine whether forests meet the minimum area of 0.2 hectares, the assessment of forest cover must be undertaken at the 0.2 hectare scale. Any land of 0.2 hectares (or more) in area that does not have trees two metres or more in height and providing crown cover of at least 20% of the land does not meet the forest cover definition. Therefore the proposed amendments require assessment at the 0.2 hectare scale.

Paragraph (4)(a) provides for a simplified assessment approach; if the forest cover mapping used by the National Inventory Report to report sequestered carbon shows over 90% of the area of the carbon estimation area as having forest cover, the CEA is taken to have attained forest cover. This approach is permitted because the National Inventory Report forest cover mapping is undertaken at a scale of less than 0.2 hectares (0.0625 ha) and applies the requirement of a minimum contiguous forest area of 0.2 hectares to classify land as having forest cover. Paragraph (4)(b) provides for a more detailed assessment such that when a CEA is considered as 0.2 hectare portions, and over 90% of those 0.2 hectare portions have attained forest cover as per the definition, the CEA is taken to have attained forest cover.

If land were to be credited for abatement where it does not attain forest cover in at least 90% of the 0.2 hectare portions by the forest cover assessment date, the crediting is unlikely to be conservative. This is because the models used for estimating abatement under the methods are calibrated to provide estimates of abatement where each 0.2 hectare portion of land attains forest cover. The proposed requirements would help ensure carbon abatement credited under the regeneration methods is conservative.

Allowing for 90% of 0.2 hectare portions to have attained forest cover, rather than 100%, would reduce the need for re-stratification if a small proportion of a CEA has not attained forest cover. Furthermore, where a small proportion of the CEA (10% or less of the 0.2 hectare portions) may be on the margins of having attained forest cover, the whole of the CEA would not be prevented from being taken to have attained forest cover.

Subsection (5) provides for requirements to be set out in the Carbon Farming Initiative Mapping Guidelines to guide assessment of carbon estimation areas under paragraph (4)(b) and further guidance by the Clean Energy Regulator.

(4) For the purpose of subsection (3), a carbon estimation area has ***attained forest cover*** if:

(a) over 90% of the area of the carbon estimation area is identified as having forest cover in accordance with the most recent version of the maps that form the basis of the National Inventory Report; or

(b) when assessed in 0.2 hectare portions, over 90% of those portions have attained forest cover such that the land in each portion has trees that:

(i) are 2 metres or more in height; and

(ii) provide crown cover of at least 20% of the land.

Note: The fact that a carbon estimation area is considered to have attained forest cover under this subsection does not mean that any requirements relating to forest cover or forest potential under the applicable methodology determination for the project are satisfied.

(5) The assessment of 0.2 hectare portions for a carbon estimation area under paragraph (4)(b) must:

(a) comply with any requirements set out in the CFI Mapping Guidelines for the purpose of this paragraph; and

(b) take into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time.

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au.

Subsection (6) would define when a CEA has passed the forest cover assessment date. This occurs once both the tonnes of carbon per hectare amount under paragraph (a) and the time period set out under paragraph (b) or (c) have been surpassed.

Where the time period has been surpassed, but not the tonnes of carbon amount (or vice versa), the forest cover assessment date has not yet passed.

The provision under paragraph (a) ensures land is only required to have attained forest cover once it is reasonable to expect it to have done so. The relationship between tonnes of carbon present in regenerating forest and canopy cover informs this provision. However, it does not apply for the last 5 years of a project's crediting period.

Paragraphs (b) and (c) set-out separate timing for existing CEAs (an area that was part of the project area for a regeneration project on 1 July 2018) and non-existing CEAs (as of 1 July 2018).

For existing CEAs, under paragraph (b), the timing is the later of 15 years after declaration, or 15 years after the commencement of modelling of forest regeneration, disregarding up to 5 years of eligible growth disruption in either case. For this purpose the declaration is the day the Regulator made the decision to declare the project and not when it may have taken effect under earlier provisions in the Act which allowed the backdating of the effect of the declaration.

For non-existing CEAs, under paragraph (c), the timing is 15 years since the modelling of forest regeneration commenced, disregarding up to 5 years of eligible growth disruption.

(6) A carbon estimation area has passed its ***forest cover assessment date***, when paragraph (a) and either paragraph (b) or (c) are satisfied:

(a) either:

(i) the carbon estimation area contains more than [5] tonnes of carbon per hectare under the modelling undertaken in accordance with the applicable methodology determination for the reporting period for the purpose of preparing the offsets report; or

(ii) the carbon estimation area is part of an eligible offset project with less than 5 years of its crediting period remaining;

(b) if the carbon estimation area is an existing CEA—the date is after the later of:

(i) the date that is 15 years since the day the eligible offsets project first including the area was declared under section 27 of the Act disregarding up to 5 years of any eligible growth disruption; and

(ii) the date that is 15 years since the modelling of forest regeneration commenced for the carbon estimation area disregarding up to 5 years of any eligible growth disruption;

(c) if the carbon estimation area is not an existing CEA—the date more than 15 years since the modelling of forest regeneration commenced for the carbon estimation area disregarding up to 5 years of any eligible growth disruption.

Note 1: The periods of eligible growth disruption need not be at the same time. For example, under paragraph (c) if the third and fifth year after modelling of forest regeneration commenced was an eligible growth disruption the forest cover assessment date would be 17 years after that

modelling commencement (assuming over [5] tonnes of carbon per hectare was present at the end of the reporting period according to the modelling).

Note 2: The modelling of when forest regeneration commences is often described as a regeneration event in the model where carbon stocks begin to increase in the carbon estimation area.

Subsection (7) would provide for further definitions.

(7) In this section:

carbon estimation area, for an eligible offsets projects, has the meaning given by the applicable methodology determination for the reporting period.

The definition for 'eligible growth disruption' would cover any period of time during which carbon stocks decrease or are modelled to be stable, for example due to a growth pause event. An eligible growth disruption would run for the period that the model shows a zero or negative change in abatement from one step to the next, rather than the period of time it takes carbon stocks to recover to previous levels (in the event of a disturbance, for example).

eligible growth disruption, in relation to a period, means any period of time meeting the following criteria:

(a) occurs after carbon stocks have begun to increase following the modelling of regeneration;

(b) during which carbon stocks are modelled not to increase under the applicable methodology determination for the reporting period;

(c) if subparagraph (6)(b)(i) applies—does not include a period before the day the project was declared under section 27 of the Act.

existing CEA means a carbon estimation area consisting only of an area that was part of the project area for a ~~human-induced regeneration~~ NFMR project on 1 July 2018.

forest potential requirement means a requirement for an area of land to have forest potential, within the meaning of the applicable methodology determination for the reporting period, for the land to be included in a carbon estimation area for the project.

The definition for '~~human-induced regeneration~~ NFMR project' includes projects under the ~~*Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013*; and projects under the~~ *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* ~~which have any land that was previously part of a project under the *Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013*~~.

~~***human-induced regeneration***~~ ***NFMR project*** means ~~either~~:

~~(a) a project whose applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* or an earlier version of that determination applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act; or~~

(b) a project:

~~(i)~~ whose applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* or an earlier version of that methodology determinations applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act~~; and~~

~~(ii) whose project area includes land that was previously part of an eligible offsets project covered by the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* or an earlier version of that determination applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act~~.

National Inventory Report means the report of that name produced by Australia in fulfilment of its obligations under the Climate Change Convention and the Kyoto Protocol, as in force from time to time.

Note: In 2018, the National Inventory Report could be accessed from http://www.environment.gov.au.

tree means a perennial plant that has primary supporting structures consisting of secondary xylem.

Supporting auditing requirements

The draft rule amendment provisions introduced in this section set out additional audit requirements relating to forest cover. Projects that have passed the forest cover assessment date would need to be audited. Projects would be exempt from this requirement if a previous audit found that the requirement to attain forest cover (subsection 9AA(3)) has already been satisfied, or where the Regulator agrees in writing that this is unnecessary. One of the reasons why an audit would be unnecessary is where a subsequent audit has been scheduled or rescheduled to cover the relevant period.

79A Forest cover audits of ~~human-induced regeneration~~ NFMR projects

(1) An eligible offsets project that is a ~~human-induced regeneration~~ NFMR project must be audited if:

(a) an offsets report for a reporting period will be submitted which includes one or more carbon estimation areas that have past their forest cover assessment date; and

(b) a previous audit report:

(i) prepared under this Division; or

(ii) prepared at the request of the project proponent and conducted in accordance with the requirements of section 80;

has not been provided to the Regulator confirming, by way of a reasonable assurance conclusion or a qualified reasonable assurance conclusion, that the requirements of subsection 9AA(3) are satisfied for each carbon estimation area that is included in the offsets report and has passed its forest cover assessment date.

(2) However, an audit need not be prepared if the Regulator agrees, in writing, that it is unnecessary.

(3) The audit must be about whether the requirements of subsection 9AA(3) are satisfied in relation to the reporting period.

(4) The report of the audit must accompany the offsets report for the reporting period mentioned in paragraph (1)(a).

Section 74 would be amended to include the following subsection to enable audit reports to cover any matter identified by the Regulator on a risk-basis with mutual agreement of the project proponent, similar to paragraph 76(2)(c):

(2A) If requested in writing by the Regulator after agreement between the Regulator and the project proponent, the initial audit must also be about any matter identified by the Regulator in a risk-based assessment of the project.

EMISSIONS REDUCTION ASSURANCE COMMITTEE

Review of the Human-Induced Regeneration and Native Forest from Managed Regrowth methods

Findings and Next Steps

3 December 2018

Overall findings

- With amendments to the CFI Rule, the HIR and NFMR methods comply with the offsets integrity standards
- The methods should be varied to ensure the methods reflect best practice

Additionality

Findings:

- Given the HIR method's dependence on having no forest cover in the baseline period to demonstrate additionality, a 10-year baseline period may not be sufficient
- Complexity of land clearing regulations, particularly in relation to fodder harvesting, makes it difficult to assess whether projects meet the regulatory additionality test

Additionality

Recommendations:

- Vary the HIR method to strengthen evidence requirements and possibly lengthen the baseline period
- Clarify the HIR method to improve the application of the regulatory additionality test

Estimating project abatement

Findings:

- The regeneration methods have over-crediting risks due to inclusion of land that:
  - has pre-existing forest cover
  - lacks forest potential
  - regenerates slower than assumed in FullCAM
- The methods clearly require:
  - the exclusion of land with pre-existing forest cover or that lack forest potential
  - forest to be assessed at a 0.2 ha scale for all relevant purposes
- Clean Energy Regulator guidelines will reduce the risks associated with pre-existing forest and forest potential
- CFI Rule amendments reduce forward- and over-crediting risks associated with slow regeneration

Concerns about NFMR

- Some members of ERAC have three concerns about NFMR:
  - the method's additionality requirement for at least one previous clearing event may not be sufficient to support the BAU assumption that land would be periodically cleared
  - scope for crediting of pre-project regeneration potentially excessive and illogical
  - scope for inclusion of fires in baseline scenario potentially too broad
- Position of ERAC on these issues still to be resolved

Estimating project abatement

Recommendations:

- Clarify requirements to assess forest potential and forest cover at 0.2 ha scale
- Clarify that regeneration must be demonstrated at 0.2 hectare scale for all land in a CEA
- Vary the HIR method to establish 5-year gateways similar to those in the CFI Rule and Regulator guidelines
  - Gateways should establish the levels of crown cover or biomass needed for continued crediting
  - Gateways should take into account regional differences in biomass-crown cover relationships (i.e. tailored gateways)
  - Proponents should have option of measuring biomass where biomass-crown cover tests not satisfied

Estimating project abatement

Recommendations:

- Consider developing a simplified version of HIR, using only National Accounts data
  - Method would have biomass-crown cover gateways
  - Look at incorporation of other streamlining options (e.g. around auditing)
  - Use discounts to manage integrity risks
- Consider developing a direct measurement HIR method

Project leakage

Finding:

- Available evidence did not indicate material leakage from projects

Project emissions

Finding:

- Emissions from fuel use are not material

Recommendation:

- Remove requirements to account for emissions from fuel use

Permanence

Findings:

- The permanence period discount for projects with 25-year permanence periods may need to be increased to manage non-permanence risks
- Allowing projects to transition from 25-year to 100-year permanence period likely to be beneficial

Recommendation:

- Consider increasing the permanence period discount and allowing projects to transition from 25-year to 100-year permanence period

Other matters

Finding:

- There may be better alternatives to the HIR method's 1.5 km radius requirement for CEAs to manage risks associated with heterogeneous rates of regeneration

Recommendation:

- Investigate alternatives to the 1.5 km radius requirement that can lower transaction costs and maintain integrity

Other matters

Finding:

- The way risks associated with method design errors are shared between proponents and the Government could be improved

Recommendation:

- Develop a more robust and sustainable risk-sharing framework for method design errors

Other reform proposals

- Other proposals
  - Develop method (or variation) that allows crediting of increased biomass in woody vegetation in sub-forest ecosystems and pre-existing forests; e.g.
    - regeneration of vegetation with <20% crown cover at maturity
    - increase in biomass in forest systems (i.e. that start with >20% crown cover)
  - Biggest challenge is additionality – devising sufficiently robust baselines, particularly in degraded ecosystems + that account for impact of climate variability on growth
  - Allow direct seeding and planting with projects
  - Consider adding requirement for vegetation to be managed so as to ensure it has structure and species mix representative of native vegetation in the region (as per Avoided Deforestation method)
  - Questions regarding allowing fodder harvesting or increased ecological thinning

Next steps

- ERAC meeting on 10 December to consider draft report – aim to finalise findings and recommendations
- Report to be released in early 2019 (possibly late Jan but more likely Feb)
- Department to consider review recommendations in early 2019
- Depending on views, Department to commence work on variations in early- to mid-2019 (noting election likely in May)

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Relating canopy cover and average height to the biomass of the stand

John Larmour, Micah Davies, Keryn Paul, Jacqui England, Stephen Roxburgh

August 2018

Report prepared for the Department of the Environment and Energy

Citation

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Important disclaimer

Contents

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1 Background

1.1 Objectives

The aim of this study was to explore the relationship between the above-ground biomass of a stand of woody vegetation and the canopy cover in semi-arid regions of Australia. The specific objective was to develop individual tree- or shrub-based relationships between stem diameter and crown area that could then be applied to plot-based inventories of stem diameter to derive crown areas and scale-up to stand-based estimates of crown cover. The focus of the new field work was on providing additional datasets to build confidence that the relationships derived using existing datasets are more broadly applicable.

2 Methods

2.1 Individual-level measurements of shrub and tree stem diameter and crown area

We identified existing datasets of 1,677 individual shrubs, multi-stemmed trees or single-stemmed trees where stem diameter and crown area were measured in semi-arid regions of Western Australia (WA), New South Wales (NSW) and Queensland (Qld) (Table 1). Just over half of these measurements (59%) were taken especially for this study from locations near Bourke and Charleville (Fig. 1).

Table 1: Type and number of shrubs and trees that were measured for both stem diameter and crown area within semi-arid regions of Australia.

Plant Functional Type & Genus	Region	*N*
Shrubs		
Atriplex spp.	Near Canna, Central West, WA	54
Rhagodia spp.	Near Canna, Central West, WA	52
Melaleuca spp.	Near Canna, Central West, WA	47
Acacia tree spp.[2]	Near Canna, Central West, WA	124
Melaleuca spp.	Near Ravensthorpe, South-West WA	40
Dodonaea spp.	Near Cobar, W NSW	46
Eremophila sturtii (turpentine bush)	Near Cobar, W NSW	50
Dodonaea viscosa	SW of Bourke, NSW	195
Eremophila sturtii	SW of Bourke, NSW	106
Multi		
Acacia shrub spp.[1]	Near Canna, Central West, WA	124
*Eucalyptus horistes (*mallee)	Near Canna, Central West, WA	152
Acacia aneura (mulga)	Near Bourke, W NSW	198
Acacia aneura (mulga)	Near Charleville, Qld	54
Trees		
Allocasuarina cristata	Near Bourke, W NSW	47
Flindersia maculosa	Near Bourke, W NSW	27
Eucalyptus populnea (poplar box)	Near Bourke, W NSW	39
Corymbia intermedia	Near Charleville, Qld	42
Corymbia tessellaris	Near Charleville, Qld	58
Callitris glaucophylla	Near Charleville, Qld	57
Eucalyptus melanoploia	Near Charleville, Qld	47
Eucalyptus coolabah	Near Charleville, Qld	57
Eucalyptus populnea (poplar box)	Near Charleville, Qld	61
Total		***1,677***

[1]*A. acuminata, A. saligna*
[2]*A. hemiteles, A. murrayana, A. victoriae*

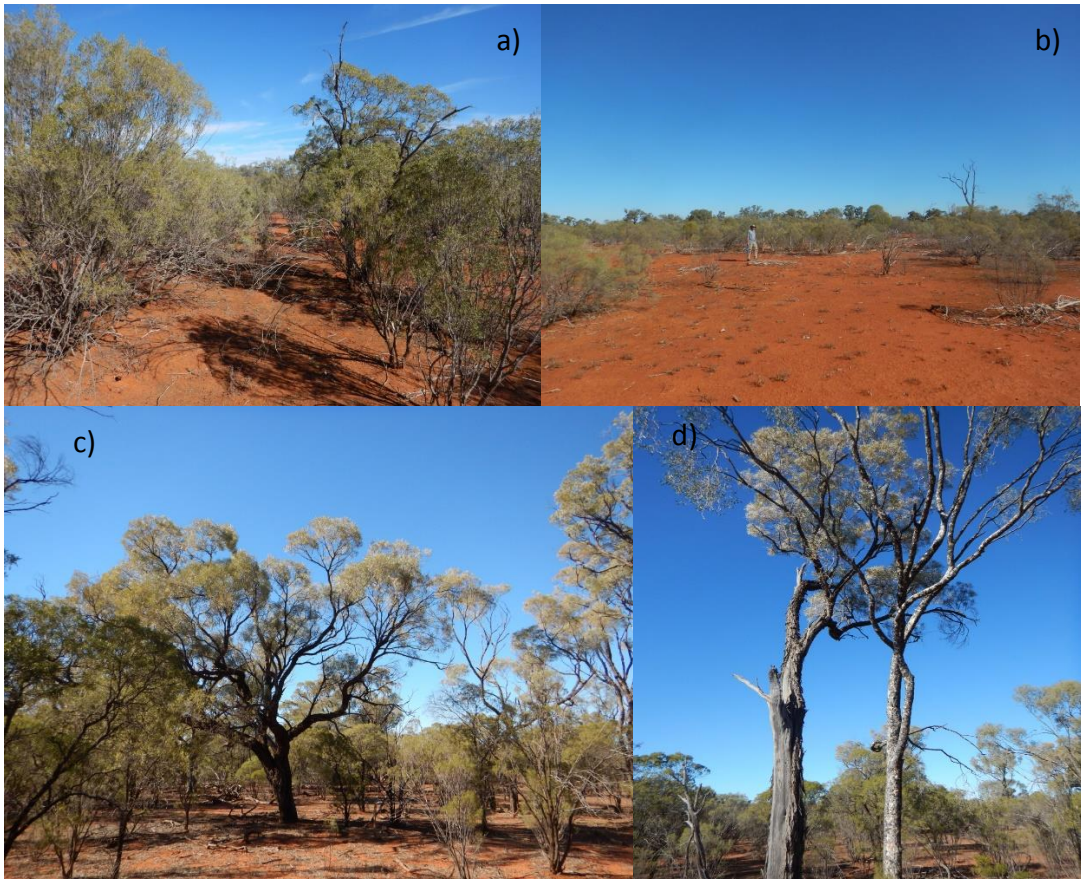

Figure 1: Examples of some of the individuals measured for stem diameter and crown area: a) & b) shrub-dominated plots measured at Bourke; c) & d) tree-form species from Bourke region.

For all 1,677 individuals measured, crown area was calculated as pi times half the crown length (diameter) measured in an East-West orientation, and times half the crown length measured in a North-South orientation. The stem diameter was measured at 10 cm height above the ground (*D10*). Given all of the shrubs and trees measured were from semi-arid regions of Australia, most of the individuals measured were multi-stemmed (Fig. 2). All measurements of multi-stemmed individuals (D_i) were converted to a single value (equivalent stem diameter, $D_e = \sqrt{\sum D_i^2}$, cm), such that the total basal area (cm^2) for all stems was equal to the basal area of an individual with this equivalent single diameter.

Figure 2: Examples of multi-stemmed individuals measured for stem diameter.

These datasets were used to determine if there was a generic relationship between *D10* and crown area across all datasets, as well as across only datasets where *D10* < 30 cm given this subset of data better represented smaller regenerating individuals. We also used ANCOVA analysis to assess whether this relationship was dependent on the plant functional type; namely whether the individual was a shrub, multi-stemmed tree, or single-stemmed tree.

2.2 Individual-level measurements of shrub and tree stem diameter and height

Empirical relationships that relate height to stem diameter of key plant functional types in Australia have been reported previously by Paul et al. (2016; see Table S2 of Supplementary Material). Here we used the same dataset of Paul et al. (2016) and derived relationships for shrubs, multi-stemmed trees (namely multi-stemmed acacias and mallees) and single-stemmed trees excluding relatively large (*D10* > 30 cm) individuals from the analysis. For all plant functional types, heights were related to the stem diameter measured at 10 cm above the ground. A further 738 and 142 individuals with *D10* >30 cm were also included in the dataset from the recent survey at Bourke and Charleville, respectively. Therefore the total dataset included 2,800 shrubs, 3,493 multi-stemmed trees, and 2,994 single-stemmed trees. These datasets were used to determine if there was a generic relationship between *D10* and height of an individual shrub, multi-stemmed tree or single-stemmed tree.

2.3 Stand-level estimates of biomass, canopy cover and height

Plot-based surveys of woody biomass traditionally use plot- or transect-based inventories of stem diameter. These inventory datasets are then used to estimate woody biomass through the application of allometric relationships for above-ground biomass (Paul et al. 2016) and below-ground biomass (Paul et al. 2018). Using the diameter-based relationship for prediction of crown area (Section 2.1) or height (Section 2.2), these same inventories may also be utilised to provide corresponding estimates of stand-based canopy cover and stand-based estimates of average height of the woody vegetation.

Here we collated plot-based inventories of stem diameter from 790 existing datasets, the primary focus being semi-arid regions of Australia (Table 2). To be included in the data analysis the inventory datasets were required to meet the following criteria:

1. Estimated total (above-ground and below-ground) biomass carbon, TBC <10 t C ha^{-1};
2. Plot size > 0.04 ha, and;
3. >10 individuals measured per plot.

As outlined in Table 2, there were three types of stands assessed:

1. Natural regeneration, where remnant trees within the measured plots were excluded from the analysis (Fig. 3);
2. Environmental plantings, where remnant trees within the measured plots were excluded from the analysis (Fig. 4), and;
3. Other native vegetation (Fig. 5).

The latter group generally included sites where the management history was not well known, and/or where it was difficult to distinguish the remnant vegetation from that which has been recently regenerated. A total of 14 new plots were measured in the Bourke region for individual canopy areas, heights and stem diameters of trees/shrubs. This region of western NSW typically has large areas dominated by shrubs (hop and turpentine bush) with limited natural regeneration of trees, typically as a consequence of competition from shrubs and high levels of grazing pressure from feral goats. Based on the types of stands available, it was necessary to modify the plot measurement methodology in order to measure enough individual trees for

crown area and height. Thus only five of the 14 plots were included in the dataset for stand-level estimates; the other plots did not meet the criteria above of having a TBC < 10 t C ha^{-1}.

Table 2: Number of stem-diameter inventory plots (*N*) collated from stands under regeneration, environmental plantings or other native vegetation in semi-arid areas of Australia. NBL refers to the National Biomass Library.

Type of stand	Source	*N*
Natural regeneration		
Canegrass and Wallal sites, near Charleville	CSIRO	209
Curra and Meadows sites, near Cobar	CSIRO	16
Conservation areas, near Bourke	CSIRO	5
Gidgee sites	NBL	2
Mulga sites	NBL	108
Environmental plantings		
22 sites, SE Australia	CSIRO	47
9 sites, Central West, WA	CSIRO	326
Other native vegetation		
9 studies	NBL	63
9 studies	CSIRO	103
Total		***879***

The datasets in Table 2 were used to explore whether there was a relationship between stand-average height and stand-average TBC, and whether this relationship differed between the three types of stands. Similarly, the collated datasets were used to explore whether there was a relationship between stand-average woody canopy cover and the stand-average TBC, and whether this relationship differed between stand types.

Stand-average TBC (t C ha^{-1}) was calculated as the sum of the above- and below-ground biomass of all individuals in the plot, multiplied by 0.5, and divided by the area of the plot. Stand-average woody canopy cover (m^2 m^{-2}) was calculated by summing the crown areas of all individuals within the plots and dividing this total crown area by the area of the plot.

The 14 plots measured at Bourke were the only stands where both measured and predicted canopy cover and average height were available. Therefore these plots provided a test of how well predictions of canopy cover and average height matched that observed.

Figure 3: Example of natural regeneration stands where inventories of stem diameter were undertaken.

Figure 4: Example of environmental planting stands where inventories of stem diameter were undertaken.

Figure 5: Example of 'other native vegetation' where inventories of stem diameter were undertaken.

3 Results and Discussion

3.1 Relationship between stem diameter and crown area of individuals

The empirical relationship between stem diameter (*D10*) and crown area of individual shrubs and trees (see Section 2.1) was best described by a power relationship (Canopy area = $0.0807D_{10}^{1.7626}$), with an R^2 of 0.867 and RMSE of 19.9 (*N* = 1,677) (Fig. 6). This relationship appeared to be generic, with no indication that it differed between shrubs and trees. However for this study, our interest was mostly in the smaller regenerating individuals with D_{10} < 30 cm. For these individuals, the best power relationship describing this smaller subset of data (Canopy area = $0.1699D_{10}^{1.5161}$; *N* = 1,387) gave and R^2 of 0.663 and RMSE of 4.9 (Fig. 6).

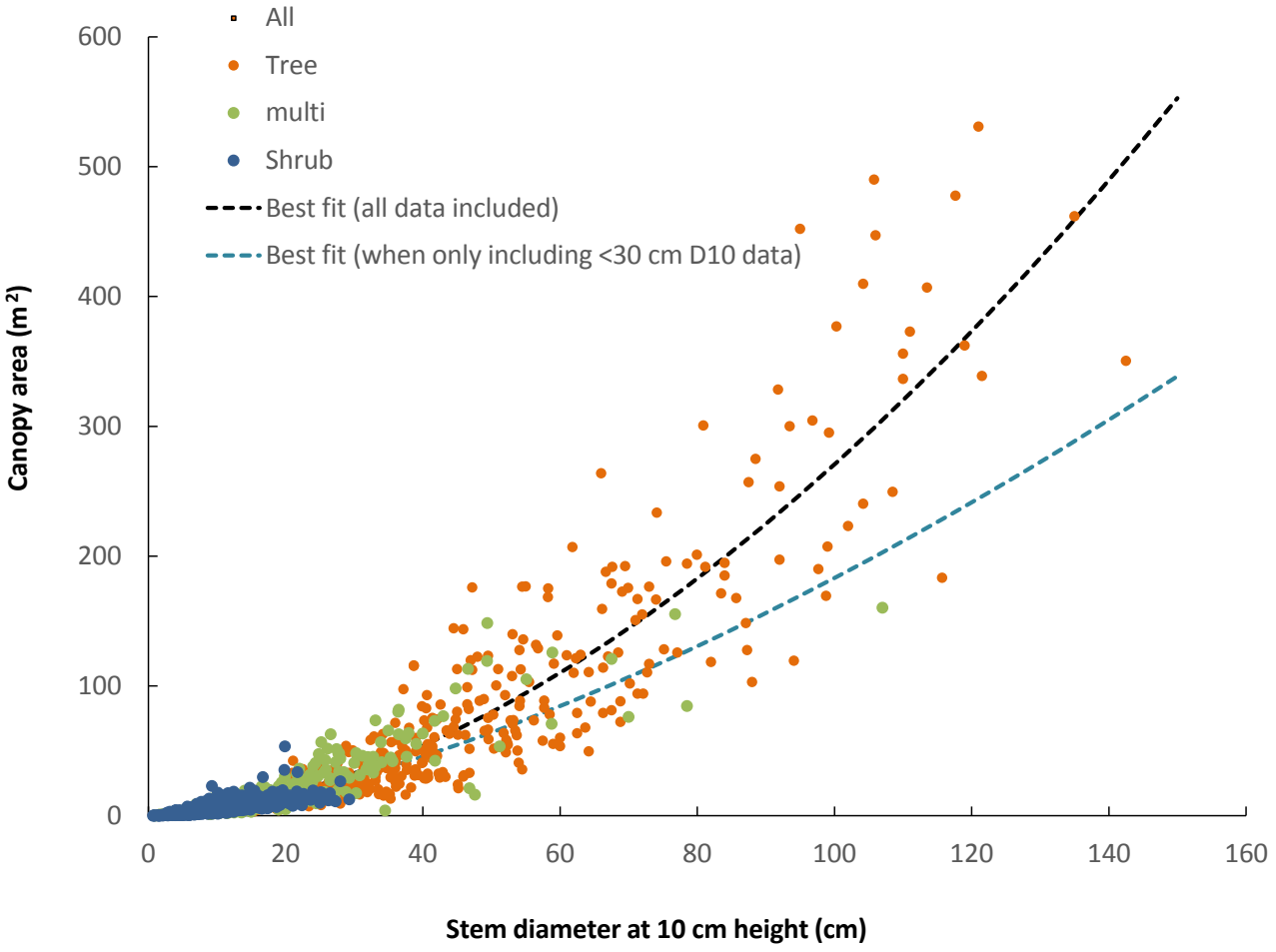

Figure 6: Relationship between stem diameter and the canopy area of an individual shrub or tree (N = 1,677). Datasets used are given in Table 1.

3.2 Relationship between stem diameter and height of individuals

The individual shrub and tree datasets compiled by Paul et al. (2016) and the additional data from Bourke were used to determine an empirical relationship between stem diameter (*D10*) and height as described in Section 2.2. A power relationship could be fitted to the dataset, but with the relationship clearly differing between trees and shrubs (Fig. 7). The power relationship for single-stemmed trees had an R^2 of 0.7496 (*N* =

2,994), for multi-stemmed trees had an R^2 of 0.5916 (*N* = 3,493), while for shrubs the relationship had an R^2 of 0.6862 (*N* = 2,800).

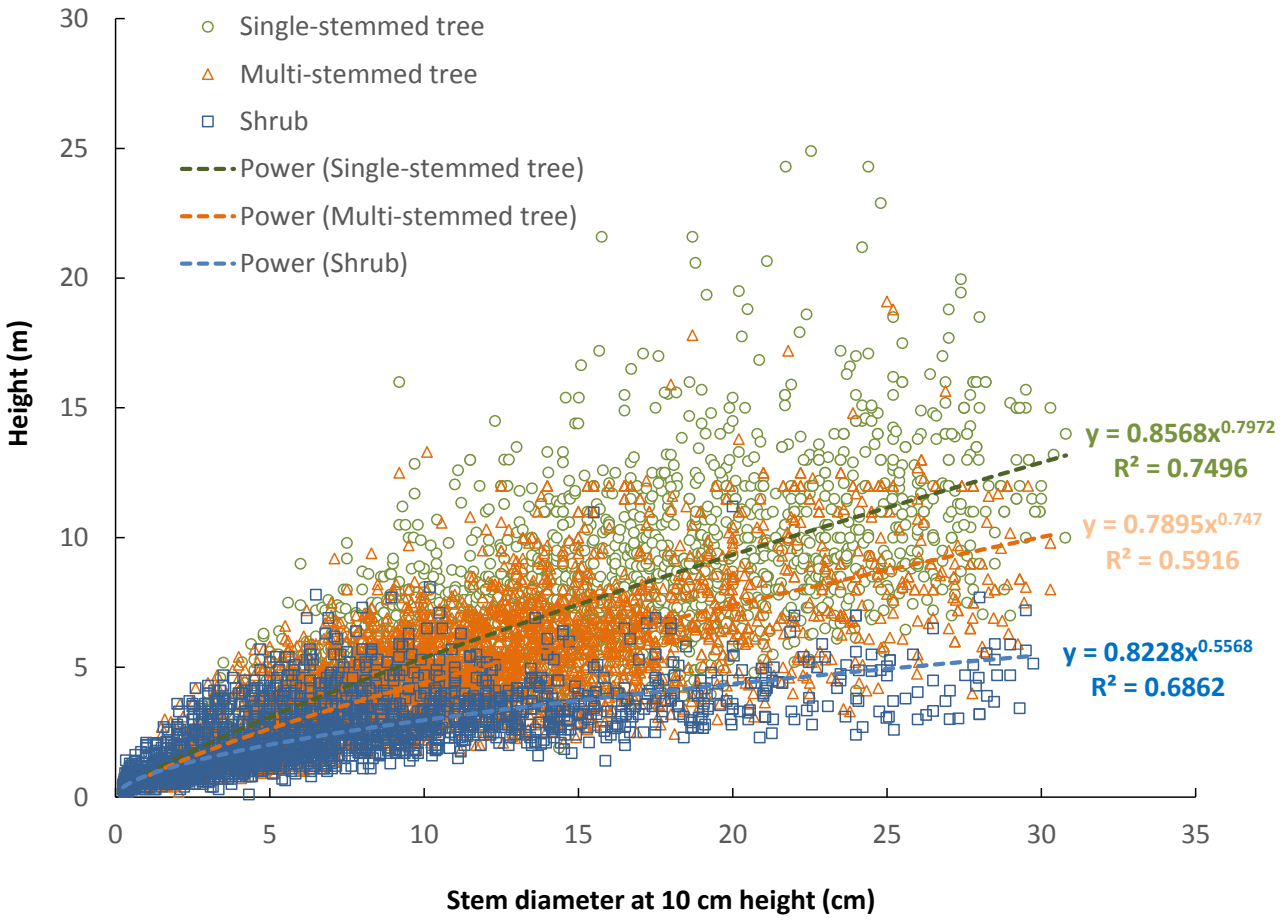

Figure 7: Relationship between stem diameter and the height of an individual shrub, single- or multi-stemmed tree. Datasets used are from Paul et al. (2016) and the new data from Bourke, and excluded shrubs and trees of relatively large size (*D10* >30 cm).

3.3 Relationship between stand-level above-ground biomass and canopy cover

Although there was large variation between plots, there was nevertheless a clear relationship between TBC and the crown cover of a stand. A power relationship could be fitted to these datasets, with an R^2 of 0.8269 (*N* = 892) (Fig. 8). This relationship appeared to be generic, with no clear indication that it differed between the different types of stands. However, there was a large amount of prediction error for 'Other native vegetation', probably due to variation in remnant trees included within their inventory assessments. For environmental plantings, these TBC-crown relationships are anticipated to vary largely based on the configuration in which the shrubs and trees are established, e.g. rows with wide inter-row spaces cf. dense block plantings. Of most interest is the TBC-crown relationship for stands of natural regeneration. For datasets from stands of natural regeneration, the power relationship could be fitted with an R^2 of 0.7865 (*N* = 349) (Fig. 8).

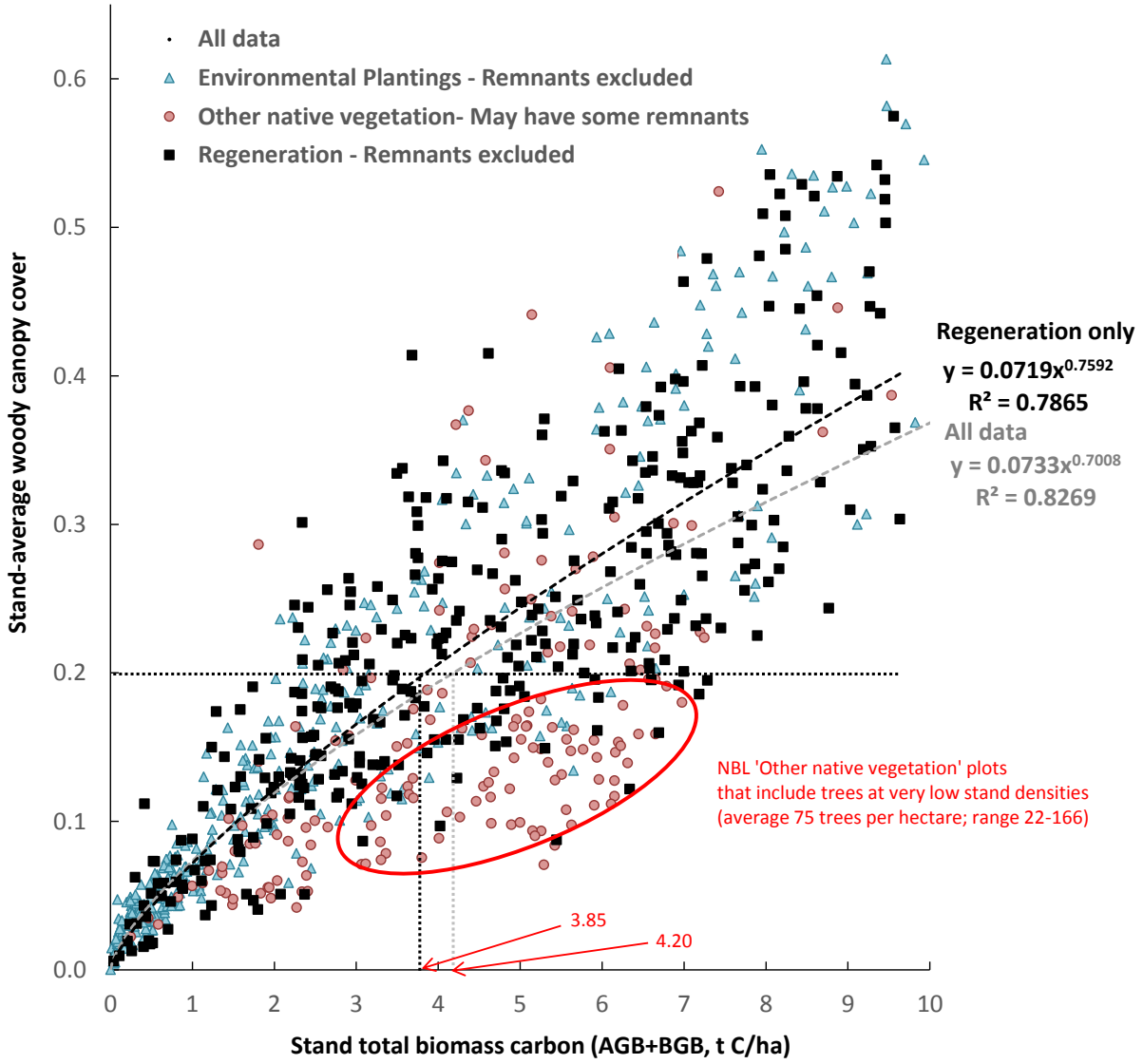

Figure 8: Relationship between the above- and below-ground total biomass carbon (TBC) and woody canopy cover of a stand (m^2 m^{-2}) in moderate-low rainfall and semi-arid regions of Australia. Datasets used are given in Table 2.

3.4 Relationship between stand-level above-ground biomass and average height

The stand-level relationship between TBC and average height was relatively poor (Fig. 9). This was particularly the case for 'Other native vegetation' where not all remnant trees were excluded from the inventory assessments given the difficulty in distinguishing remnant trees from those regenerating. Indeed a number of 'Other native vegetation' stands with TBC of 4 to 7 t C ha^{-1} probably contained some remnant trees given their relatively high heights (> 5 m). These same stands also contributed to the relatively high TBC for a given canopy cover of only about 0.05-0.08. See sites circles in red in Fig. 8 and 9.

For regenerating stands, the fitted power relationship had an R^2 of only 0.1596 (Fig. 9), with typical heights of regenerating stands being 1.0 to 5.5 m. However, it appeared that there were still a proportion of regenerating stands that did not attain an average height of 2 m at the 3.85 t C ha^{-1} of TBC required to reach a canopy cover of 0.2 (Fig. 8).

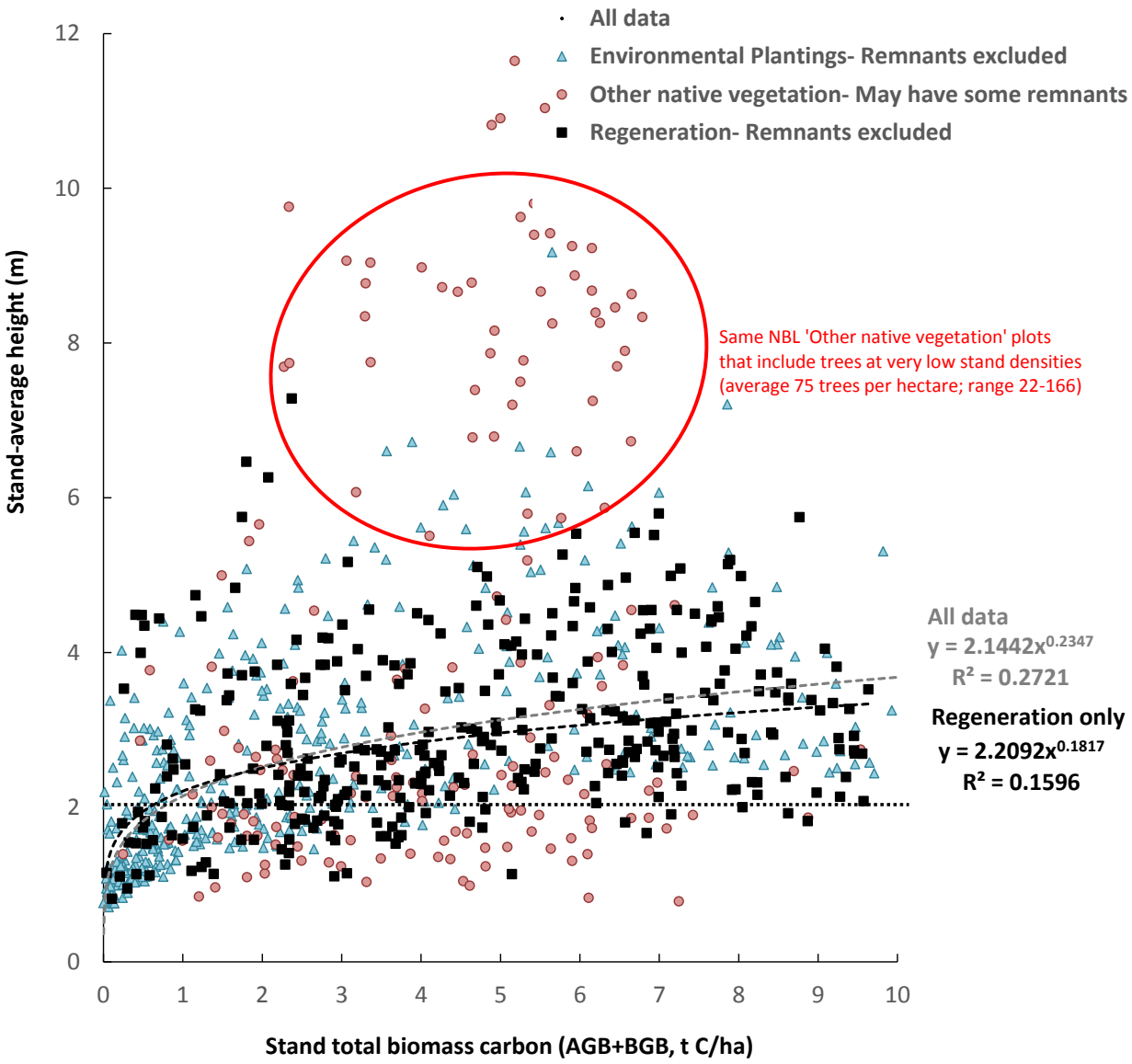

Figure 9: Relationship between the above-ground biomass (AGB) and average height of a stand in moderate-low rainfall and semi-arid regions of Australia. Datasets used are given in Table 2.

3.5 Comparison of observed versus predicted canopy cover and height

The 14 plots measured at Bourke were the only stands where both measured and predicted canopy cover and average height were available. Therefore these plots provided a test of how well predictions of canopy cover and average height matched that observed. Our results showed that when applying the power relationship shown in Fig. 6, there was negligible bias in prediction of canopy area of individual trees and shrubs measured (Fig. 10a), and hence, there was also negligible bias in the plot-based estimates of canopy cover (Fig. 10c). Similarly, when applying the power relationships shown in Fig. 7, there was negligible bias in prediction of the height of individual trees and shrubs measured (Fig. 10b), and hence, there was also negligible bias in the plot-based estimates of average stand height (Fig. 10d).

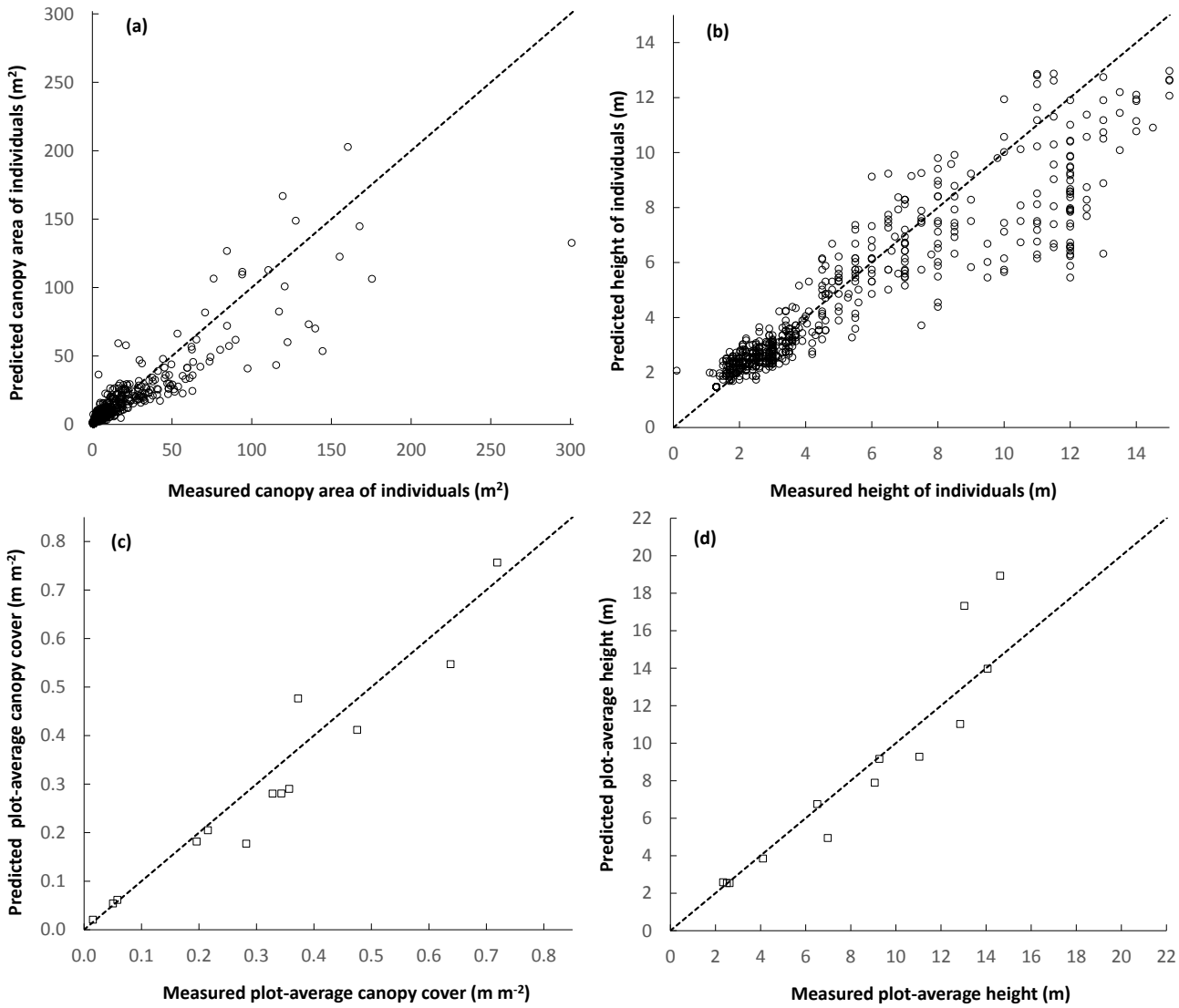

Figure 10: For the study sites near Bourke, a comparison between observed and predicted: (a) canopy area of individual trees and shrubs, when applying the power relationship fitted to data shown in Fig. 6; (b) height of individual trees and shrubs measured, when applying the power relationships fitted to data shown in Fig. 7; (c) plot-average canopy cover at the 14 plots measured, when applying the power relationship fitted to data shown in Fig. 6 and accounting for the area of the plots, and (d) plot-average height at the 14 plots measured, when applying the power relationships fitted to data shown in Fig. 7 and accounting for the area of the plots.

4 Conclusions

The relationship between stem diameter and crown area of individual trees and shrubs appears to be robust (R^2 = 0.83) for the semi-arid woodland and shrubland regions included in this study. Further work is required to test if this relationship holds for different climatic regions. A reasonable relationship between stand-level estimates of canopy cover and above-ground biomass was found, particularly for natural regeneration, although this varied according to the extent to which stands included remnant trees. If this relationship can be validated more broadly, crown areas could be utilised to estimate biomass from aerial surveys, either from detailed plot-based drone surveys or from broad-scale airborne or satellite imagery. Crown areas shown on current imagery and compared to historic images, could be an effective method to estimate changes in biomass over varying time scales. We suggest additional tree crown area studies in a broader range of woodland systems, such as those in the southern tablelands of NSW and south western Queensland, to further test the relationship between crown area and stem diameter.

5 References

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WE ASK, WE SEEK AND WE SOLVE

Proposed amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015* affecting native vegetation regeneration projects

The following proposed amendments (blue text) to the rule:

- extend coverage of provisions requiring attainment of forest cover within a specified period to continue to obtain certificates of entitlement, to apply to projects under the Native Forest from Managed Regrowth method in addition to existing applicability to projects under the Human-Induced Regeneration method
- ensure that where regeneration projects are stratified in accordance with the Clean Energy Regulator's *Guidelines on stratification, evidence and records for projects under the Human-Induced Regeneration of a Permanent Even-Aged Native Forest and Native Forest from Managed Regrowth methods*, the process used to identify forest for the assessment of forest cover attainment can be repeated.

9AA Issue of certificate of entitlement—eligibility requirements for ~~human-induced~~ regeneration projects

(1) For paragraph 15(2)(h) of the Act, this section specifies eligibility requirements that must be met in order for a certificate of entitlement to be issued in respect of an eligible offsets project that is a ~~human-induced~~ regeneration project for a reporting period.

Note: The fact that these requirements are not met in relation to a reporting period does not mean that they cannot be met in relation to a subsequent reporting period within the crediting period; for example, if at the end of that subsequent reporting period forest cover has been attained.

(2) If the offsets report for the reporting period was required to include information in accordance with paragraph 70(3A)(a)—it is an eligibility requirement that the information provided in the report, and any documents included in accordance with paragraph 71(c) to support such information, are sufficient to enable the Regulator to determine if the forest potential requirement of the applicable methodology determination for the reporting period is satisfied in relation to all carbon estimation areas that are included in the offsets report.

(3) It is an eligibility requirement that all carbon estimation areas that:

(a) are included in the offsets report for the reporting period; and

(b) are past their forest cover assessment date;

have attained forest cover by or before the end of the reporting period.

Note 1: Under the applicable methodology determination for the ~~human-induced~~ regeneration project a project proponent may choose to re-stratify the carbon estimation areas to ensure that this requirement is met in relation to a reporting period. Under section 77A of the Act a project proponent may also choose to report on all carbon estimation areas that meet this requirement in advance of any carbon estimation areas which do not meet this requirement.

Note 2: It is intended that audit reports provided under section 79A or otherwise provided to the Regulator will be used to assist the Regulator to verify this requirement. Under subsection 9(2) if an audit report does not set out a reasonable assurance conclusion or qualified reasonable assurance conclusion a certificate of entitlement may not be issued.

(4) For the purpose of subsection (3), a carbon estimation area has ***attained forest cover*** if:

(a) both of the following apply:

(i) over 90% of the area of the carbon estimation area is identified as having forest cover in accordance with the most recent version of the maps that form the basis of the National Inventory Report;

(ii) that version of the maps does not identify any pre-existing forest cover in the carbon estimation area, taking into account any guidelines published by the Regulator on its website for the purpose of this subparagraph, as in force from time to time; or

Note: In 2019, the Regulator's website was http://www.cleanenergyregulator.gov.au.

(b) when assessed in 0.2 hectare portions, over 90% of those portions have attained forest cover such that the land in each portion has trees that:

(i) are 2 metres or more in height; and

(ii) provide crown cover of at least 20% of the land.

Note: The fact that a carbon estimation area is considered to have attained forest cover under this subsection does not mean that any requirements relating to forest cover or forest potential under the applicable methodology determination for the project are satisfied.

(5) The assessment of 0.2 hectare portions for a carbon estimation area under paragraph (4)(b) must:

(a) comply with any requirements set out in the CFI Mapping Guidelines for the purpose of this paragraph; and

(aa) use data sources and data processing approaches that:

(i) are the same as those relied upon to demonstrate that the carbon estimation area did not have any pre-existing forest cover; and

(ii) are approved by the Regulator on a list published on its website or are otherwise approved by the Regulator in writing; and

(b) take into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time.

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au.

(6) A carbon estimation area has passed its ***forest cover assessment date***, when paragraph (a) and either paragraph (b) or (c) are satisfied:

(a) either:

(i) the carbon estimation area contains more than 5 tonnes of carbon per hectare under the modelling undertaken in accordance with the applicable methodology determination for the reporting period for the purpose of preparing the offsets report; or

(ii) the carbon estimation area is part of an eligible offsets project with less than 5 years of its crediting period remaining;

(b) if the carbon estimation area is an existing CEA—the date is after the later of:

(i) the date that is 15 years since the day the eligible offsets project first including the area was declared under section 27 of the Act disregarding any eligible growth disruption period; and

(ii) the date that is 15 years since the modelling of forest regeneration commenced for the carbon estimation area disregarding any eligible growth disruption period;

(c) if the carbon estimation area is not an existing CEA—the date more than 15 years since the modelling of forest regeneration commenced for the carbon estimation area disregarding any eligible growth disruption period.

Note: The modelling of when forest regeneration commences is often described as a regeneration event in the model where carbon stocks begin to increase in the carbon estimation area.

(7) In this section:

carbon estimation area, for an eligible offsets projects, has the meaning given by the applicable methodology determination for the reporting period.

eligible growth disruption period, means the total period of time meeting the following criteria:

(a) occurs after carbon stocks have begun to increase following the modelling of regeneration;

(b) during which carbon stocks are modelled not to increase under the applicable methodology determination for the reporting period;

(c) if subparagraph (6)(b)(i) applies—does not include a period before the day the project was declared under section 27 of the Act; and

(d) if so much of the total period that occurs after the start of the project's last or only crediting period exceeds 5 years, that period is taken to be 5 years.

Example: If a project to which paragraph (6)(c) applies had 2 years of its eligible growth disruption period before the start of its crediting period and 6 years of eligible growth disruption after the start of its crediting period, its eligible growth disruption period would be 2+5=7 years.

existing CEA means a carbon estimation area consisting only of an area that was part of the project area for a ~~human-induced~~ regeneration project on 15 August 2018.

forest potential requirement means a requirement for an area of land to have forest potential, within the meaning of the applicable methodology determination for the reporting period, for the land to be included in a carbon estimation area for the project.

~~human-induced~~ regeneration project means either:

(a) a project whose applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* or an earlier version of that determination applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act; or

(b) a project:

~~(i)~~ whose applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* or an earlier version of that methodology determinations applicable

to the project in accordance with sections 125, 126, 127 or 130 of the Act; ~~and~~

~~(ii) whose project area includes land that was previously part of an eligible offsets project covered by the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* or an earlier version of that determination applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act.~~

National Inventory Report means the report of that name produced by Australia in fulfilment of its obligations under the Climate Change Convention and the Kyoto Protocol, as in force from time to time.

Note: In 2018, the National Inventory Report could be accessed from http://www.environment.gov.au.

pre-existing forest cover, for a carbon estimation area, means forest cover that existed:

(a) if the applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013* or an earlier version of that methodology determination applicable to the project in accordance with sections 125, 126, 127 or 130 of the Act—at the time of the decision to implement the project mechanism (within the meaning of that determination) in the carbon estimation area;

(b) if the applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Forest—1.1) Methodology Determination 2013* as in force at any time until 21 March 2016—immediately before project commencement (within the meaning of that determination) for the carbon estimation area;

(c) if the applicable methodology determination for the reporting period is the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Forest—1.1) Methodology Determination 2013* as in force at any time after 21 March 2016—at any time during the baseline period (within the meaning of that determination) for the carbon estimation area.

tree means a perennial plant that has primary supporting structures consisting of secondary xylem.

70 Information that must be set out in offsets reports

(1) For paragraph 76(4)(b) of the Act, this section specifies information that must be set out in an offsets report about an eligible offsets project for a reporting period.

…

Information for ~~human-induced~~ regeneration projects

(3A) The offsets report for a ~~human-induced~~ regeneration project must set out the following information:

(a) if:

(i) a reporting period ends more than 5 years after the start of the project's last or only crediting period and the information required by this paragraph has not been included in an offsets report within the last 5 years; or

(ii) the Regulator requests, in writing, some or all of the following information in relation to a carbon estimation area after a risk based assessment of the project;

an explanation, for each carbon estimation area included in the offsets report that has not already attained forest cover:

(iii) of the progress towards or attainment of forest cover in each such carbon estimation area and evidence supporting that progress or attainment; and

(iv) of how the project mechanism has continued to be implemented in each such carbon estimation area and evidence supporting that continued implementation;

(v) of how the boundaries and stratification of the carbon estimation area meet the requirements of the applicable methodology determination;

taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time;

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

(b) if:

(i) the offsets report includes a carbon estimation area that has passed its forest cover assessment date; and

(ii) the information required by this paragraph has not already been included in an offsets report;

an explanation of the evidence that demonstrates whether or not the requirements of subsection 9AA(3) are satisfied in relation to the carbon estimation area, taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time;

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

(c) for each carbon estimation area included in the offsets report:

(i) the date that the modelling of forest regeneration commenced; and

(ii) the estimated forest cover assessment date; and

(iii) details of any eligible growth disruption period; and

(iv) an explanation of whether forest cover has been attained; and

(v) the total carbon stock at the end of the reporting period, in both tonnes of carbon and tonnes of carbon per hectare, under the modelling undertaken in accordance with the applicable methodology determination for the reporting period.

…

(6) In this section:

attained forest cover, in relation to a carbon estimation area, has the meaning given by subsection 9AA(4).

carbon estimation area has the meaning given by subsection 9AA(7).

eligible growth disruption period has the meaning given by subsection 9AA(7).

forest cover assessment date has the meaning given by subsection 9AA(6).

~~***human-induced***~~ ***regeneration project*** has the meaning given by subsection 9AA(7).

71 Documents that must accompany offsets reports

For paragraph 76(4)(d) of the Act, an offsets report about an eligible offsets project for a reporting period must be accompanied by the following documents:

(a) any document that, under the applicable methodology determination, is required to be provided to the Regulator with the offsets report;

(b) if the project is an area-based offsets project and the project proponent has chosen to divide the project into parts in accordance with section 77A of the Act—a scale map identifying the project area to which the offsets report relates;

(c) if the offsets report for a ~~human-induced~~ regeneration project is required to contain information under subsection 70(3A)—documents to support the information, taking into account any guidelines published by the Regulator on its website for the purpose of this paragraph, as in force from time to time.

Note: In 2018, the Regulator's website was http://www.cleanenergyregulator.gov.au

79A Forest cover audits of ~~human-induced~~ regeneration projects

(1) An eligible offsets project that is a ~~human-induced~~ regeneration project must be audited if:

(a) an offsets report for a reporting period will be submitted which includes one or more carbon estimation areas that have past their forest cover assessment date; and

(b) a previous audit report:

(i) prepared under this Division; or

(ii) prepared at the request of the project proponent and conducted in accordance with the requirements of section 80;

has not been provided to the Regulator confirming, by way of a reasonable assurance conclusion or a qualified reasonable assurance conclusion, that the requirements of subsection 9AA(3) are satisfied for each carbon estimation area that is included in the offsets report and has passed its forest cover assessment date.

(2) However, an audit need not be prepared if the Regulator agrees, in writing, that it is unnecessary.

(3) The audit must be about whether the requirements of subsection 9AA(3) are satisfied in relation to the reporting period.

(4) The report of the audit must accompany the offsets report for the reporting period mentioned in paragraph (1)(a).

(5) In this section:

carbon estimation area has the meaning given by subsection 9AA(7).

forest cover assessment date has the meaning given by subsection 9AA(6).

~~***human induced***~~ ***regeneration project*** has the meaning given by subsection 9AA(7).

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FOI 190318
Document 31a

Australian Government
Department of the Environment and Energy

COVER SHEET FOR SUBMISSIONS

PROPOSED AMENDMENTS TO THE *CARBON CREDITS (CARBON FARMING INITIATIVE) RULE 2015* RELATING TO EMISSIONS REDUCTION FUND NATIVE FOREST REGENERATION PROJECTS

Overview

The Australian Government is considering amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015.* The Department of the Environment and Energy is inviting members of the public and industry to provide submissions. Submissions should be provided by 5:00pm AEST on Thursday 14th March 2019.

Contact details

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Phone number (optional)			

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Is this a confidential submission? ☐ **Yes** ☒ **No**

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Submission instructions

Submissions are due by 5:00pm AEST on Thursday 14th March 2019. Any submissions received after this date will be considered at the Department's discretion.

Where possible, submissions should be sent electronically, preferably in Microsoft Word or other text-based formats, to the email address below.

All submissions must include this cover sheet and reference the project name.

Submissions should be sent to:

Email: ERFforests@environment.gov.au

Post: Forests Section
Climate Change Division
Department of the Environment and Energy
GPO Box 787
CANBERRA, ACT 2601

Summary

The proposed rule change is for an improper purpose.

- The *Carbon Credits (Carbon Farming Initiative) Act 2011* was specifically designed to provide regulatory certainty to project participants and stakeholders.
- This was done through sections 114 and 126, which provide specific provisions for amending a methodology determination, and provide that despite any future variation, the original methodology determination continues to apply to existing projects.
- The proposed rule change is, in substance if not in form, a variation to the NFMR methodology determination[1] which has potentially significant commercial implications for project participants and stakeholders.
- It would appear, and it has not been denied, that the adoption of a rule change to introduce method specific variations is specifically designed to avoid sections 114 and 126 of the Act.

The proposed rule change is unjustifiable, premature and lacks procedural fairness.

- No scientifically rigorous justification for the change has been provided.
- No scientifically rigorous demonstration of overcrediting within NFMR projects has been provided.
- No objective measurement of actual abatement *vis-à-vis* NFMR modelled abatement has been undertaken.
- An ERAC review of NFMR method is underway, however it is not complete, and its findings have not yet been published.
- It is therefore premature and procedurally unfair to impose the rule change prior to the finalisation of the ERAC review.

The proposed rule change is grossly unfair and denies natural justice to NFMR stakeholders.

- In these circumstances the question arises, why pursue this variation to the method dressed up as a rule change?
- In the absence of any alternative plausible explanation, the only remaining explanation is perhaps the worst kept secret in the ERF; the regulator has substantially overcredited a number of HIR projects, and the provisions of the Act require that a rule change (rather than a method change) is now necessary to paper over those mistakes.
- The NFMR project stakeholders are small businesses and farmers. These people committed their resources and land to the ERF in good faith and entered into other binding commercial arrangements based upon the regulatory certainty provided by the sections 114 and 126 of the Act.
- The effect of the rule change is that despite having faithfully applied the NFMR method since project inception, the NFMR stakeholders must now potentially pay for the past mistakes of the regulator, because the bureaucracy lacks the necessary courage to address these issues in a forthright and transparent manner.
- How this situation arose is a matter of public interest and this submission is therefore not confidential.

[1] For example, the rule change imposes a time frame for the achievement of forest cover where none currently exists. The explanatory statement suggests that it only 'clarifies' this time frame, however this is misleading, as it implies that some timeframe currently exists requiring clarification, when it does not. We are not suggesting it is unreasonable to impose a timeframe, only that it is improper, premature and unfair to impose one in the manner proposed.

s42

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FOI 190318
Document 32

s22

From: s22
Sent: Tuesday, 2 April 2019 9:59 AM
To: Erfforests
Subject: s22
Attachments: s22 Item 5 - Native forests from managed regrowth.pdf; s22 s22

From: Emissions Reduction Assurance Committee
Sent: Friday, 9 June 2017 3:00 PM
To: 'andrew.macintoshs22 ' ; Wilson, Helen ; 'Andy Lloyd' ; 'Mick Keogh' ; 'Paul.Grahams22 ' ; s47F ; 'Beverley Henry' ; 'Hilary Smith' ; 'Suzanne A Jones'
Cc: s22 ; s22 ; Katrina Maguire ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22 ; s22
Subject: ERAC - Papers 26 June 2017 meeting [SEC=UNCLASSIFIED]

Dear ERAC members,

Please find attached your papers for the Monday 26 June 2017 meeting:

- Agenda

s22

- Item 5 – Method discussion: Native Forests from Managed Regrowth

s22

s22

Kind regards
s22

s22
Policy Officer | ERF Governance and Policy Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
✉ GPO BOX 787 Canberra, ACT, 2601
☏ (s22 | s22 @environment.gov.au

EMISSIONS REDUCTION ASSURANCE COMMITTEE

26 June 2017 Meeting

Agenda Item 5: Native Forests from Managed Regrowth Method

For Discussion

Recommendation

That the ERAC:

1. **note** the Department is working with the Clean Energy Regulator to assess some issues with the calculation of abatement in the existing *Native Forests from Managed Regrowth* method, and will provide further advice at a later meeting.

Purpose

This paper provides, for information and discussion, an outline of aspects of abatement calculations in the *Native Forests from Managed Regrowth* (NFMR) method being assessed to help inform decisions on next steps.

Background

Overview of the NFMR method

The NFMR method (2013) provides for projects to regenerate native vegetation on previously cleared land. In the absence of a project, the land would be periodically re-cleared for livestock grazing. Projects must stop mechanical or chemical destruction, or suppression, of regrowth. There must be a documented decision to change land management to enable regeneration. Projects may also involve encouraging regeneration by excluding livestock, changing grazing management, or managing feral animals or weeds.

To be eligible for a NFMR project, land must:

- have been comprehensively cleared at least once in the past
- have had forest cover (trees at least two metres high, with crown cover of at least 20 per cent and covering at least 0.2 hectare) before it was cleared
- at the time of the decision to promote regeneration, have the potential to reach forest cover and not have existing forest cover.

The method credits the difference between simulated carbon stocks (calculated using FullCAM) for baseline and project scenarios.

A zero baseline can be applied if ongoing and active suppression of regrowth has resulted in immaterial carbon stocks in the 10 years before the project. Alternatively, where carbon stocks have reached a material level during that 10-year period, a baseline representing the long-term average carbon stock is calculated.

Carbon stocks for the project are estimated from vegetation regrowth occurring since the last comprehensive clearing event (before project commencement), adjusted for disturbance events such as fires.

NFMR project activities are similar to those under the *Human-Induced Regeneration* method. The two methods also have some similarities in abatement estimation. However, unlike the NFMR approach, the Human-Induced Regeneration method does not issue credits for carbon already accumulated in woody vegetation at the project registration date.

The NFMR method is scheduled for review in mid-2019.

Current projects

There are 34 registered NFMR projects, of which 23 have contracts with the Clean Energy Regulator. Devine Agribusiness Carbon Pty Ltd is the proponent for 32 projects. The projects are located in southwest Queensland.

Around 1.3 million Australian Carbon Credit Units have been issued to NFMR projects, placing the method fifth in terms of credits issued, although well below the top four methods. Total contracted abatement for NFMR projects is around four million tonnes; this compares to 80 million tonnes for the HIR method.

Abatement calculations

The method adopts a default 15-year clearing cycle (based on known typical periods between re-clearing) for modelling baseline carbon stocks. Proponents can use this default even where the actual period is longer (for example, some project reports indicate the land was last cleared in the 1990s). Where this occurs, the baseline amount deducted from the project carbon stock could be underestimated.

The method allows the Regulator to request evidence that grazing in a project area has not prevented regrowth. However, it does not require project carbon stock estimates to take into account any suppression of regrowth by grazing or other factors. If suppression is material and not accounted for, abatement could be overestimated.

In cases where projects are on land last cleared more than 20 years ago, there may be a need to assess the conditions under which vegetation has grown large enough to sequester the substantial levels of carbon reported, but has not reached forest cover at project commencement.

Consultation

The Department has consulted the Clean Energy Regulator.

Next Steps

The Department will provide more specific advice at the next meeting, depending on findings from the work discussed above.

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FOI 190318
Document 35

s22

From: Andrew Macintosh <andrew.macintosh@s47F >
Sent: Tuesday, 19 December 2017 5:45 PM
To: Maguire, Katrina
Cc: s22 ; s22 ; Wilson, Helen; s22
Subject: Re: update on NFMR FullCam guidelines [SEC=UNCLASSIFIED]

Categories: Copied to SharePoint

Thanks Katrina.

I appreciate all the work at this time of year.

In short, very supportive of guidelines being amended asap.s47G I'm also keen to attend the proposed site visit, preferably with 1-2 other members.

If you have a moment tomorrow, I'll call to discuss.

A

From: Maguire, Katrina
Sent: Tuesday, 19 December 2017 4:41:14 PM
To: Andrew Macintosh
Cc: s22 ; s22 ; Wilson, Helen; s22
Subject: update on NFMR FullCam guidelines [SEC=UNCLASSIFIED]

Hi Andrew

I just wanted to give you an update on progress with amending the FullCam guidelines for the Native Forest from Managed Re-growth method, as discussed at the most recent ERAC meeting.

We have discussed the proposed amendment with the Clean Energy Regulator and they are now comfortable with it. s22 , s22 and I have spoken to Dominic Devine at length about the change and sent them the draft guidelines. Devine fully support the reviews of the NFMR and HIR methods and do not support us making an amendment to the FullCam guidelines in advance of the method review. s47G

Our plan is to load, as per the discussion at ERAC, the amended FullCam guidelines by the end of this week, s47G Please let us know soon if you have a different view.

Dominic has invited us to visit his properties in late February, which I've said we'd be happy to and he is also happy to have any members of ERAC who would like to attend. The Department, hopefully with the Regulator will probably take the opportunity, at the same time, to bring together representatives from the local NRM group and any interested local stakeholders and NFMR/HIR project participants to discuss the ERF and vegetation projects. ERAC may also like us to use that forum or organise other discussions specifically to inform the NFMR and HIR reviews. Stakeholders are very supportive of the NFMR and HIR reviews and my sense is many people will be willing to share their views and intel.

Just before uploading the amended guidelines I will send an email to other aggregators who have been part of the Regulator's discussions on their operational policy and posture.

Please let us know if you'd like the secretariat to pass this update on to all ERAC members.

Katrina Maguire

Assistant Secretary
Land and Outreach Branch
Climate Change Division
Department of the Environment and Energy
t: 02 6159 7600 | m: s22
e: katrina.maguire@environment.gov.au
GPO Box 787 | Canberra ACT 2601
www.environment.gov.au

FOI 190318
Document 36

s22

From: s22
Sent: Thursday, 1 March 2018 4:26 PM
To: 'hilary s47F '; 'beverley.henry@ s47F '
Cc: Katrina Maguire; s22 ; s22 ; s22 ; s22 ; s22
Subject: Charleville briefing pack [SEC=UNCLASSIFIED]
Attachments: consultation_charleville trip briefing_erac.docx

Dear Hilary and Beverley,

I have attached a briefing pack for your visit to Charleville. We will be happy to provide a hard-copy (tabbed) for you when the team sees you on Monday, if that would be useful?

Please note that the included talking points are only for your guidance – you don't need to follow them word for word.

If there is anything else you would like included, please let Katrina or s22 know tomorrow.

Kind regards,
s22

s22
Assistant Director, Forests
Climate Change Division
Department of the Environment and Energy
s22 | s22 @environment.gov.au

Please note I work Monday to Thursday

Background briefing for Charleville trip

5-9 March 2018

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Logistics

Contact numbers

Department of the Environment and Energy	*Clean Energy Regulator*	*ERAC members*	*Queensland Government*	*Carbon service providers and others*	
Katrina Maguire: s22	Mary-Anne Wilson: s22	Beverley Henry: s22	s47F s22 1	Vicki Franklin (Agforce): s47F	Dominic Devine (Leichardt): s47F
s22 : s22	s22 : s22	Hilary Smith: s22	s22 s22	Skye Glenday (Climate Friendly): s47F	Rhonda Toms-Morgan (ConnectAg): s47F
s22 : s22				Gary Wyatt (Corporate Carbon): s47F	Terri (Charleville RSL): (07) s47F
s22 : s22]					
[s22 - Canberra: s22]					

s22

s22

Thursday 8	Depart Cunnamulla ~ 06.00-06.30 to meet Dominic Devine at Bollon Café by 08.30 (Google Maps says 2 hrs 21 mins, Dominic says 2 hrs) for breakfast Hire cars to/from Bollon; cars provided and driven by Dominic Devine and Graham Kenny around Leichardt properties	All day. Leichardt (formerly Devine Agribusiness) site visits: s47G(1)(b) Dominic to provide lunch (sandwiches) at Department's expense Contacts: Dominic Devine, Graham Kenny s22 and s22 (tbc): catch-up over dinner with s47F	Merino Motor Inn 78 Victoria Street St George Ph: 07 4625 3333
Friday 9	Depart St George by ~ 07.30 to allow for 2 hrs 10 mins travel time (Google Maps), return of hire cars and any delays	Return cars to Roma Airport Commercial Vehicles Airport Drive, Roma Ph: 07 4638 2999	

	Flights: • QF2541: depart Roma 11:05, arrive Brisbane 12:15 • QF1549: depart Brisbane 14:10, arrive Canberra 17:00	The car hire office will be closed (opens 10.30am). Please park the car and leave the keys in the after-hours drop off box. Leave parking ticket in the vehicle to avoid fine	

s22

s22

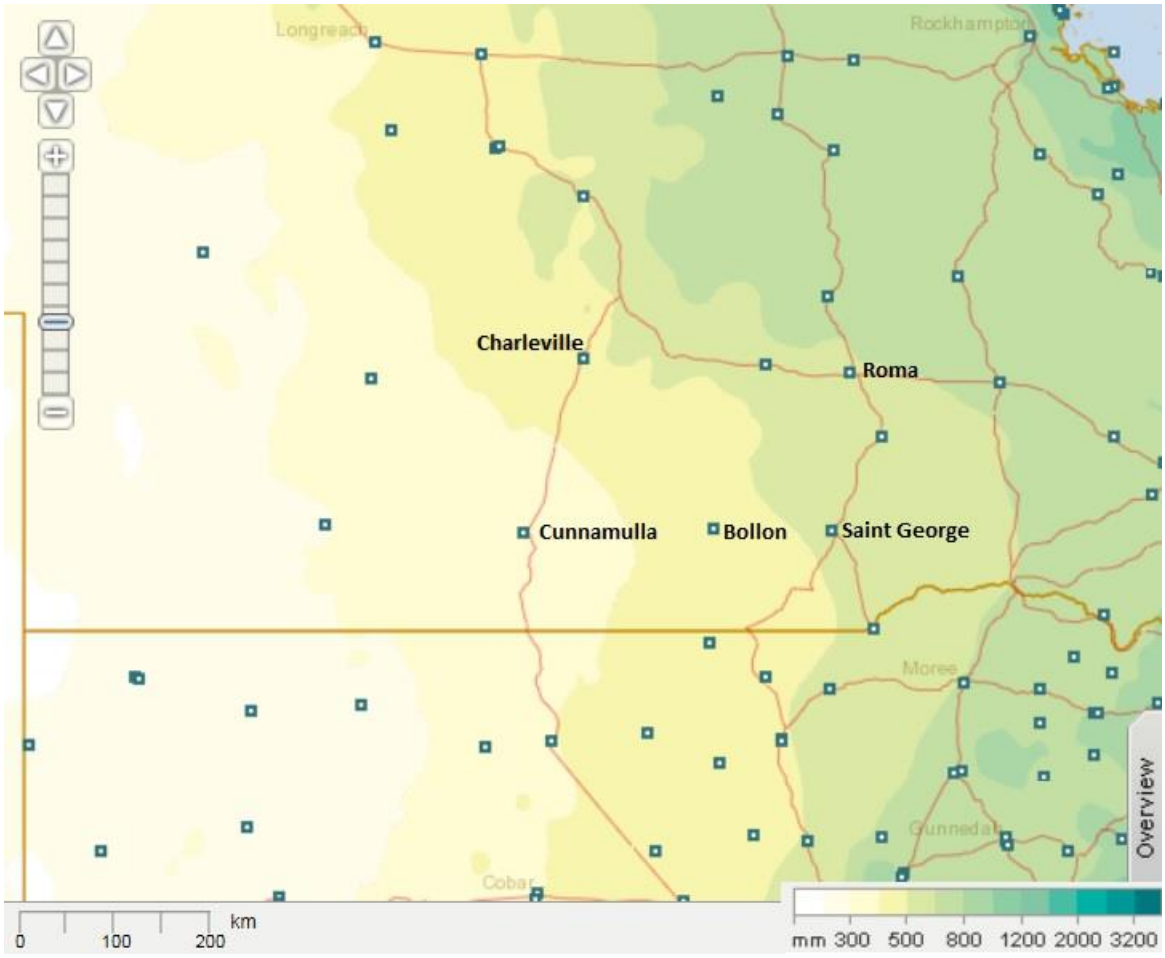
Site visit information and projects in the region

Projects to be visited

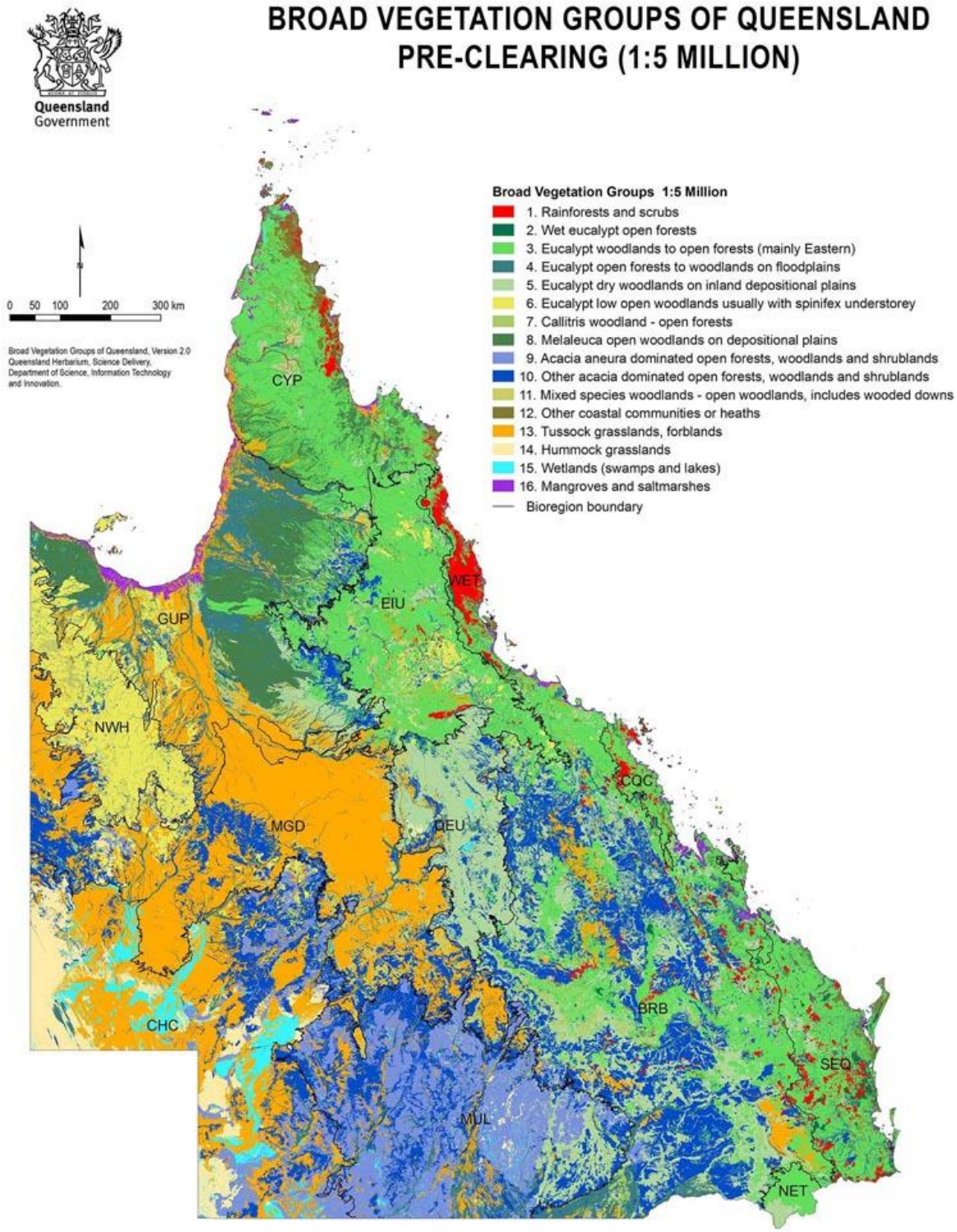
Day	Project name	Project ID	Scheme participant	Method	Carbon service provider
s22					
Thursday 8	s47G(1)(b)			NFMR	Leichardt (Devine)

s47G

Annual rainfall in Maranoa area



Major vegetation groups in Queensland



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FOI 190318
Document 38

s22

From: s22
Sent: Friday, 11 May 2018 4:18 PM
To: 'Hilary Smith'; 'Beverley Henry'; 'Mick Keogh'; 'Andrew Macintosh'
Cc: s22 ; Maguire, Katrina; s22 ; s22 ; s22 ; s22 ; s22 ; s22 s22 ; s47F
Subject: ERAC subcommittee meeting 14 May: papers [SEC=UNCLASSIFIED]
Attachments: s22 Consultation_Charleville_site visit summary.docx; s22

Dear subcommittee members

The following papers for Monday's meeting are attached. Apologies for not getting these to you earlier.

s22

- Detailed notes from Queensland and New South Wales site visits. These are combined notes from Department representatives and Committee members. We have provided them as a general reference source.

s22

S45

Regards

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
Ts22 M s22
s22 @environment.gov.au

From: s22
Sent: Tuesday, 8 May 2018 5:10 PM

To: 'Hilary Smith' ; s22
Cc: Beverley Henry ; Mick Keogh ; Andrew Macintosh
Subject: RE: NFMR meeting on 14th [SEC=UNCLASSIFIED]

Hi Hilary

We are putting an agenda and other papers together, and will send them as soon as possible.

The meeting is 10-12 on Monday, in the John Gorton Building.

Regards

s22

From: Hilary Smith [mailto:hilary@s47F]
Sent: Tuesday, 8 May 2018 12:31 PM
To: s22 s22 @environment.gov.au>; s22 s22 @environment.gov.au>
Cc: Beverley Henry <s47F >; Mick Keogh <s47F >; Andrew Macintosh <andrew.macintoshs47F >
Subject: NFMR meeting on 14th

Dear s22
Do we have an agenda and venue for this meeting?
Can you please confirm details.
Thanks
Hilary

Sent from my Sony Xperia™ smartphone

Summary of Charleville site visits - Emissions Reduction Fund: native forest revegetation methods

Tuesday 6th -8th March 2018

Emissions Reduction Assurance Committee: Hilary Smith, Beverley Henry

Clean Energy Regulator: s47F , s22

Department: Katrina Maguire, s22 , s22

These notes on the site visits in the Charleville area have been compiled by the Department and incorporate comments from participating members of the ERAC subcommittee. They have been prepared to document what was seen and heard on the visits, for use by the subcommittee and Department in undertaking the method reviews.

Projects visited

Day	Project name	Project ID	Scheme participant	Method	Carbon service provider
s22					
Thursday 8	47G	ERF102124	47G	NFMR	Leichardt (Devine)

s22, s45

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FOI 190318
Document 39

s22

From: Beverley Henry <beverley.henry@qut.edu.au>
Sent: Thursday, 26 July 2018 10:16 PM
To: s22
Cc: Hilary Smith; Andrew Macintosh; Katrina Maguire; s22 s22 ; s22 s22 ; mjkeogh@s22
Subject: Re: Details for Tuesday's subcommittee meeting [SEC=UNCLASSIFIED]

Hi s22
That timing's fine thanks. My flight isn't until around 4pm.
Kind regards
Beverley
Sent from my iPhone

On 26 Jul 2018, at 9:09 pm, s22 s22 @environment.gov.au> wrote:

> Sorry Hilary. A couple of clarifications. We expect the meeting with the aggregators at the CER to run from 9.00 to 10.30, subject to confirmation with the CER. We are suggesting then going back to John Gorton Building for the follow-up discussions with you and the phone call with Dominic Devine, and allowing up to 2.00 for these.
> Paul
> **From:** Hilary Smith [mailto:hilary@s22]
> **Sent:** Thursday, 26 July 2018 9:05 PM
> **To:** 'Andrew Macintosh' <andrew.macintosh@s22 >; Beverley Henry <beverley.henry@s22 >; s22 s22 @environment.gov.au>
> **Cc:** Maguire, Katrina <Katrina.Maguire@environment.gov.au>; s22 s22 @environment.gov.au>; s22 s22 @environment.gov.au>; s22 s22 @environment.gov.au>; s22 s22 @environment.gov.au>; mjkeogh@s22
> **Subject:** RE: Details for Tuesday's subcommittee meeting [SEC=UNCLASSIFIED]
> Hi s22
> Can you please clarify whether you want up to 2 hours for the discussion (taking the meeting to 11:00 or 12:00?) or up to 2:00PM?
> And it also sounds like you want to relocate back to John Gorton Building after the meeting in Civic - is that correct?
> Thanks
> Hilary
>
> Sent from my Sony Xperia™ smartphone
>
> ---- s22 wrote ----
>
> Dear Beverley, Hilary and s22
>
> We have confirmed with the Clean Energy Regulator that we will meet aggregators in Canberra on Tuesday, before the Regulator holds another workshop with them on its technical guidance.
>
> We aim to start the meeting at 9.00, at the Regulator's offices, 5 Farrell Place, Civic. We expect representatives from Climate Friendly, Corporate Carbon, GreenCollar, Select Carbon

and CO2 Australia will attend. We expect to receive a paper from the aggregators on their proposal for an alternative to the Department's proposed amendment to the Rule, before the meeting.

Following the subcommittee, we propose to come back to the Department to discuss the alternative proposal as well as the data analysis supporting the Rule proposal and the review report with you. We will also schedule a telephone discussion with Dominic Devine, who is aware of the alternative proposal. We would like to allow up to around 2.00 for these discussions. Please let us know if you will have any problems with availability for this amount of time.

Regards

s22

Director, Forests Section

Climate Change Division

Department of the Environment and Energy

T s22 M s22

s22 @environment.gov.au

From: Andrew Macintosh [mailto:andrew.macintosh@s22]
Sent: Wednesday, 25 July 2018 5:20 PM
To: Maguire, Katrina <Katrina.Maguire@environment.gov.au>; s22 s22 @environment.gov.au>; s22 Andrew.Bray@environment.gov.au>
Cc: Beverley Henry <beverley.henry@s22 >; Hilary Smith <hilary@s22 >; mjkeogh@s22
Subject: Tuesday sub com meeting

Arvo All

As discussed, the sub com would like to hold a face to face meeting on next Tuesday morning. s22 and Katrina, could you please organise relevant travel and a venue?

As part of the meeting, we would like to offer aggregators an opportunity to address the sub com. The Regulator also has a meeting with aggregators on Tuesday starting at 10am so we could arrange for the meetings to run back to back.

Sorry Sub com members but it will mean an early start if you are coming in the morning.

For clarity, the sub com is expecting the public consult to start as close to Wednesday as possible, although we acknowledge that timing is ultimately up to the minister.

Thanks

s22

FOI 190318
Document 40

s22

From: s22
Sent: Monday, 30 July 2018 6:40 PM
To: 'Andrew Macintosh'; Beverley Henry; 'Hilary Smith'
Cc: Maguire, Katrina; s22 ; s22 s22
Subject: Papers for meetings tomorrow [SEC=UNCLASSIFIED]
Attachments: Agenda_ERAC and CER_31 July 2018.docx; s22 s45

Follow Up Flag: Follow up
Flag Status: Completed

Hi Andrew, Beverley and Hilary

A draft agenda for the meetings tomorrow is attached. This is for your use, to give you an idea of how we see the discussions going.

s22

We will bring hardcopies of the papers.

See you tomorrow.

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 40a

Emissions Reduction Assurance Committee
Subcommittee – HIR and NFMR method reviews

Draft Agenda: Tuesday 31 July 2018

Location 1: 5 Farrell Place, Canberra

Location 2: John Gorton Building, Parkes, Canberra

1. Meeting with aggregators, Clean Energy Regulator and Department, 9.00 – 10.30 (5 Farrell Place)			
Time	**No**	**Item**	**Lead**
s22			
2. Subcommittee meeting with Department 11.30 – 2.00 (John Gorton Building)			
s22			
12:15pm	2)	**Teleconference with Dominic Devine**	Chair
s22			

Please see following page for list of expected participants.

Expected participants

Emissions Reduction Assurance Committee

Andrew Macintosh (Chair), Beverley Henry, Hilary Smith

Industry (attendees not confirmed) – Part 1 of meeting

Climate Friendly
s47F
s47F

Corporate Carbon - Gary Wyatt

Terra Carbon/GreenCollar Group
s47F
s47F
s47F

CO_2 Australia - s47F

Select Carbon – s47F, s47F

Leichardt Group - Dominic Devine and Graham Kenny (separate teleconference)

Department of the Environment and Energy
Katrina Maguire, Assistant Secretary, Land Branch
Rob Sturgiss, Assistant Secretary, National Inventory Systems and International Reporting Branch (Part 2 of meeting)
s22, Director, Geospatial Analysis Unit (Part 1)
s22, Land Inventory Team (Part 1)
s22, Director, Forests Section
s22, Forests Section
s22, Forests Section

Australian Government Solicitor
s22, Counsel (TBC)

Clean Energy Regulator
s22, General Manager, Contact Centre and Metrics and Markets.
s22, Manager, Regulatory Improvement and Strategy

s47C

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Document 44

s22

From: s22
Sent: Friday, 17 August 2018 11:14 AM
To: 'Andrew Macintosh'
Subject: Devine Agribusiness Carbon - correspondence [SEC=UNCLASSIFIED]
Attachments: Rule Amendment_Devine Agribusiness_Minister reply_draft.docx

Hi Andrew

Our early draft reply to the letter from Devine Agribusiness is attached for your information.

Kristin mentioned she is catching up with you today. I gave her a short update on where things are up to.

s22

From: s22
Sent: Thursday, 16 August 2018 5:28 PM
To: 'Andrew Macintosh'
Subject: FW: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

Hi Andrew

When you have a few minutes I can give you some more background. I also have some questions for you on handling with the ERAC.

Thanks

s22

From: s47F
Sent: Thursday, 16 August 2018 5:11 PM
To: Andrew Macintosh <andrew.macintosh@s22>; Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>; Maguire, Katrina <Katrina.Maguire@environment.gov.au>
Cc: s22 s22 @environment.gov.au>; s47F s47F cleanenergyregulator.gov.au>
Subject: RE: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

UNCLASSIFIED

Hi Andrew,

I am writing to provide a brief update on the discussion with Dominic Devine today. s22 and Mark might want to add more to the summary. s47C

47G, s47C

s47C, 47G

Let me know if you require further information?

s47F

CLEAN ENERGY REGULATOR

s47F

Manager

Market Intelligence and Client Support
Scheme Entry and Entitlement Division
(02) 6159 s47F
www.cleanenergyregulator.gov.au

Think before you print

UNCLASSIFIED

From: Andrew Macintosh <andrew.macintosh@s22>
Sent: Friday, 10 August 2018 9:08 AM
To: Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>; Maguire, Katrina <Katrina.Maguire@environment.gov.au>
Cc: s22 s22 @environment.gov.au>; s47F ; Wilson, s47F s47F @cleanenergyregulator.gov.au>
Subject: RE: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

Will do

From: Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Sent: Friday, 10 August 2018 9:06 AM
To: Andrew Macintosh <andrew.macintosh@s22>; Maguire, Katrina <Katrina.Maguire@environment.gov.au>
Cc: s22 s22 @environment.gov.au>; s47F ; s47F , s47F s47F @cleanenergyregulator.gov.au>
Subject: RE: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

UNCLASSIFIED

Thanks Andrew

My landline is best if you can.

Mark

CLEAN ENERGY REGULATOR

Mark Williamson
Executive General Manager

Scheme Entry and Entitlement Division

(02) 6159 3961 | mark.williamson@cleanenergyregulator.gov.au

www.cleanenergyregulator.gov.au

UNCLASSIFIED

From: Andrew Macintosh <andrew.macintosh@s22>
Sent: Friday, 10 August 2018 8:33 AM
To: Maguire, Katrina <Katrina.Maguire@environment.gov.au>; Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Cc: s22 s22 @environment.gov.au>; s47F ; Wilson, s47F s47F @cleanenergyregulator.gov.au>
Subject: Re: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

I can do 9.10 and can arrange the 3 way. I'm booked from 10-10.30, and from 12 until about 3pm.

A

From: Maguire, Katrina <Katrina.Maguire@environment.gov.au>
Sent: Thursday, 9 August 2018 7:25:30 PM
To: Williamson, Mark
Cc: Andrew Macintosh; s22 ; s22 ; s47F
Subject: Re: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

I can do 9:10 but can't organise a three way conference until I get in in the morning

Sent from my iPhone

On 9 Aug 2018, at 6:50 pm, Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au> wrote:

UNCLASSIFIED

Hi Andrew

Yes, certainly open to a chat. However, my calendar is tight from 9.30am to midday. I could do before or after that.

Katrina, I agree the Department should coordinate both our comments to s22 and the proposed reply. Mary-Anne will take the lead at our end on that.

Regards

Mark

Mark Williamson
Executive General Manager

Scheme Entry and Entitlement Division
(02) 6159 3961 | mark.williamson@cleanenergyregulator.gov.au
www.cleanenergyregulator.gov.au

UNCLASSIFIED

From: Andrew Macintosh <andrew.macintosh@s22 >
Sent: Thursday, 9 August 2018 6:13 PM
To: Maguire, Katrina <Katrina.Maguire@environment.gov.au>; Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Cc: s22 s22 @environment.gov.au>
Subject: RE: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

I reckon we should have a quick chat in the morning to discuss.

Anyone interested?

From: Maguire, Katrina <Katrina.Maguire@environment.gov.au>
Sent: Thursday, 9 August 2018 5:48 PM
To: Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Cc: Andrew Macintosh <andrew.macintosh@s22 >; s22 s22 @environment.gov.au>
Subject: RE: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

Hi Mark and Andrew – to avoid sending s22 3 different responses can you pls send us your views on the letter and we'll pull it together in a draft response and email to s22
Thanks
KAtrina

From: s22
Sent: Thursday, 9 August 2018 1:12 PM
To: Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Cc: Andrew Macintosh <andrew.macintosh@s22 >; Maguire, Katrina <Katrina.Maguire@environment.gov.au>; s22 s22 @environment.gov.au>
Subject: Re: Devine Agribusiness Carbon - CFI Rule change [SEC=UNCLASSIFIED]

I agree, before. Just part of the ongoing stakeholder engagement.

Sent from my iPhone

On 9 Aug 2018, at 12:37 pm, Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au> wrote:

UNCLASSIFIED

Yes, agree with Andrew's comment.

s47F and I are planning a visit to see Mr Devine shortly to show him our improving geospatial capability and to step him through the requirements of the law and how we will apply that. As he says in part of his letter, that includes removing areas without forest potential.

s22, we may need to discuss whether our meeting with him may be best before or after the Minister's reply. I think before.

Regards

Mark

Mark Williamson
Executive General Manager

Scheme Entry and Entitlement Division
(02) 6159 3961 | mark.williamson@cleanenergyregulator.gov.au
www.cleanenergyregulator.gov.au

UNCLASSIFIED

From: Andrew Macintosh <andrew.macintosh@s22>
Sent: Thursday, 9 August 2018 12:15 PM
To: s22 s22 @environment.gov.au>; Maguire, Katrina <Katrina.Maguire@environment.gov.au>; s22 s22 @environment.gov.au>; Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Subject: RE: Devine Agribusiness Carbon - CFI Rule change

Thanks s22. We'll take a look and report back.

A

From: s22 s22 @environment.gov.au>
Sent: Thursday, 9 August 2018 11:54 AM
To: Andrew Macintosh <andrew.macintosh@s22>; Maguire, Katrina <Katrina.Maguire@environment.gov.au>; s22 s22 @environment.gov.au>; Williamson, Mark <Mark.Williamson@cleanenergyregulator.gov.au>
Subject: Fwd: Devine Agribusiness Carbon - CFI Rule change

Welcome any views next week

Thanks

Sent from my iPhone

Begin forwarded message:

> **From:** "Graham Kenny" <graham.kenny@leichardt.com.au>
> **To:** "s22 " s22 @environment.gov.au>

Cc: "Dominic Devine" <dominic.devine@leichardt.com.au>
Subject: Devine Agribusiness Carbon - CFI Rule change

Dear s22 ,

We attach a letter from Devine Agribusiness Carbon to the Minister outlining our concerns regarding the proposed CFI rule change as discussed with you recently, together with some supporting information.

Could you please see that it receives the Minister's attention.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 22, 127 Creek Street, Brisbane Qld 4000

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FOI 190318
Document 45

s22

From: Andrew Macintosh <andrew.macintosh@s22 >
Sent: Thursday, 18 October 2018 4:16 PM
To: s22 ; Thompson, Shayleen; Katrina Maguire; s22
Subject: Devine Agribusiness

Arvo All

I just noticed Devine Agribusiness has either changed its name or been acquired by another entity. See: http://www.leichardt.com.au/.

The website suggests it was just a name change. s47C

A

Andrew Macintosh
Professor
ANU Law School
ANU College of Law
Wk: 61 2 6125 3832
Mb: s47F

FOI 190318
Document 46

s22

From: Erfforests
Sent: Friday, 29 March 2019 9:50 AM
To: s22
Subject: FW: Draft slides and meeting notes for presentation on Monday [SEC=UNCLASSIFIED]
Attachments: ERAC review findings overview 2 Dec 2018.pptx

From: Andrew Macintosh [mailto:andrew.macintosh@s47F]
Sent: Sunday, 2 December 2018 5:27 PM
To: s22 ; Hilary Smith ; Beverley Henry ; mjkeogh@s47F
Cc: s22
Subject: Re: Draft slides and meeting notes for presentation on Monday [SEC=UNCLASSIFIED]

Hi All

Please find attached revised slides for the meeting tomorrow.

Plan re NFMR is to discuss issues but state that the ERAC has not reached a position on it - i.e. the truth.

s22 and s22 , I'm happy for these to be circulated when you are ready (others, sorry about the late notice).

A

From: s22
Sent: Friday, 30 November 2018 6:53:05 PM
To: Andrew Macintosh
Cc: s22
Subject: Draft slides and meeting notes for presentation on Monday [SEC=UNCLASSIFIED]
Hi Andrew
Draft slides for Monday are attached for you to consider. They are based on this afternoon's version of the findings.

s47C

I've added a final slide on next steps as discussed.
Once you get back to me on the final version, I'll send it to other subcommittee members together with the info below, and we'll send it to meeting attendees on Monday morning.
Notes for presentation

- Suggested agenda:
  - Update on rule amendment
  - Where the review of the methods is up to
  - Overview of findings and recommendations
    - Mention handling of other NFMR findings and recommendations
  - Next steps:
    - Process aspects: ERAC consideration, finalisation, write to Minister [Indicative timing?]
    - Future directions for the methods
  - We have ordered morning tea for 10.30
- Update on rule
  - Amendment for HIR registered on Friday 30 November

- Department is still considering best approach for NFMR

Attendees

Climate Friendly: s47F , s47F (in person)
CO2 Australia: s47F (in person)
Corporate Carbon: s47F (phone)
Select Carbon: s47F , s47F (phone)
GreenCollar: s47F ,s47F (phone)
Australian Integrated Carbon Financial Services: s47F (phone)
Devine Agribusiness: Dominic Devine, Graham Kenny (phone)
Clean Energy Technology: s47F (phone)
Country Carbon: s47F (phone)
Carbon Farmers of Australia: s47F (adviser – in person)

Note the CER is meeting the agents on Monday afternoon, in the first of planned regular meetings to discuss general scheme/project administration. They will be at our meeting, and can give a very update on the status of the guidelines if attendees ask.

Thanks

s22

FOI 190318
Document 47

s22

From: s22
Sent: Wednesday, 5 December 2018 1:49 PM
To: 'Beverley Henry'; 'mjkeogh@s47F '
Cc: Katrina Maguire; s22 ; s22 ; 'Andrew Macintosh'; 'Hilary Smith'
Subject: Draft meeting outcomes - ERAC subcommittee meeting with stakeholders 3 Dec 2018 [SEC=UNCLASSIFIED]
Attachments: ERAC_review subcommittee stakeholder meeting outcomes_3dec2018.docx

Hi Beverly and Mick

Please find attached draft notes from Monday's meeting with stakeholders. These have been drafted to support your update to ERAC next week. Please let me know if you have any amendments you would like me to incorporate.

Kind regards

s22

s22
Assistant Director
Forests Section
Climate Change Division
Department of the Environment and Energy
s22
Office Hours: 8am to 2:30pm, Monday-Friday

s47C

s47C

s47C

FOI 190318
Document 48

s22

From: Beverley Henry <beverley.henry@s47F >
Sent: Wednesday, 5 December 2018 4:17 PM
To: s22 ; 'mjkeogh@s47F '
Cc: Katrina Maguire; s22 s22 ; 'Andrew Macintosh'; 'Hilary Smith'
Subject: RE: Draft meeting outcomes - ERAC subcommittee meeting with stakeholders 3 Dec 2018 [SEC=UNCLASSIFIED]
Attachments: ERAC_review subcommittee stakeholder meeting outcomes_3dec2018_bh.docx

Hi s22

Thanks for your support in Monday's meeting and for the comprehensive notes which are a very good record of the discussions. I've nothing major but have made a couple of additions/suggestions on the attached (subject to Mick's thoughts also).

Thanks again
Beverley

Beverley Henry

Mob: s47F | **Email:** beverley.henry@s22

From: s22
Sent: Wednesday, 5 December 2018 1:49 PM
To: Beverley Henry ; 'mjkeogh@s22 '
Cc: Katrina Maguire ; s22 ; s22 ; 'Andrew Macintosh' ; 'Hilary Smith'
Subject: Draft meeting outcomes - ERAC subcommittee meeting with stakeholders 3 Dec 2018 [SEC=UNCLASSIFIED]

Hi Beverly and Mick

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Kind regards

s22

s22
Assistant Director
Forests Section
Climate Change Division
Department of the Environment and Energy
s22
Office Hours: 8am to 2:30pm, Monday-Friday

s47C

s47C

s47C

s47C

FOI 190318
Document 49

s22

From: Andrew Macintosh <andrew.macintosh@s22 >
Sent: Wednesday, 5 December 2018 12:46 PM
To: s22
Cc: Katrina Maguire
Subject: RE: Timing for talking to Devine Agribusiness about review outcomes [SEC=UNCLASSIFIED]

Thanks s22

I'll call later to discuss. Could actually be good because it would be good to get the entire Committee's views on NFMR before consulting s47C

If the whole Committee agrees with the current drafting, we'll need to consulting him on basis of procedural fairness.

A

From: s22
Sent: Wednesday, 5 December 2018 12:25 PM
To: Andrew Macintosh
Cc: Katrina Maguire
Subject: Timing for talking to Devine Agribusiness about review outcomes [SEC=UNCLASSIFIED]

Hi Andrew

I hope you are recovering.

Graham Kenny contacted me to say he is travelling and will come back to us at the end of the week about a time next week to discuss NFMR review outcomes.

Not ideal for the ERAC meeting, but there's not much we can do about it.

s22

s47C

s47C

s47C

s47C

FOI 190318
Document 51

s22

From: Hilary Smith <hilary@s22 >
Sent: Monday, 10 December 2018 8:13 AM
To: 'Andrew Macintosh'; 'Beverley Henry'; s22 ; mjkeogh@s22
Cc: s22 ; s22 ; s22
Subject: RE: Availability for teleconference with Devine Agribusiness, 2.00 Tuesday 11 December [SEC=UNCLASSIFIED]

2-3PM on 11th is fine for me.
Hilary

From: Andrew Macintosh
Sent: Friday, 7 December 2018 3:44 PM
To: Beverley Henry ; s22 ; Hilary Smith ; mjkeogh@s22
Cc: s22 s22 ; s22
Subject: Re: Availability for teleconference with Devine Agribusiness, 2.00 Tuesday 11 December [SEC=UNCLASSIFIED]

I can do 2pm but must be gone at 3pm sharp

From: Beverley Henry <beverley.henry@s22 >
Sent: Friday, 7 December 2018 3:29:57 PM
To: s22 ; Andrew Macintosh; Hilary Smith; mjkeogh@s22
Cc: s22 ; s22 ; s22
Subject: RE: Availability for teleconference with Devine Agribusiness, 2.00 Tuesday 11 December [SEC=UNCLASSIFIED]

Hi s22

I should be available at 2pm on 11th and am interested in joining the phone hook-up on NFMR.

s47F

Kind regards
Beverley

Beverley Henry

Mob: s47F | **Email:** beverley.henry@s22

From: s22 s22 @environment.gov.au>
Sent: Friday, 7 December 2018 3:14 PM
To: 'Andrew Macintosh' <andrew.macintosh@s22 >; Hilary Smith <hilary@s22 >; Beverley Henry <beverley.henry@s22 >; mjkeogh@s22
Cc: s22 s22 @environment.gov.au>; s22 s22 @environment.gov.au>; s22 s22 @environment.gov.au>
Subject: Availability for teleconference with Devine Agribusiness, 2.00 Tuesday 11 December [SEC=UNCLASSIFIED]

Dear HIR and NFMR review subcommittee members

Devine Agribusiness have suggested 2.00pm on Tuesday 11 December to discuss the review's draft findings and recommendations on the NFMR method. Could you please let me know whether you would be able to dial in for a discussion at that time?

Also, our notes from the meeting held on Monday to discuss findings with carbon service providers are attached, to support discussion at the ERAC meeting on Monday. Mick, please feel free to add any comments.

Thanks

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 52

s22

From: s22
Sent: Monday, 10 December 2018 1:06 PM
To: 'Andrew Macintosh'; Beverley Henry; Hilary Smith
Subject: Teleconference details for discussion with Dominic Devine and Graham Kenny [SEC=UNCLASSIFIED]

Hi Andrew, Beverley and Hilary

I have confirmed the teleconference with Dominic Devine and Graham Kenny for 2 to 3 pm tomorrow.

The dial-in number is 1800 047 396
The participant code is 716464

Thanks

s22

FOI 190318
Document 53

s22

From: s22
Sent: Thursday, 13 December 2018 1:53 PM
To: Beverley Henry; 'Andrew Macintosh'; Hilary Smith
Cc: s22
Subject: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]
Attachments: Consultation_ERAC_Devine Agribusiness_ 11Dec2018_Notes.docx

Hi Andrew, Beverley and Hilary

Our draft notes from the teleconference with Dominic Devine and Graham Kenny are attached for comment.

We have tried to capture the main points made, and have grouped them by ERAC comments and Devine Agribusiness comments. Please let us know whether you would like any points added, removed or revised.

We will forward the final notes to Dominic and Graham on your behalf.

s22

Thanks

s22

s47C

s47C

s47C

FOI 190318
Document 54

s22

From: Beverley Henry <beverley.henry@s47F >
Sent: Friday, 14 December 2018 1:19 PM
To: Andrew Macintosh; s22 Hilary Smith
Cc: s22
Subject: RE: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]
Attachments: Consultation_ERAC_Devine Agribusiness_ 11Dec2018_Notes_bh.docx

Hi s22 and all

Thanks for the notes – they are a good record of the discussions.
Like Andrew, I had a suggestion on the dot point on SLATS regrowth clearing. There were also two minor suggested edits – for consideration only.

On the SLATS point, Qld data reports regrowth clearing (i.e. clearing of veg that is regrowing but which has not achieved sufficient height and cover 'maturity' to be classed as remnant. It also reports repeat clearing based on a time series of clearing since 1988 which shows the same parcel of land having been cleared more than once. For the whole state repeat clearing was has been about 30% over the past years to 2016 (last report), bearing in mind that around half the clearing is in the Brigalow Belt (see below). The rate in the Mulga Lands is variable as shown in recent years by permitted clearing for fodder (although most has still been on Cat X land).
For interest I've also pasted a page from the 2008-09 at which time SLATS reported the number of times detected as cleared (no longer reported). The times cleared will very likely have increased over the past 10 yrs and regional data would be needed to understand what is happening in the NFMR project areas. s47C

Kind regards
Beverley

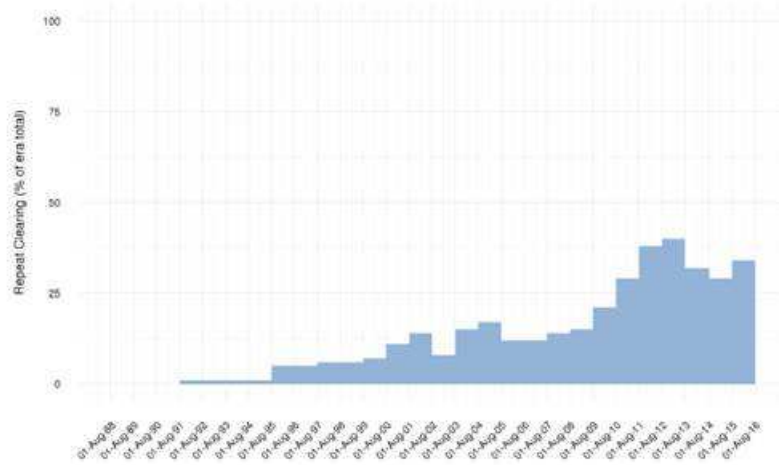


Figure 14: Repeat woody vegetation clearing as a percentage of total woody vegetation cleared for each period (1988–2016)

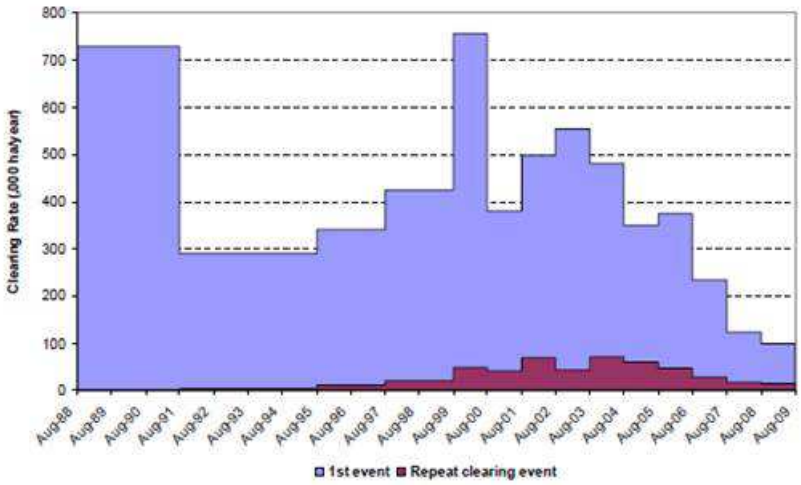


Figure 23: Time series for clearing rates for initial and repeat clearing events (1988–2009).

For 2008–09 era, of the 99 940 ha/year cleared, 15 240 ha/year (15%) has previously been detected as woody vegetation clearing. Table 10 (this page) shows the rates of woody vegetation clearing of repeat clearing events for each era.

Table 10: Woody vegetation clearing by repeat incidence (1988–2009)

Period	Rate of woody vegetation change (,000ha/yr) for repeated clearing events					
	1st event	2nd event	3rd event	4th event	Total	% of repeat clearing
1988–91	729.70	0.00	0.00	0.00	729.70	0.00
1991–95	286.71	3.09	0.00	0.00	289.80	1.07
1995–97	328.49	11.80	0.00	0.00	340.30	3.47
1997–99	405.04	20.20	0.07	0.00	425.30	4.76
1999–2000	709.56	47.93	0.30	0.00	757.78	6.36
2000–01	338.45	41.45	0.30	0.00	380.20	10.98
2001–02	428.61	67.95	1.34	0.00	497.90	13.92
2002–03	510.72	42.40	0.79	0.00	553.91	7.80
2003–04	410.88	69.21	2.25	0.01	482.36	14.82
2004–05	290.16	58.50	2.20	0.02	350.88	17.30
2005–06	328.77	44.47	1.87	0.03	375.13	12.36
2006–07	206.30	26.96	1.55	0.02	234.83	12.15
2007–08	105.44	16.19	1.11	0.03	122.78	14.11
2008–09	84.70	14.41	0.81	0.01	99.94	15.25

Beverley Henry

Mob: +61 s47F | **Email:** beverley.henry@s47F

From: Andrew Macintosh
Sent: Friday, 14 December 2018 10:58 AM
To: s22 ; Beverley Henry ; Hilary Smith
Cc: s22
Subject: RE: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]

Thanks s22 and co.

The only thing I question is the following:

- Queensland SLATS data also shows repeat clearing occurring. Like the National Accounts data, it shows the majority of clearing in recent years has been repeat clearing. However, it is consistent

with the National Accounts data in showing most land has only been cleared once within the timeframe the ERAC considered.

I thought that was expressed slightly differently = the SLATS data show there is extensive clearing of regrowth but it is not clear whether it also shows that a significant proportion of land that is cleared once (i.e. forest conversion) is subsequently cleared on a cyclical basis.

Other than that, I'm happy for it to be sent to Devine and Kenny after Bev and Hilary provide their comments.

s22

Thanks

Andrew

From: s22 s22 @environment.gov.au>
Sent: Thursday, 13 December 2018 1:53 PM
To: Beverley Henry <beverley.henry@s47F >; Andrew Macintosh <andrew.macintosh@s47F >; Hilary Smith <hilary@s47F >
Cc: s22 s22 @environment.gov.au>
Subject: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]

Hi Andrew, Beverley and Hilary

Our draft notes from the teleconference with Dominic Devine and Graham Kenny are attached for comment.

We have tried to capture the main points made, and have grouped them by ERAC comments and Devine Agribusiness comments. Please let us know whether you would like any points added, removed or revised.

We will forward the final notes to Dominic and Graham on your behalf.

s22

Thanks

s22

s47C

s47C

s47C

FOI 190318
Document 55

s22

From: s22
Sent: Monday, 17 December 2018 1:38 PM
To: Hilary Smith
Cc: s22
Subject: FW: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]
Attachments: Consultation_ERAC_Devine Agribusiness_ 11Dec2018_Notes_bh.docx

Hi Hilary

Just checking whether you have any comments to add on the teleconference notes. We have incorporated Beverley's changes.

Thanks

s22

From: Beverley Henry [mailto:beverley.henry@s47F]
Sent: Friday, 14 December 2018 1:19 PM
To: Andrew Macintosh ; s22 ; Hilary Smith
Cc: s22
Subject: RE: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]

Hi s22 and all

Thanks for the notes – they are a good record of the discussions.
Like Andrew, I had a suggestion on the dot point on SLATS regrowth clearing. There were also two minor suggested edits – for consideration only.

On the SLATS point, Qld data reports regrowth clearing (i.e. clearing of veg that is regrowing but which has not achieved sufficient height and cover 'maturity' to be classed as remnant. It also reports repeat clearing based on a time series of clearing since 1988 which shows the same parcel of land having been cleared more than once. For the whole state repeat clearing was has been about 30% over the past years to 2016 (last report), bearing in mind that around half the clearing is in the Brigalow Belt (see below). The rate in the Mulga Lands is variable as shown in recent years by permitted clearing for fodder (although most has still been on Cat X land).
For interest I've also pasted a page from the 2008-09 at which time SLATS reported the number of times detected as cleared (no longer reported). The times cleared will very likely have increased over the past 10 yrs and regional data would be needed to understand what is happening in the NFMR project areas. s47C

Kind regards
Beverley

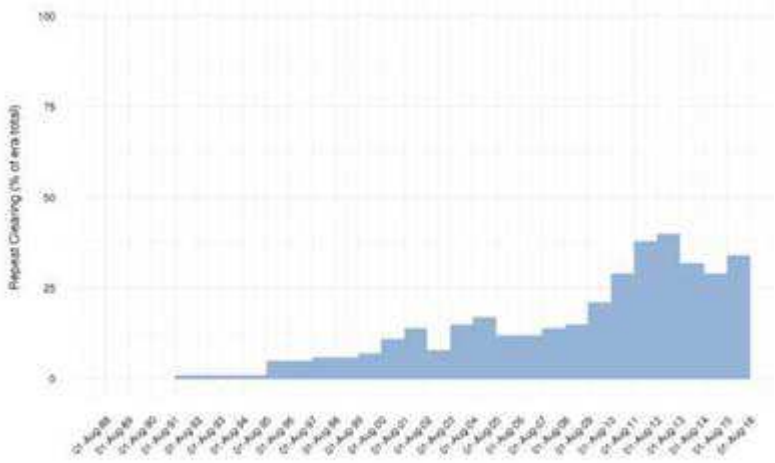
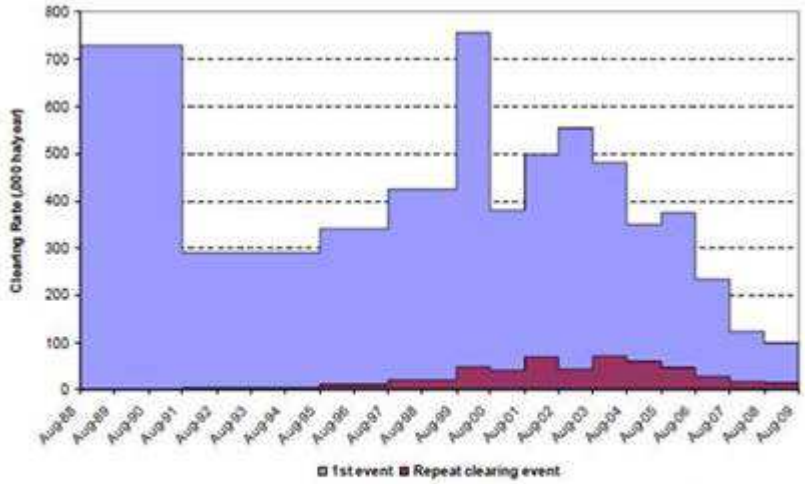


Figure 14: Repeat woody vegetation clearing as a percentage of total woody vegetation cleared for each period (1988–2016)



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Beverley Henry

Mob: s47F | **Email:** beverley.henry@s47F

From: Andrew Macintosh <andrew.macintosh@s47F>
Sent: Friday, 14 December 2018 10:58 AM
To: s22 s22 @environment.gov.au>; Beverley Henry <beverley.henry@s47F>; Hilary Smith <hilary@s22>
Cc: s22 s22 @environment.gov.au>
Subject: RE: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]

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s22

Thanks

Andrew

From: s22 s22 @environment.gov.au>
Sent: Thursday, 13 December 2018 1:53 PM
To: Beverley Henry <beverley.henry@s47F>; Andrew Macintosh <andrew.macintosh@s47F>; Hilary Smith <hilary@s47F>
Cc: s22 s22 @environment.gov.au>
Subject: For consideration: draft notes from teleconference with Devine Agribusiness [SEC=UNCLASSIFIED]

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We will forward the final notes to Dominic and Graham on your behalf.

s22

Thanks

s22

FOI 190318
Document 1

s22

s22

From: Maguire, Katrina
Sent: Tuesday, 4 April 2017 5:37 PM
To: 'dominic@devineagribusiness.com.au' ; 'graham.kenny@leichardt.com.au'
Cc: s22 ; s22 @cleanenergyregulator.gov.au'
Subject: Emissions Reduction Fund projects [SEC=UNCLASSIFIED]

Hi Dominic and Graham

I tried to call you this afternoon at your office but understand you are out of town at the moment. I have also left a message on Dominic's mobile. Please find attached a letter relating to Emissions Reduction Fund projects registered under the names of Devine Agribusiness and Oratara Pty Ltd. Contact details for representatives from my Branch and the Clean Energy Regulator are in the attached letter if you'd like to discuss the issue.

Thanks

Katrina Maguire
Assistant Secretary
Land Branch
Domestic Emissions Reduction Division
Department of the Environment and Energy

t: 02 6159 7600
e: katrina.maguire@environment.gov.au
GPO Box 787 | Canberra ACT 2601
www.environment.gov.au

Australian Government
Department of the Environment and Energy

Mr Dominic Devine
dominic@devineagribusiness.com.au

Mr Graham Kenny
graham.kenny@leichardt.com.au

Dear Mr Devine and Mr Kenny

I am writing to you in relation to the Emissions Reduction Fund *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013* and the Full Carbon Accounting Model (FullCAM) guidelines for this method. I am writing to you as contacts for projects under this method registered by Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd.

The Emissions Reduction Fund is a key part of the Australian Government's plan to reduce Australia's emissions. All projects under the Fund are required to use an approved method. Methods set out the rules for accurately estimating emissions reductions from activities and ensuring emissions reductions are real and would not have occurred in the ordinary course of business. This is required under the *Carbon Credits (Carbon Farming Initiative) Act 2011*. The Department of the Environment and Energy continually reviews the guidelines that support methods to ensure utmost integrity in the Fund.

The Department and the Clean Energy Regulator recently identified an anomaly in the FullCAM guidelines, which could result in overcrediting in some circumstances.

Section 4.18 of the method requires the use of FullCAM to determine the project carbon stocks for a carbon estimation area. Section 4.18 also requires using project-specific inputs as specified in the FullCAM guidelines. Sections 4.19 and 4.22 of the method provide for modelling to cover the period beginning on the day after the last comprehensive clearing before the implementation date. Section 2.4 of the FullCAM guidelines provides for this modelling to estimate carbon sequestration in regrowth occurring since the clearing event. However, the FullCAM guidelines do not provide for the reductions in carbon stocks associated with suppression activities also occurring since the clearing event. This could lead to overcrediting if the FullCAM modelling does not fully reflect the actual events that have occurred prior to the project commencing.

The Department proposes to publish revised FullCAM guidelines to address this anomaly. The proposed revisions ensure abatement estimates accurately reflect the changes in land management required under the method to deliver genuine and additional abatement in accordance with the Act. These proposed revisions are consistent with the provisions in the FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forests-1.1) Methodology Determination Variation 2016*.

In accordance with the definition of the FullCAM guidelines in the method, the revised guidelines would be applicable to any forthcoming project offsets reports at the time of their submission. The incorporation of documents in methodology determinations as in force from time to time is consistent with subsection 106(8) of the Act.

The proposed revised guidelines are enclosed. The revisions specific to modelling suppression activities are contained in section 3.10.4. The Department is providing the proposed revised guidelines to provide you with the opportunity to comment before a decision is made on whether to proceed with the revisions. Please provide any comments by close of business on Monday 10 April 2017.

The Department and the Clean Energy Regulator would be happy to arrange a time to further discuss this matter with you by telephone. The Department's contact is s22, Director, Forests Section, who can be contacted on s22 or at s22@environment.gov.au.

s47G The Clean Energy Regulator's contact is s22 Manager, Auctions and Contracts Section, who can be contacted on s22 or at s22@cleanenergyregulator.gov.au.

Yours sincerely

Katrina Maguire
Assistant Secretary
Land Branch
4 April 2017

Enc.

FOI 190318
Document 2

s22

s22

From: Dominic Devine [mailto:dominic.devine@leichardt.com.au]
Sent: Thursday, 6 April 2017 3:56 PM
To: s22
Subject: Re: Comments on the proposed revision to FullCAM guidelines for the 'Native forest from managed regrowth' method [SEC=UNCLASSIFIED]

Thanks s22

Sent from my iPhone

On 6 Apr 2017, at 3:50 PM, s22 s22 @environment.gov.au> wrote:

> Hi Dominic
>
> Thanks for your time this afternoon. As discussed today, I can confirm the Department is willing to accept comments on the proposed revisions to the FullCAM guidelines for the 'Native forest from managed regrowth' method by close of business Thursday 13 April.
>
> As you know, the Department periodically revises FullCAM guidelines for Emissions Reduction Fund methods, to reflect updates to FullCAM and to clarify application of the guidelines where necessary. More broadly, the Department reviews implementation of ERF methods and supporting materials such as FullCAM guidelines on an ongoing basis, to ensure they continue to meet the offsets integrity standards in the legislation. One of the standards particularly relevant to the FullCAM guidelines is ensuring that estimates, projections and assumptions are conservative (paragraph 133(1)(g) of the Act).
>
> We will take your comments into account in making a decision to change to the guidelines as proposed. In the meantime, we will also give some thought to the comments you have already given us by phone.
>
> As discussed yesterday, the Department also intends to include in the revised guidelines a clause to clarify that the changes to the guidelines do not apply to your projects that are already in the audit process.
>
> Once the revised guidelines are published, you are welcome to raise any further comments with us or provide further suggestions that can be taken into account the next time the guidelines are revised.
>
> Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22

s22 @environment.gov.au

FOI 190318 - Document 3

s22

s22

From: Michael Byrnes [mailto:michaelbyrnes@mrh.com.au]
Sent: Wednesday, 26 April 2017 4:24 PM
To: s22 ; s22
Cc: Peter Rowe ; s22
Subject: FW: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr s22 and Mr s22 ,

We note Mr s22 is out of the office until 28 April 2017. Please see our below email to him with the **attached** enclosure, in the event the Department wishes to consider it prior to Mr s22 's return.

Kind regards,

Michael Byrnes | Solicitor
MRH Lawyers

P: 07 3012 6161
E: michaelbyrnes@mrh.com.au
www.mrh.com.au

BUNDABERG
74 Woondooma Street
P: 07 4154 5563
F: 07 4154 5590

BRISBANE
Level 21
345 Queen Street
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F: 07 4154 5590

JOHANNESBURG
Block 4, Ground Floor
Quadrum Office Park
50 Constantia Boulevard
Roodepoort 1709
P: +27 (0) 11 534 8540
F: +27 (o) 11 534 8401

From: Michael Byrnes
Sent: Wednesday, 26 April 2017 4:19 PM
To: s22
Cc: Peter Rowe

Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr s22

Further to the below, please find our correspondence **attached**.

Kind regards,

Michael Byrnes | Solicitor
MRH Lawyers

P: 07 3012 6161
E: michaelbyrnes@mrh.com.au
www.mrh.com.au

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JOHANNESBURG
Block 4, Ground Floor
Quadrum Office Park
50 Constantia Boulevard
Roodepoort 1709
P: +27 (0) 11 534 8540
F: +27 (o) 11 534 8401

From: s22 [mailto s22 @environment.gov.au]
Sent: Thursday, 13 April 2017 10:46 AM
To: Peter Rowe
Cc: Dominic Devine; Graham Kenny (graham.kenny@leichardt.com.au); Maguire, Katrina; s22
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr Rowe

Thank you for your email requesting an extension of time for your clients to provide comments on the Department of the Environment and Energy's proposed changes to the FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013*.

The Department can provide a further extension of time for submitting comments on the proposed changes. Given the public holidays over the next two weeks, we are willing to accept comments by 11.00 am on Wednesday 26 April 2017.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22

s22 @environment.gov.au

From: Peter Rowe [mailto:PeterRowe@mrh.com.au]
Sent: Wednesday, 12 April 2017 4:14 PM
To: s22 s22 @environment.gov.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Graham Kenny (graham.kenny@leichardt.com.au) <graham.kenny@leichardt.com.au>
Subject: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines.

Dear Mr s22 ,

We act for Devine Agribusiness Carbon Pty Ltd ACN 160 651 052 and Oratara Pastoral Pty Ltd ACN 609 515 808 in relation to various registered projects under the Carbon Credits (Carbon Farming Initiative) Act 2011.
We are instructed that the Department proposes to make revisions to the existing FullCAM guidelines upon which our clients' projects have been predicated.
s47G

We note that the Department requires our clients' comments to be submitted by tomorrow, 13 April, 2017. Unfortunately, our clients were only contacted by email just over a week ago.

It would seem in the interests of all parties that comprehensive submissions be made prior to the Department's determination. Accordingly, our clients seek an extension of time for comments to be submitted until Friday 21 April, 2017.

We trust that the Department will give due consideration to this request, given the apparent haste of the revisions s47G In any event, our clients reserve any rights in relation to review of the Department's administrative decisions.

We look forward to your response.

Regards,

Peter Rowe | Partner
MRH Lawyers

Level 21, 345 Queen Street, Brisbane.
GPO Box 5017, Brisbane QLD 4001
P: 07 32291788 | F: 07 4154 5592 | E: peterrowe@mrh.com.au
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EMAIL TRANSMISSION

Partner	Peter Rowe
Solicitor	Michael Byrnes
Direct Line	07 3229 1788
Direct Fax	07 4151 5929
E-mail	michaelbyrnes@mrh.com.au
Our Reference	PR:MB:773148
Your Reference	

mrh LAWYERS

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www.mrh.com.au

ABN 56 185 310 845

26 April 2017

Department of the Environment and Energy
c/o Mr s22

Email: s22 ***@environment.gov.au***

Dear Mr s22

PROPOSED AMENDMENT TO FULLCAM GUIDELINES

We act for Devine Agribusiness Carbon Pty Ltd and Oratora Pastoral Pty Ltd. We refer to the Department's correspondence dated 4 April 2017 and subsequent emails with our clients and our office in relation to proposed changes to the Full Carbon Accounting Model guidelines ('**FullCAM**').

For reference, our clients' statement of the background to this matter is set out in the **enclosed Schedule 1**. We do not propose to improve upon that statement of background. Whilst the statement refers only to Devine Agribusiness Carbon Pty Ltd, please take this also as a reference to the other affected proponent namely Oratara Pastoral Pty Ltd.

Our clients:

a) thank you for the opportunity to make submissions;

b) acknowledge the Department's stated wish that neither our clients, nor their existing projects, be prejudiced by the proposed amendments to FullCAM;

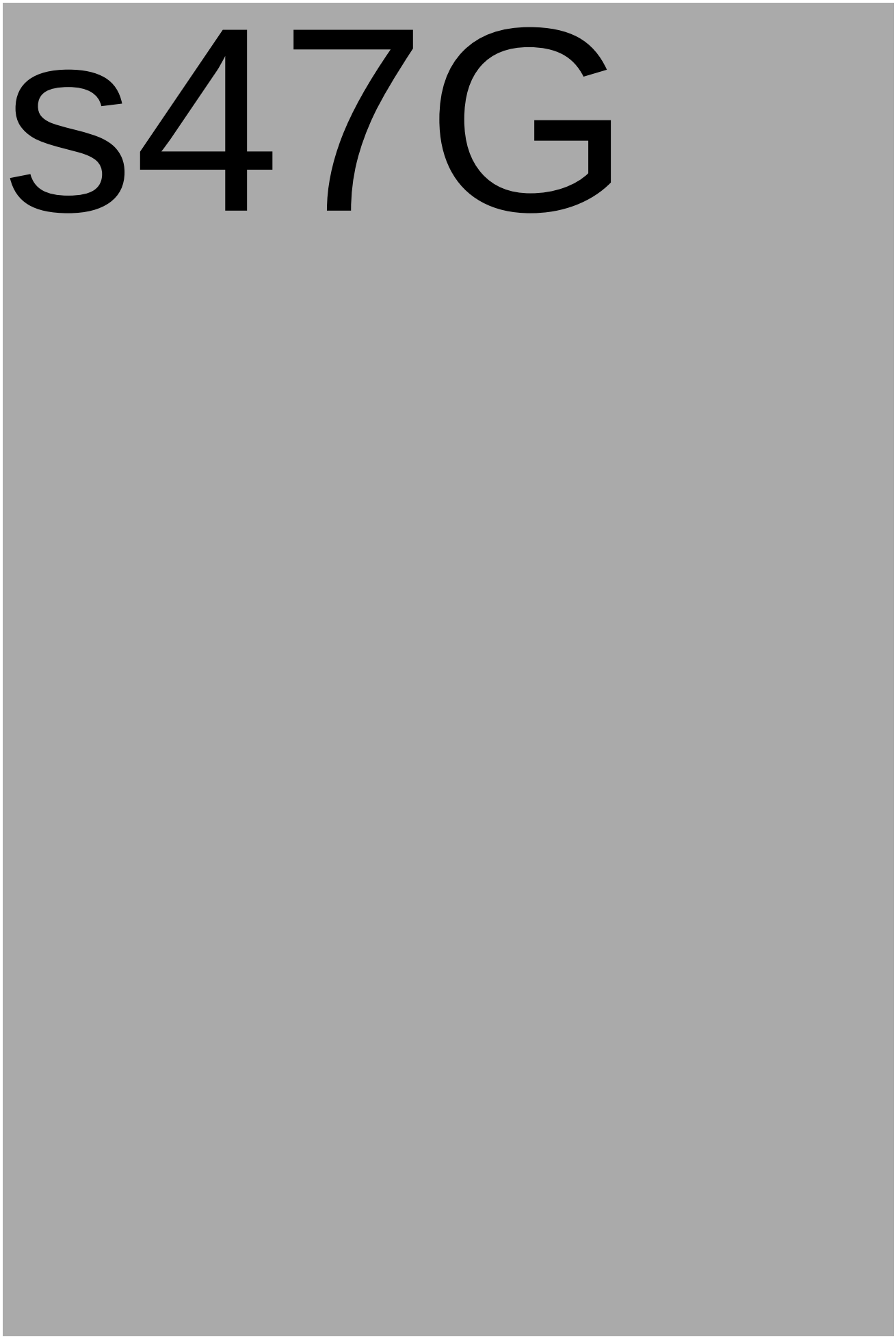
c) acknowledge that the Department intends only to apply the new FullCAM guidelines, once amended, to projects where the audit process has not yet commenced ("**the concession**");

s47G

s47G

Retrospectivity

1. **Projects for which ACCUs have already been issued to our clients and been sold to the Commonwealth**.
    a. For these projects, audits have of course already been completed and on the face of it the new guidelines would not apply due to the application of the concession.



5. **The Guidelines Amendments.**

   a. Our clients have concerns about the proposed amendments to the guidelines.

   b. They understand that for the period for which the amended guidelines may be implemented, the" grazing pause" introduced by those amendments will model a 100% reduction in abatement.

   c. This raises the possibility, for example, of a grazing event occurring for a three year period which results in a 20% reduction in actual abatement; however the application of the proposed guidelines would result in a 100% reduction in creditable abatement for that period. This would be an absurd outcome.

   d. We are instructed that the fact that the same process is contained within another method does not justify its inclusion into this method. There is nothing to be gained from having an erroneously designed process within both methods as opposed to only one.

6. **Proposed Solutions.**

We look forward to the Department's response. We request the right to make further submissions in response to the Department's initial response and our clients understand the urgency of these issues in that regard.

Please feel free to contact with us to discuss these matters further.

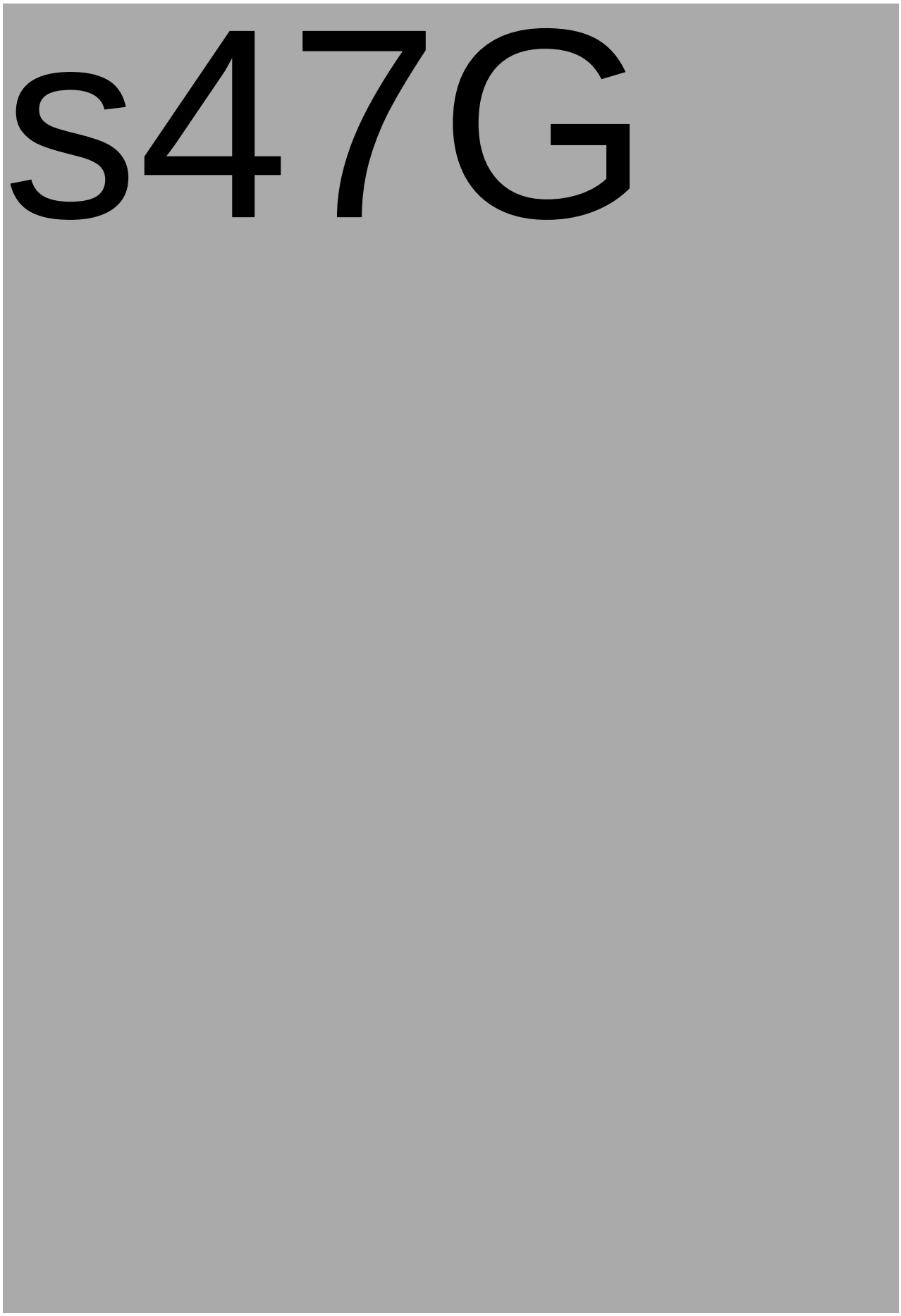
Yours faithfully

Peter Rowe
Partner

Schedule 1

Background

- Devine Agribusiness Carbon Pty Ltd ("DAC") is a registered project proponent under the CFI Act.
- DAC has been undertaking registered carbon abatement projects for a number of years.
- DAC holds a number of federal government contracts under the ERF with a combined value of in excess of $40M to deliver ACCU's from its projects over a ten-year period.
- DAC has entered into a number of contracts with landowners to develop carbon abatement projects their land to deliver ACCU's into the ERF contracts.
- All DAC projects have been developed using the "Native forests from managed regrowth methodology". A methodology co-authored by DAC at an investment of approx. $900K.
- This methodology requires the use of FullCAM to determine project carbon carbon stocks for each carbon estimation area.
- The Department of Environment and Energy has advised they intend on making significant alterations to the FullCAM guidelines pertaining to this methodology. These alterations are a direct result of errors made by the department when determining the original guidelines.
- The Department is in discussions with DAC on the proposed amendments and has advised that it is the intention that DAC are not disadvantaged by the proposed changes to FullCAM.
- The Department and the CER have further advised that the new FullCAM guidelines will not apply to projects where applications for issuance have already been made to the CER and further projects where the Audit process has commenced using the existing FullCAM guidelines.
- DAC acknowledges that the department is trying to act in good faith and appreciates the opportunity to provide input into this process.


S47G

s22

s22

From: Peter Rowe [mailto:PeterRowe@mrh.com.au]
Sent: Wednesday, 26 April 2017 4:19 PM
To: s22
Cc: Michael Byrnes
Subject: Devine Agribusiness Carbon Pty Ltd and Oratara Pty Ltd- Submissions regarding FullCAM amendments.

Dear Mr s22 ,

I have just sent through the above submissions on behalf of my clients as named above.

You had asked for submissions by 11.00 am. Unfortunately, although I sent virtually complete submissions to my clients last week, they have been travelling out west and have been difficult to contact. Accordingly, I was only able to finalise their instructions this afternoon.

My apologies for the late lodgement of the submissions. I seek your indulgence to allow the department to take account of those submissions notwithstanding that they were delivered, due to circumstances, after your requested time of 11.00 am today.

Thank you Mr s22 .

Regards,

Peter Rowe | Partner
MRH Lawyers

Level 21, 345 Queen Street, Brisbane.
GPO Box 5017, Brisbane QLD 4001
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FOI 190318 - Document 5

s22

s22

From: s22
Sent: Friday, 19 May 2017 11:21 AM
To: 'Peter Rowe'
Cc: s47F ' ; Katrina Maguire ; s22
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr Rowe

Thank you for your letter of 26 April 2017 on behalf of Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd concerning the Department of the Environment and Energy's proposed changes to the FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013*.

As mentioned in my email to your clients on 6 April 2017, the Department conducts ongoing monitoring and review of existing Emissions Reduction Fund methods as well as the tools and guidelines incorporated in methods by reference. This is an important part of ensuring the continued integrity of the Fund. The Department's work supports the Emissions Reduction Assurance Committee in carrying out its functions under the *Carbon Credits (Carbon Farming Initiative) Act 2011* (CFI Act). These functions include monitoring compliance of methods with the offsets integrity standards in the Act, and undertaking periodic reviews of methods.

The Department uses FullCAM in estimating land sector greenhouse gas emissions as part of the National Greenhouse Accounts prepared in accordance with Australia's international climate change commitments. The methodologies for developing the National Greenhouse Accounts, including FullCAM, need to conform to international guidelines and will continue to be refined as new information emerges and as international practice evolves. Ongoing refinement of FullCAM for international reporting purposes also helps ensure Emissions Reduction Fund methods that use FullCAM continue to meet the offsets integrity standards. Ongoing improvements to the guidelines for using FullCAM for Emissions Reduction Fund methods are necessary to reflect updates to FullCAM as well as feedback from users and findings from the Department's monitoring of implementation.

In monitoring and reviewing Emissions Reduction Fund methods and the supporting tools and information, the Department considers implications for scheme participants, in consultation with the Clean Energy Regulator. The Department values feedback from participants with practical experience in implementing methods, and appreciates your clients' comments on the proposed changes to the Native Forests from Managed Regrowth FullCAM guidelines.

The Department has taken your clients' comments into account in further revising the Native Forests from Managed Regrowth FullCAM guidelines. The revised guidelines are attached. The Department has adopted a revised approach to modelling grazing by livestock, and other disturbance events, as set out in sections 3.10.4 and 3.10.5 of the guidelines. The 'grazing by livestock' event has the effect of applying a reduction to carbon stocks where grazing by livestock has occurred. This reduction is approximately 30 per cent and is supported by recent work undertaken by CSIRO for the Department comparing the carbon stocks between disturbed and undisturbed vegetation in Western NSW and South-West Queensland. Where grazing by livestock ceases, carbon stocks will recover to close to

'undisturbed' levels over a number of years. The 'other disturbances' event applies a growth pause for disturbance events other than grazing by livestock, fire or thinning.

For Native Forest from Managed Regrowth projects subject to grazing by livestock, and which have been issued credits based on undisturbed carbon stock levels under previous versions of the FullCAM guidelines, the effect of the change is that it will take some years for project carbon stocks to surpass previously credited levels. The exact duration will vary according to the years since regeneration for the project. This approach allows for proponents to continue grazing in CEAs and still generate credits, but ensures the impacts of grazing are more accurately accounted for in the modelling. Ensuring FullCAM provides a best estimate is important for the integrity of the method.

The Department has also introduced provisions to the FullCAM guidelines (see section 1.6) which ensure an offsets report submitted before 31 December 2017 that needs to be audited and for which the assurance engagement terms were agreed before 1 May 2017, can use the version of the FullCAM guidelines published on 16 December 2016.

As well as the changes discussed above, we identified some other necessary clarifications in the guidelines, and have incorporated these in the revised version. These include clarifications to reflect the above changes, minor clarifications to explanations, and formatting improvements. For clarity, the attached version highlights all text changes compared to the 16 December 2016 version.

We are happy to consider any comments from your clients on the further revisions to the FullCAM guidelines before finalising them for publication. Please provide any comments by Tuesday 30 May 2017 if possible. We are also happy to discuss with you and your clients the revisions made to the guidelines and any further queries.

Your letter raised a number of questions regarding crediting and provision of information for your clients' existing Native Forest from Managed Regrowth projects. Under the CFI Act, the Department has responsibility for developing and maintaining methods for proponents to use to estimate emissions reductions, whereas the Clean Energy Regulator is responsible for the issuing of Australian Carbon Credit Units on achievement of emissions reductions and compliance with the CFI Act. The Clean Energy Regulator is independent of the Department and operates under the *Clean Energy Regulator Act 2011*. As the questions on crediting and information provision relate to the Clean Energy Regulator's responsibilities, with your agreement we can forward your letter to the Regulator on your behalf. Alternatively, you can submit your queries directly to the Regulator.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: s47F @mrh.com.au]
Sent: Wednesday, 26 April 2017 4:19 PM
To: s22 s22 @environment.gov.au>
Cc: Peter Rowe <PeterRowe@mrh.com.au>
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr s22 ,

Further to the below, please find our correspondence **attached**.

Kind regards,

s47F | Solicitor
MRH Lawyers

P: s47F
E s47F @mrh.com.au
www.mrh.com.au

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From: s22 [mailto s22 @environment.gov.au]
Sent: Thursday, 13 April 2017 10:46 AM
To: Peter Rowe
Cc: Dominic Devine; Graham Kenny (graham.kenny@leichardt.com.au); Maguire, Katrina; s22
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr Rowe

Thank you for your email requesting an extension of time for your clients to provide comments on the Department of the Environment and Energy's proposed changes to the FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013*.

The Department can provide a further extension of time for submitting comments on the proposed changes. Given the public holidays over the next two weeks, we are willing to accept comments by 11.00 am on Wednesday 26 April 2017.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: s47F @mrh.com.au]
Sent: Wednesday, 12 April 2017 4:14 PM
To: s22 s22 @environment.gov.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Graham Kenny (graham.kenny@leichardt.com.au) <graham.kenny@leichardt.com.au>
Subject: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines.

Dear Mr s22 ,

We act for Devine Agribusiness Carbon Pty Ltd ACN 160 651 052 and Oratara Pastoral Pty Ltd ACN 609 515 808 in relation to various registered projects under the Carbon Credits (Carbon Farming Initiative) Act 2011.
We are instructed that the Department proposes to make revisions to the existing FullCAM guidelines upon which our clients' projects have been predicated.

s47G

We note that the Department requires our clients' comments to be submitted by tomorrow, 13 April, 2017. Unfortunately, our clients were only contacted by email just over a week ago.

It would seem in the interests of all parties that comprehensive submissions be made prior to the Department's determination. Accordingly, our clients seek an extension of time for comments to be submitted until Friday 21 April, 2017.

We trust that the Department will give due consideration to this request, given the apparent haste of the revisions s47G In any event, our clients reserve any rights in relation to review of the Department's administrative decisions.

We look forward to your response.

Regards,

Peter Rowe | Partner
MRH Lawyers

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FOI 190318
Document 6

s22

From: s22
Sent: Thursday, 25 May 2017 5:45 PM
To: 'Peter Rowe'
Cc: 'michaelbyrnes@mrh.com.au' ; Katrina Maguire ; s22
Subject: FW: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr Rowe

I am writing in relation to the revised FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013* provided in my email of 19 May 2017, and the Department's request for comments by 30 May 2017. As indicated to Mr Dominic Devine and Mr Graham Kenny by telephone on 24 May, I wish to advise that the Department is no longer seeking comments by 30 May 2017 on the version of the guidelines sent to you last week.

Your clients provided initial feedback by telephone on 19 and 22 May regarding the Department's revised approach to modelling the effects of livestock grazing. The Department has reviewed the proposed approach based on this feedback. In discussing the matter with your clients on 24 May, we indicated that we intended to further consider a suitable approach, taking into account their feedback together with the requirements of the method.

The Department appreciates the constructive input from your clients and their offer to work further with the Department on developing a suitable approach.

Your clients sought an indication from the Department of timing for a decision on a revision to the Guidelines, and also requested an assurance that the Department would provide final draft guidelines for comment at least 14 days before the revised guidelines are published. The Department will provide further advice on expected timing as soon as possible.

I have also emailed your clients following our discussion with them yesterday.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: s22
Sent: Friday, 19 May 2017 11:21 AM
To: Peter Rowe <PeterRowe@mrh.com.au>
Cc: 'Michael Byrnes' <michaelbyrnes@mrh.com.au>; Maguire, Katrina <Katrina.Maguire@environment.gov.au>;

s22 @environment.gov.au>
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr Rowe

Thank you for your letter of 26 April 2017 on behalf of Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd concerning the Department of the Environment and Energy's proposed changes to the FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013*.

As mentioned in my email to your clients on 6 April 2017, the Department conducts ongoing monitoring and review of existing Emissions Reduction Fund methods as well as the tools and guidelines incorporated in methods by reference. This is an important part of ensuring the continued integrity of the Fund. The Department's work supports the Emissions Reduction Assurance Committee in carrying out its functions under the *Carbon Credits (Carbon Farming Initiative) Act 2011* (CFI Act). These functions include monitoring compliance of methods with the offsets integrity standards in the Act, and undertaking periodic reviews of methods.

The Department uses FullCAM in estimating land sector greenhouse gas emissions as part of the National Greenhouse Accounts prepared in accordance with Australia's international climate change commitments. The methodologies for developing the National Greenhouse Accounts, including FullCAM, need to conform to international guidelines and will continue to be refined as new information emerges and as international practice evolves. Ongoing refinement of FullCAM for international reporting purposes also helps ensure Emissions Reduction Fund methods that use FullCAM continue to meet the offsets integrity standards. Ongoing improvements to the guidelines for using FullCAM for Emissions Reduction Fund methods are necessary to reflect updates to FullCAM as well as feedback from users and findings from the Department's monitoring of implementation.

In monitoring and reviewing Emissions Reduction Fund methods and the supporting tools and information, the Department considers implications for scheme participants, in consultation with the Clean Energy Regulator. The Department values feedback from participants with practical experience in implementing methods, and appreciates your clients' comments on the proposed changes to the Native Forests from Managed Regrowth FullCAM guidelines.

The Department has taken your clients' comments into account in further revising the Native Forests from Managed Regrowth FullCAM guidelines. The revised guidelines are attached. The Department has adopted a revised approach to modelling grazing by livestock, and other disturbance events, as set out in sections 3.10.4 and 3.10.5 of the guidelines. The 'grazing by livestock' event has the effect of applying a reduction to carbon stocks where grazing by livestock has occurred. This reduction is approximately 30 per cent and is supported by recent work undertaken by CSIRO for the Department comparing the carbon stocks between disturbed and undisturbed vegetation in Western NSW and South-West Queensland. Where grazing by livestock ceases, carbon stocks will recover to close to 'undisturbed' levels over a number of years. The 'other disturbances' event applies a growth pause for disturbance events other than grazing by livestock, fire or thinning.

For Native Forest from Managed Regrowth projects subject to grazing by livestock, and which have been issued credits based on undisturbed carbon stock levels under previous versions of the FullCAM guidelines, the effect of the change is that it will take some years for project carbon stocks to surpass previously credited levels. The exact duration will vary according to the years since regeneration for the project. This approach allows for proponents to continue grazing in CEAs and still generate credits, but ensures the impacts of grazing are more accurately accounted for in the modelling. Ensuring FullCAM provides a best estimate is important for the integrity of the method.

The Department has also introduced provisions to the FullCAM guidelines (see section 1.6) which ensure an offsets report submitted before 31 December 2017 that needs to be audited and for which the assurance engagement terms were agreed before 1 May 2017, can use the version of the FullCAM guidelines published on 16 December 2016.

As well as the changes discussed above, we identified some other necessary clarifications in the guidelines, and have incorporated these in the revised version. These include clarifications to reflect the above changes, minor clarifications to explanations, and formatting improvements. For clarity, the attached version highlights all text changes compared to the 16 December 2016 version.

We are happy to consider any comments from your clients on the further revisions to the FullCAM guidelines before finalising them for publication. Please provide any comments by Tuesday 30 May 2017 if possible. We are also happy to discuss with you and your clients the revisions made to the guidelines and any further queries.

Your letter raised a number of questions regarding crediting and provision of information for your clients' existing Native Forest from Managed Regrowth projects. Under the CFI Act, the Department has responsibility for developing and maintaining methods for proponents to use to estimate emissions reductions, whereas the Clean Energy Regulator is responsible for the issuing of Australian Carbon Credit Units on achievement of emissions reductions and compliance with the CFI Act. The Clean Energy Regulator is independent of the Department and operates under the *Clean Energy Regulator Act 2011*. As the questions on crediting and information provision relate to the Clean Energy Regulator's responsibilities, with your agreement we can forward your letter to the Regulator on your behalf. Alternatively, you can submit your queries directly to the Regulator.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: Michael Byrnes [mailto:michaelbyrnes@mrh.com.au]
Sent: Wednesday, 26 April 2017 4:19 PM
To: s22 @environment.gov.au>
Cc: Peter Rowe <PeterRowe@mrh.com.au>
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr s22 ,

Further to the below, please find our correspondence **attached**.

Kind regards,

Michael Byrnes | Solicitor
MRH Lawyers

P: 07 3012 6161
E: michaelbyrnes@mrh.com.au
www.mrh.com.au

BUNDABERG
74 Woondooma Street
P: 07 4154 5563
F: 07 4154 5590

BRISBANE
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345 Queen Street
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JOHANNESBURG
Block 4, Ground Floor
Quadrum Office Park
50 Constantia Boulevard
Roodepoort 1709
P: +27 (0) 11 534 8540
F: +27 (o) 11 534 8401

From: s22 @environment.gov.au]
Sent: Thursday, 13 April 2017 10:46 AM
To: Peter Rowe
Cc: Dominic Devine; Graham Kenny (graham.kenny@leichardt.com.au); Maguire, Katrina; s22
Subject: RE: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines. [SEC=UNCLASSIFIED]

Dear Mr Rowe

Thank you for your email requesting an extension of time for your clients to provide comments on the Department of the Environment and Energy's proposed changes to the FullCAM guidelines for the *Carbon Credits (Carbon Farming Initiative) (Native Forests from Managed Regrowth) Methodology Determination 2013*.

The Department can provide a further extension of time for submitting comments on the proposed changes. Given the public holidays over the next two weeks, we are willing to accept comments by 11.00 am on Wednesday 26 April 2017.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: Peter Rowe [mailto:PeterRowe@mrh.com.au]
Sent: Wednesday, 12 April 2017 4:14 PM
To: s22 @environment.gov.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Graham Kenny (graham.kenny@leichardt.com.au) <graham.kenny@leichardt.com.au>
Subject: Devine Agribusiness Carbon Pty Ltd and Oratara Pastoral Pty Ltd-Revisions of FullCAM Guidelines.

Dear s22

We act for Devine Agribusiness Carbon Pty Ltd ACN 160 651 052 and Oratara Pastoral Pty Ltd ACN 609 515 808 in relation to various registered projects under the Carbon Credits (Carbon Farming Initiative) Act 2011.
We are instructed that the Department proposes to make revisions to the existing FullCAM guidelines upon which our clients' projects have been predicated.

s47G

We note that the Department requires our clients' comments to be submitted by tomorrow, 13 April, 2017. Unfortunately, our clients were only contacted by email just over a week ago.

It would seem in the interests of all parties that comprehensive submissions be made prior to the Department's determination. Accordingly, our clients seek an extension of time for comments to be submitted until Friday 21 April, 2017.

We trust that the Department will give due consideration to this request, given the apparent haste of the revisions s47G In any event, our clients reserve any rights in relation to review of the Department's administrative decisions.

We look forward to your response.

Regards,

Peter Rowe | Partner
MRH Lawyers

Level 21, 345 Queen Street, Brisbane.
GPO Box 5017, Brisbane QLD 4001
P: 07 32291788 | F: 07 4154 5592 | E: peterrowe@mrh.com.au
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FOI 190318 - Document 7

s22

From: s22
Sent: Thursday, 25 May 2017 5:33 PM
To: 'dominic@devineagribusiness.com.au'; Graham Kenny (graham.kenny@leichardt.com.au)
Cc: s22 ; Katrina Maguire
Subject: Revision of Native Forest from Managed Regrowth FullCAM guidelines: follow-up to telephone discussions [SEC=UNCLASSIFIED]

Dear Dominic and Graham

Thanks for your time on the phone yesterday, as well as last Friday and Monday. We appreciate your feedback and advice and your offer to continue to work with the Department on a suitable way to deal with the effects of grazing in the FullCAM guidelines for the Native Forest from Managed Regrowth method. As discussed yesterday, we will do some more work on an approach that takes your advice into account, and will come back to you for further advice.

I will also email Peter Rowe to formally advise we are no longer seeking comments on the version of the guidelines I sent last Friday and that we will provide further advice on timing as soon as possible.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
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s22 @environment.gov.au

FOI 190318
Document 8

s22

From: s22
Sent: Wednesday, 19 July 2017 4:52 PM
To: 'dominic@devineagribusiness.com.au'; Graham Kenny (graham.kenny@leichardt.com.au)
Cc: s22 ; s22
Subject: Revision of Native Forest from Managed Regrowth FullCAM guidelines [SEC=UNCLASSIFIED]

Dear Dominic and Graham

I am following up on our previous discussions and correspondence about dealing with the effects of grazing in the FullCAM guidelines for the Native Forest from Managed Regrowth method. Thanks for your patience while we have been working on this since our conversation on 25 May. Dominic, I tried to call you earlier this week.

As discussed on 25 May, we have looked at a revised approach involving modelling a growth pause in circumstances where suppression such as grazing has a material effect on carbon stocks. In doing this, we have kept in mind concepts raised in our discussions with you, including ways to determine materiality and the effects different animal types have on different plants. We have done this in consultation with the Clean Energy Regulator, including to consider auditability aspects. As you suggested, we have also looked at the literature on vegetation systems and interactions with livestock and other management in southwest Queensland.

After looking at possible approaches closely, we have determined that there isn't currently a practical way to define a growth pause event representing material effects of suppression (particularly any historical effects) for the FullCAM guidelines for the Native Forest from Managed Regrowth method. We have not identified other modelling approaches for representing effects of suppression under this method either. Therefore we won't be amending the FullCAM guidelines at present.

As discussed in May, some aspects of the matters we've looked at with you in relation to the FullCAM guidelines may also be relevant to the Native Forest from Managed Regrowth method itself. Our discussions with you will help inform the Department's ongoing monitoring and review of the method.

If necessary, I would be happy to email Peter Rowe to advise him of this outcome.

Thanks again for taking the time to work through this issue with us and for your responsive and constructive advice. I will be out of the office for the rest of this week and next week. If you would like to discuss any aspects further, s22 and I would be happy to do this when I get back, or otherwise s22 will be available this week and next week.

Regards

s22
Director, Forests Section
Domestic Emissions Reduction Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 9

s22

From: s22
Sent: Tuesday, 12 December 2017 5:18 PM
To: 'graham.kenny@leichardt.com.au'; 'dominic@devineagribusiness.com.au'
Cc: s22 ; s22 ; s22
Subject: FullCam guidelines [SEC=UNCLASSIFIED]

Hi Dominic and Graham

Would you have time in the next couple of days for us to give you a call to discuss some changes we are making to the FullCam Guidelines for new projects under the Native Forest from Managed Regrowth method? These changes are designed to address some specific concerns the Emissions Reduction Assurance Committee (ERAC) have about the time period for modelling regeneration prior to project registration. The ERAC review of both the NFMR and Human Induced Regeneration methods that I mentioned yesterday at the meeting with the Clean Energy Regulator will look more broadly to ensure both methods continue to meet all the offsets integrity standards.

Thanks
Katrina

Katrina Maguire
Assistant Secretary
Land and Outreach Branch
Climate Change Division
Department of the Environment and Energy

t: 02 6159 7600 | m: s47F
e: katrina.maguire@environment.gov.au
GPO Box 787 | Canberra ACT 2601
www.environment.gov.au

An Australian Government Initiative

FOI 190318
Document 10

s22

From: Erfforests
Sent: Wednesday, 13 December 2017 4:20 PM
To: Dominic Devine
Cc: Graham Kenny (graham.kenny@leichardt.com.au); Maguire, Katrina; s22
s22
Subject: For comment: NFMR FullCAM Guidelines changes [SEC=UNCLASSIFIED]
Attachments: FullCAM_2017 Guidelines update_NFMR (131217).docx

Dear Dominic

Thank you for your time on the phone today. We certainly found it a very helpful conversation and look forward to learning more about your projects in the new year.

As we noted, the Department intends to implement a change to the Native Forest from Managed Regrowth Method FullCAM Guidelines. The change will only apply to new projects and areas.

Under the FullCAM Guidelines update, project proponents will model the regeneration event in the project carbon scenario as commencing no more than 14 years prior to the project registration date.

The change ensures consistency with the method's default baseline assumption that the land would be cleared again after 14 years of regrowth for pastoral purposes.

The change is intended to apply to projects registered from today onwards, and new areas added to existing projects from today onwards. Existing projects will be unaffected aside from any new areas that are added. The Department intends to publish the change to the Guidelines by 22 December 2017. If you wish to make any comment, please reply to the Department by COB 20 December.

For your convenience, changes from the latest public version of the Guidelines are included in track in the attachment. There are also a number of minor editing changes, including changes to better express the timing of windrow and burn and management fire events. Some of these changes were contained within the draft version of the Guidelines that you were consulted on earlier in the year. The update also includes references to the requirements around the timing of the regeneration event that are contained within the Method.

I'm happy to talk you through any of the changes at any time if you wish to get in contact using the below details.

Regards

s22
Forests Section | Land & Outreach Branch
Climate Change Division | **Department of the Environment and Energy**
p s22 | **e** s22 @environment.gov.au | **m** PO Box 787 ACT 2601

FOI 190318
Document 11

s22

From: Katrina Maguire
Sent: Monday, 18 December 2017 2:16 PM
To: 'Dominic Devine'; 'graham.kenny@leichardt.com.au'
Cc: s22 ; s22
Subject: RE: Review of NFMR FullCAM Guidelines [SEC=UNCLASSIFIED]

Hi Dominic and Graham

s22 has spoken to Graham and explained the 14 years is the start of regeneration, not the date of last clearing. s47G

s47G

s47G I know you'd prefer us not to make the change at all, including on principle, in advance of the review and we will ensure ERAC are aware of your concerns.

Thanks
Katrina

From: Dominic Devine [mailto:dominic.devine@leichardt.com.au]
Sent: Friday, 15 December 2017 4:46 PM
To: Maguire, Katrina
Subject: Fwd: Review of NFMR FullCAM Guidelines

Dear Katrina,

In following up our call earlier today following are the details you requested s47G

s47G

s47G

Regards

Dominic Devine
Devine Agribusiness Carbon Pty. Ltd.
M: s47F
GPO Box 948, Brisbane Qld 4001

FOI 190318
Document 12

s22

From: s22
Sent: Friday, 9 February 2018 11:13 AM
To: Dominic Devine
Cc: s22 s22
Subject: Update on planned visit to projects near St George [SEC=UNCLASSIFIED]

Hi Dominic

Just letting you know we are making progress on plans to come to Queensland, and the week starting 5 March looks like it will work.

Last time we spoke, we were looking at arriving in St George early in the week. Before we go any further with arrangements, I wanted to check whether later in the week would also suit you. This could mean either: arriving in St George late on Tuesday 6 March, visiting projects with you on the Wednesday and then leaving St George for Canberra on the Thursday; or arriving on Wednesday, visiting properties on Thursday and leaving on Friday.

The reason for looking at the different dates is that we are looking at flying into or out of Roma instead of St George, because the daily flights to both Roma and Charleville give us more flexibility at either end of the trip.

I look forward to hearing from you. We should then be able to confirm plans for the trip fairly soon.

Thanks

s22
Director, Forests Section
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Department of the Environment and Energy
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s22 @environment.gov.au

FOI 190318
Document 13

s22

From: Erfforests
Sent: Tuesday, 20 February 2018 10:39 AM
To: 'dominic.devine@leichardt.com.au'
Cc: 'graham.kenny@leichardt.com.au'
Subject: Invitation to Emissions Reduction Fund workshop [SEC=UNCLASSIFIED]

Dear Domenic,

Following on from recent discussions I'm writing to invite you to a workshop in Charleville on Tuesday 6 March regarding the Emissions Reduction Fund.

The workshop is being held by the Emissions Reduction Assurance Committee. You've been invited because you have an interest in the two 'methods' being reviewed by Committee:

- Native Forest from Managed Regrowth
- Human-Induced Regeneration of a Permanent Even Aged Native Forest.

The Committee wants to hear from people with knowledge and practical experience in land management as well as direct experience in running projects.

Together with staff from the Department of the Environment and Energy and the Clean Energy Regulator, the Committee is seeking the views of landholders, carbon service providers, local councils, NRM groups and other local community members to better understand how the methods are being implemented and inform the Committee's reviews of these methods. The workshop will also provide an opportunity for you to ask questions of representatives from the Committee, the Department and Regulator about the methods and the reviews.

Details of the workshop are below:

- Location: Charleville RSL, Cnr Watson and River Street, Charleville
- Day and time: Tuesday 6 March, 1-4pm (lunch will be provided from 12pm)

Please let me know by **Tuesday 27 February** whether or not you plan to attend or send someone on your behalf. Could you also please advise of any dietary requirements, and whether you intend to come for lunch. In addition, if there are others with experience of the methods or an informed view whom you believe should participate, I'd appreciate their names, interest and contact details.

Kind regards,

s22

FOI 190318
Document 14

s22

From: s22
Sent: Friday, 6 July 2018 4:35 PM
To: 'dominic.devine@leichardt.com.au'
Cc: Maguire, Katrina; s22
Subject: Proposed CFI Rule Amendment regarding forest cover attainment [SEC=UNCLASSIFIED]
Attachments: Consultation_ERAC summary_workshop_180704.docx; Rule amendment_forest cover achievement.docx; CER__Sydney workshop_Legislative rule change_data_ 030718.docx

Hello Dominic

Thank you for your time on the phone this afternoon. As discussed, please find attached the draft CFI rule amendment concerning the attainment of forest cover within regeneration projects together with supporting data and the ERAC position summary. These documents were presented to stakeholders at Wednesday's workshop in Sydney. s42

Regards

s22
Forests Section | Land & Outreach Branch
Climate Change Division | **Department of the Environment and Energy**
p s22 | e s22 @environment.gov.au | **m** PO Box 787 ACT 2601

FOI 190318
Document 15

s22

From: Graham Kenny <graham.kenny@leichardt.com.au>
Sent: Monday, 30 July 2018 4:18 PM
To: s22 ; Maguire, Katrina
Cc: Dominic Devine
Subject: RE: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]
Attachments: DACarbon Draft Position Paper - Proposed CFI rule change July 2018.pdf

Dear s22 and Katrina,

We attach our draft position paper containing some points for discussion on tomorrows call.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 22, 127 Creek Street, Brisbane Qld 4000

From: s22
Sent: Monday, 30 July 2018 2:17 PM
To: Dominic Devine
Cc: Graham Kenny
Subject: RE: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]

Thanks Dominic.

From: Dominic Devine [mailto:dominic.devine@leichardt.com.au]
Sent: Monday, 30 July 2018 2:06 PM
To: s22 s22 @environment.gov.au>
Cc: Graham Kenny <graham.kenny@leichardt.com.au>
Subject: Re: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]

Sounds good s22

Sent from my iPhone

On 30 Jul 2018, at 1:29 pm, s22 s22 @environment.gov.au> wrote:

> Hi Dominic
>
> Would you be available for a phone call with ERAC members and the Department at 12.15 tomorrow?
>
> The ERAC members will be Andrew Macintosh, Hilary Smith and Beverley Henry
>
> We can call you.
>
> Thanks

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 16

s22

From: s22
Sent: Monday, 30 July 2018 5:41 PM
To: 'Graham Kenny'; Maguire, Katrina
Cc: Dominic Devine
Subject: RE: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]

Thanks Graham. We'll look forward to speaking with you tomorrow.

Regards

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: Graham Kenny [mailto:graham.kenny@leichardt.com.au]
Sent: Monday, 30 July 2018 4:18 PM
To: s22 ; Maguire, Katrina
Cc: Dominic Devine
Subject: RE: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]

Dear s22 and Katrina,

We attach our draft position paper containing some points for discussion on tomorrows call.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 22, 127 Creek Street, Brisbane Qld 4000

From: s22 s22 @environment.gov.au>
Sent: Monday, 30 July 2018 2:17 PM
To: Dominic Devine <dominic.devine@leichardt.com.au>
Cc: Graham Kenny <graham.kenny@leichardt.com.au>
Subject: RE: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]

Thanks Dominic.

From: Dominic Devine [mailto:dominic.devine@leichardt.com.au]
Sent: Monday, 30 July 2018 2:06 PM
To: s22 s22 @environment.gov.au>
Cc: Graham Kenny <graham.kenny@leichardt.com.au>
Subject: Re: Phone call with ERAC members tomorrow [SEC=UNCLASSIFIED]

Sounds good s22

Sent from my iPhone

On 30 Jul 2018, at 1:29 pm, s22 s22 @environment.gov.au> wrote:

> Hi Dominic
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>
> We can call you.
>
> Thanks

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 17

s22

From: s22
Sent: Friday, 3 August 2018 5:02 PM
To: Dominic Devine; 'Graham Kenny'
Cc: Maguire, Katrina
Subject: Emissions Reduction Assurance Committee review of Native Forest from Managed Regrowth method - further information [SEC=UNCLASSIFIED]

Dear Dominic and Graham

Thank you for making time to speak with Andrew Macintosh, Chair of the Emissions Reduction Assurance Committee (ERAC), Committee members Beverley Henry and Hilary Smith, and the Department on Tuesday. As requested, the following is further information on the evidence the Committee has considered.

The Department is available to meet with any of your clients or other people involved in your projects to explain how the rule would apply if you wish. The Chair of the ERAC has also asked that we reiterate his offer to talk again should you wish to do so.

Background
In the papers the Department circulated for the 4 July 2018 meeting in Sydney, we provided amalgamated data on the extent of vegetation cover within both Human-Induced Regeneration (HIR) and Native Forest from Managed Regrowth (NFMR) projects that have reported. We chose not to separate out data for the two methods to avoid allowing data to be attributed to your portfolio. The extent of vegetation cover was determined by overlaying the Department's vegetation cover layers (aka NCAS data) over the carbon estimation areas (CEAs) known from submitted reports. The NFMR project data are in the first table below.

As you are aware, the ERAC is reviewing whether the NFMR and HIR methods continue to meet the offsets integrity standards in the *Carbon Farming Initiative Act 2011*. The Committee's sources of information include data from project offsets reports that you have provided to the Clean Energy Regulator. The second table below lists the relevant NFMR projects. The Clean Energy Regulator has provided this information to the Committee and the Department in accordance with the information disclosure provisions of the *Clean Energy Regulator Act 2011*.

One of the offsets integrity standards requires methods to apply conservative estimates, projections and assumptions. In reviewing the methods against this standard, the Committee has been considering whether the method ensures the estimates of sequestration derived from FullCAM adequately (and conservatively) reflect the actual sequestration achieved in the CEAs. As the Chair of the ERAC stated on Tuesday, the ERAC has concerns about the potential for over-crediting and forward crediting due to the way FullCAM is applied in the method. In forming its views on this issue, the ERAC has relied on a number of different types and sources of information, including conceptual information on the requirements of the method, project data, spatial data from the Department on changes in vegetation cover extent in CEAs, and data from CSIRO and s22 on relationships between tree biomass and crown cover.

Data summary

s47G

Biomass to canopy cover data compiled by s22 and CSIRO suggest forest cover is attained in regenerating forest systems when approximately 5 tonnes of carbon has accumulated in trees and debris per hectare. The FullCAM model predicts this level is reached in areas where NFMR projects are currently located after 10-20 years of modelled regeneration.

The proposed rule is designed to test existing projects for the presence of forest cover 15 years from the project registration date. As NFMR projects were registered as early as 2014, this would mean the proposed Rule amendment would first apply to existing NFMR projects in 2029. s47C

To illustrate how the proposed Rule amendment would apply, a typical existing project registered in 2015, that modelled regeneration commencing in 2000 and which has been unhindered by any modelled disturbances or suppression, would be first tested for whether the CEA has developed forest cover between 2030 and 2035 (noting there is up to 5 years from the previous reporting period to submit the next offsets report, at which time the test occurs). As CSIRO and s22 work suggests FullCAM is modelling regeneration occurring at a rate where forest cover is reached after 10-20 years, the test would apply at a time well beyond this period.

The Committee is aware of the limitations in interpreting remote sensing data, and has used the vegetation cover data for the purpose of considering the adequacy of the requirements in the methods for ensuring crediting of abatement appropriately reflects actual abatement.

NFMR projects considered

Projects examined
EOP100508
EOP100868
EOP100932
EOP100933
EOP100934
EOP100936
EOP100969
EOP100971
ERF101472
ERF101475
ERF101942
ERF102124

Regards

s22
Director, Forests Section
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Department of the Environment and Energy
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FOI 190318
Document 18

s22

From: s22
Sent: Friday, 17 August 2018 3:18 PM
To: 'dominic.devine@leichardt.com.au'; 'graham.kenny@leichardt.com.au'
Cc: s22 s22 ; Maguire, Katrina
Subject: Biomass to canopy cover report and data [SEC=UNCLASSIFIED]
Attachments: Final report - Stand biomass and canopy cover_8Aug18-v2.docx

Hello Dominic and Graham

Thanks for your time again yesterday. As requested, I've attached the CSIRO Report on the canopy cover to biomass relationship, along with the entirety of the data received from s22 below, beginning with the data previously emailed through and provided at the Regulator workshop last month. Note that the CSIRO Report has only been finalised in recent days following peer review comments, including from s22, and has not yet been circulated to other stakeholders. The timing element of the draft rule amendment is driven by when FullCAM estimates biomass has attained levels where the relationship to canopy cover suggests forest cover would be present if on-ground regrowth matched the estimates.

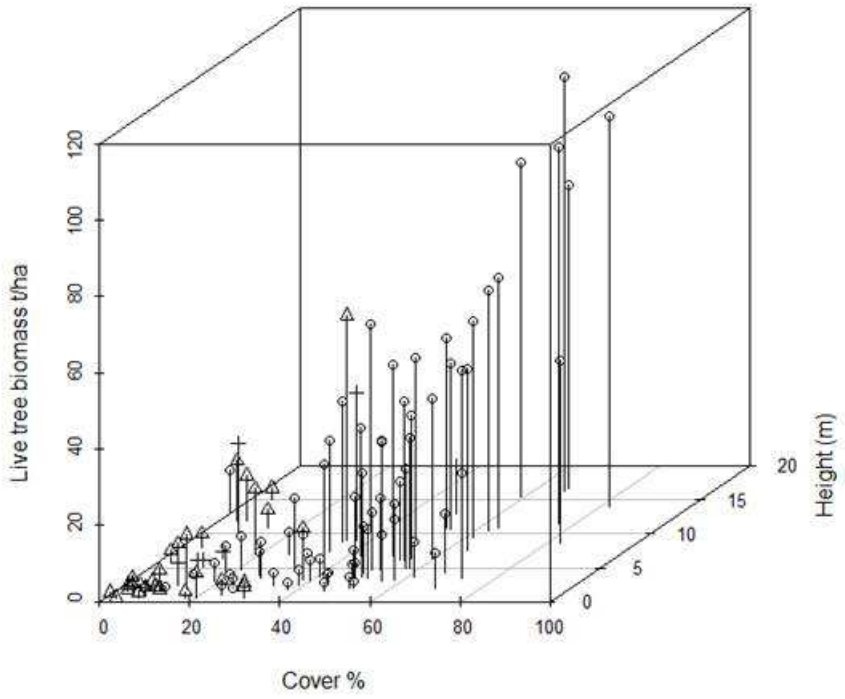
Happy to talk you through any of this information at any point.

Regards

s22
Forests Section | Land & Outreach Branch
Climate Change Division | **Department of the Environment and Energy**
p s22 | **e** s22 @environment.gov.au | **m** PO Box 787 ACT 2601

Canopy cover to biomass data from s22 (provided at the CER Workshop 4/7/18 and to Devine 6/7/18)

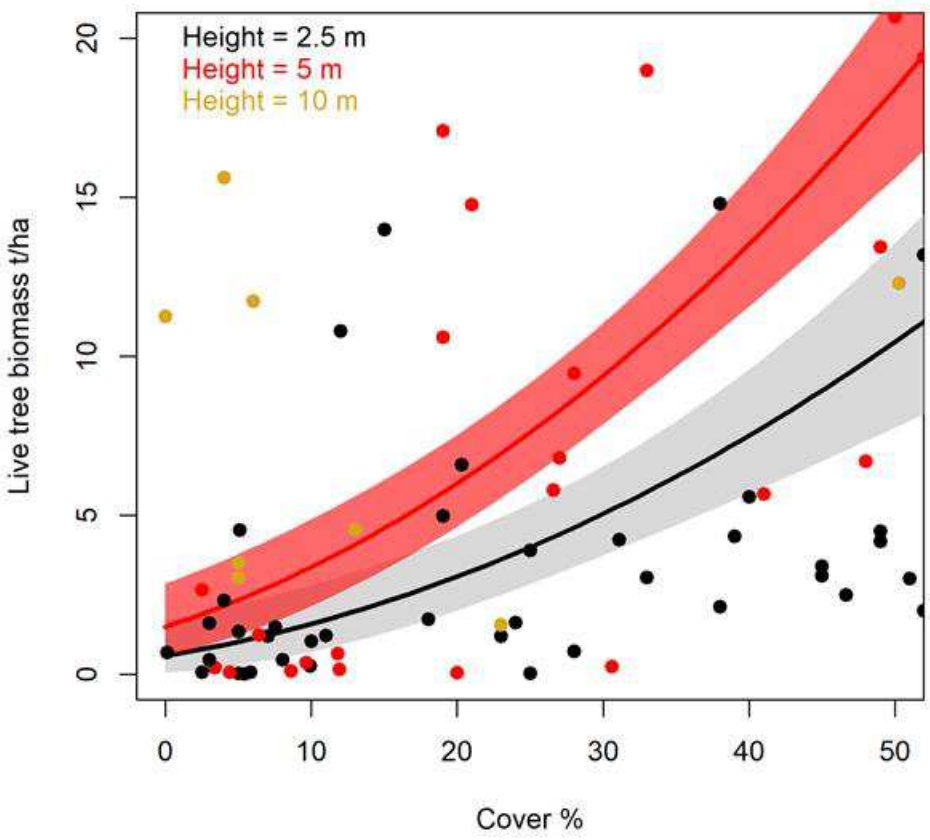
Figure 1. Relationship between above and below ground live tree biomass (tonnes per hectare dry weight equivalent), canopy cover (as percentage) and height (metres) for 110 sites in southern and central Queensland including brigalow (open circles), mulga (triangles) and poplar box (crosses)



Source: s22 , unpublished work using Biomass Plot Library data (accessible at http://data.auscover.org.au/xwiki/bin/view/Product+pages/Biomass+Plot+Library), 2018.

- This figure incorporates data from brigalow (71 sites), mulga (30 sites) and poplar box (9 sites).
- The entire dataset doesn't suggest significant differences among dominant species in terms of the relationship between stand biomass, height and cover.

Figure 2. Relationship between live tree biomass (above and below ground tonnes per hectare dry weight equivalent) and canopy cover for 3 subset height classes

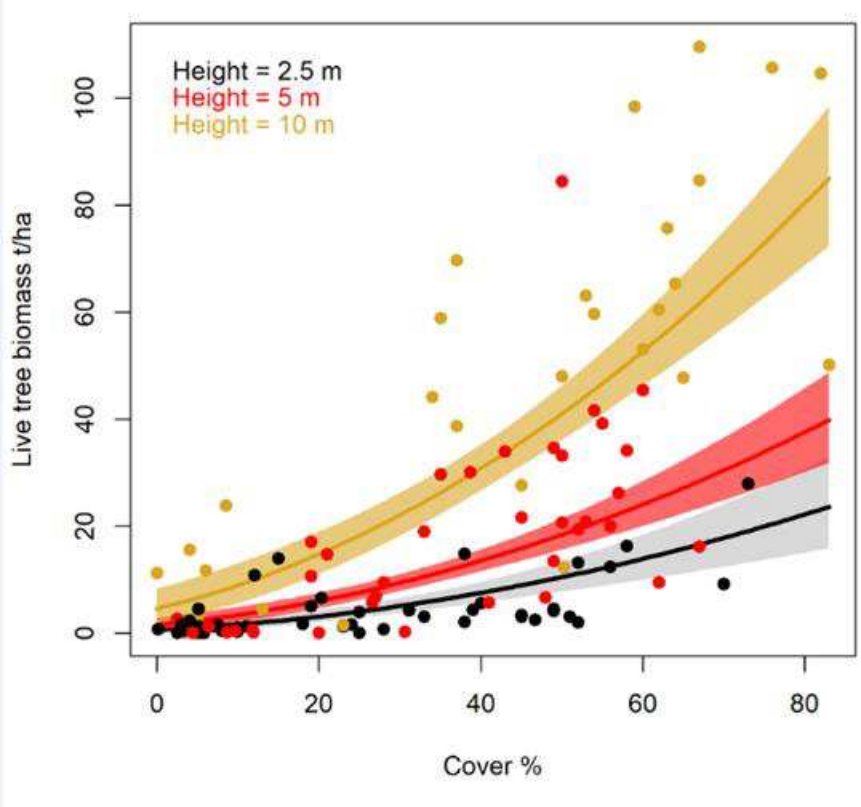


Source: s22 , unpublished work using Biomass Plot Library data (accessible at http://data.auscover.org.au/xwiki/bin/view/Product+pages/Biomass+Plot+Library), 2018.

- Statistical modelling of live tree biomass versus height and canopy cover for three subset height classes suggests that regrowth 2.5 metres tall and providing 25 percent canopy cover (i.e. generous view of the forest cover threshold) would rarely be expected to exceed 5.2 tonnes per hectare of live tree biomass (silver highlight shows upper confidence interval for model fit).
- 5.2 tonnes per hectare of live tree biomass translates to 3.6 tonnes of carbon per hectare in the FullCAM trees and debris pools (5.2 tonnes of biomass per hectare figure multiplied by 0.49 to convert biomass to carbon, and then multiplied by 1.43 to convert tree carbon to tree and debris carbon based on FullCAM ratios).

Further graph provided by s22

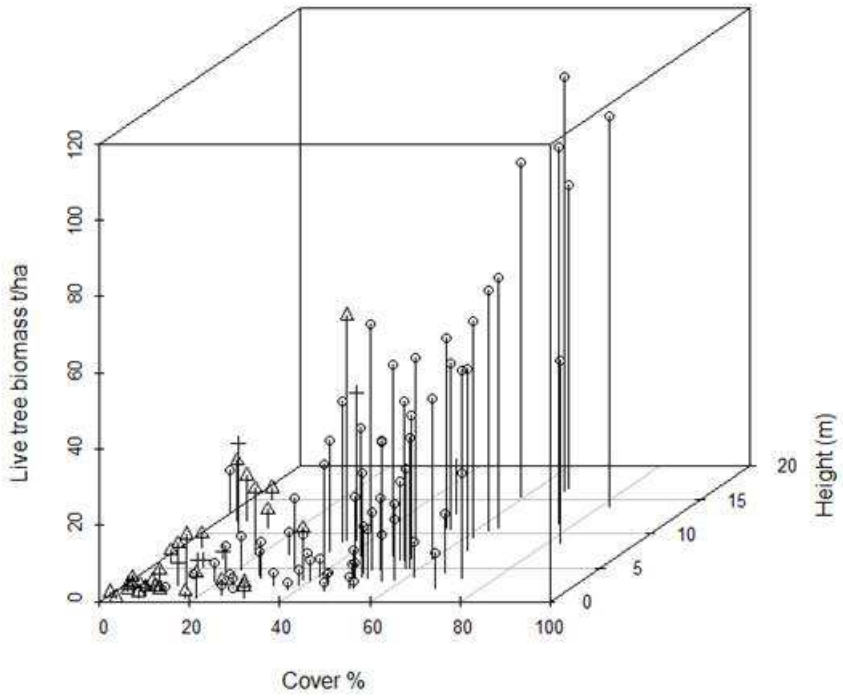
Following the Workshop s22 consolidated the data into this graph that he provided through, noting that a colleague had checked the model and came up with similar figures.



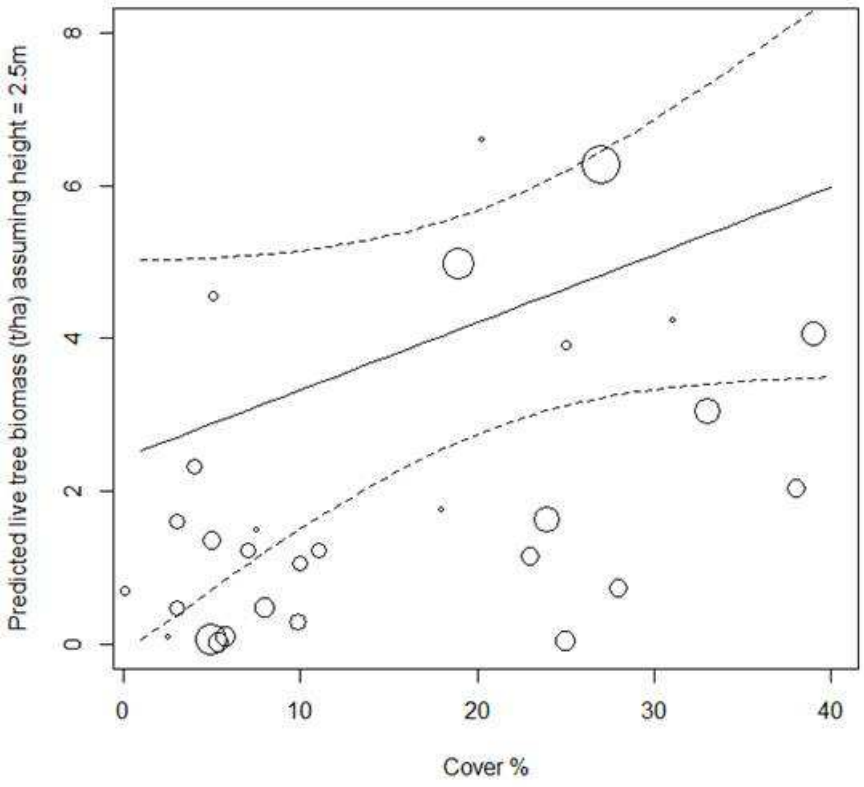
Original email with data from s22

Below is the original email provided by s22 that was drawn upon for the data provided and explained at the Regulator Workshop, which s22 also attended.

I've had a look through some stand level data for regrowth in southern and central Qld (110 sites from brigalow (71 sites, open circles in plot below), mulga (30 sites, triangles below) and poplar box (9 sites, + below)). An analysis of the entire dataset doesn't suggest significant differences among dominant species in terms of the relationship between stand biomass, height and cover.



Basic statistical modelling of biomass vs. height and cover for a subset of 33 sites with height under 4m and cover less than 40% suggest that regrowth 2.5m tall and 25% cover (i.e. a generous view of the forest threshold) would probably have about 4.7 t/ha of living biomass in trees, and would rarely be expected to exceed 6.2 t/ha (dashed line showing upper confidence interval for model fit). 6.2 t/ha of biomass translates to about 11 t CO2-e.



For comparison, an exponential fit through the whole dataset of 110 sites suggests tree biomass for 2.5m height and 25% cover is likely to be closer to 2 t/ha (interval 1.5-2.8 t/ha) but this is strongly influenced by the data well above the forest threshold, which is why I ran a more limited analysis on a subset with lower cover and height and forced it through the origin. The odd suggestions that zero cover would have more than 2 t/ha in the second figure above is because of the assumed height of 2.5 m. Larger points in the graph are from taller stands.

FOI 190318
Document 19

s22

From: s22
Sent: Thursday, 13 September 2018 5:35 PM
To: Dominic Devine
Cc: Katrina Maguire; s22 ; s22
Subject: Draft rule amendment - revised version for discussion [SEC=UNCLASSIFIED]
Attachments: draft rule amendment_HIR_NFMR (003).docx

Hi Dominic

Katrina asked us to send you a version of the draft rule as it would be proposed to apply to the NFMR method. We have marked it up in track changes so you can see the difference from the HIR one.

We are progressing a written response from Minister Price to your letter to Minister Frydenberg. The Regulator has told us they have now sent you their draft guidance. s47G

As discussed with Katrina it would be great to discuss all this information with you and Graham. We can also discuss the links between the draft rule and the Clean Energy Regulator's guidance.

Regards

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 20

s22

From: s22
Sent: Tuesday, 18 September 2018 5:39 PM
To: 'Dominic Devine'
Cc: Graham Kenny; Katrina Maguire
Subject: RE: Draft rule amendment - revised version for discussion [SEC=UNCLASSIFIED]

Hi Dominic

Thanks for getting back to me. I'll make sure to pass your comments on the guidance on to the Regulator.

We'll look forward to further discussion with you.

Regards

s22

From: Dominic Devine [mailto:dominic.devine@leichardt.com.au]
Sent: Tuesday, 18 September 2018 1:37 PM
To: s22
Cc: Graham Kenny
Subject: Re: Draft rule amendment - revised version for discussion [SEC=UNCLASSIFIED]

s22

Thank you for your email. When we have received the responses from the Minister and the CER we will be in a position to further discuss all of the information.

We also note the following passage within the guidance:

"If after implementing the final form of this Guidance, proponents believe that they may no longer be able to meet their current contracted obligations, they are encouraged to contact the Clean Energy Regulator to discuss concerns. Each case will be handled on a case-by-case basis in line with contract provisions and under commercial-in-confidence arrangements."

The proposed rule change not only foreshadows what are in effect, amendments to the eligibility criteria and evidentiary requirements of the NFMR method. It also foreshadows the Commonwealth's belief that it is entitled to do so outside of the CFI Act's provisions concerning the variation of methods.

s47G

s47G

Regards

Dominic Devine

Devine Agribusiness Pty Ltd

Sent from my iPhone

On 13 Sep 2018, at 5:34 pm, s22 s22 @environment.gov.au> wrote:

> Hi Dominic
>
> Katrina asked us to send you a version of the draft rule as it would be proposed to apply to the NFMR method. We have marked it up in track changes so you can see the difference from the HIR one.
>
> We are progressing a written response from Minister Price to your letter to Minister Frydenberg. The Regulator has told us they have now sent you their draft guidance. 47G
>
> As discussed with Katrina it would be great to discuss all this information with you and Graham. We can also discuss the links between the draft rule and the Clean Energy Regulator's guidance.
>
> Regards
>
> s22
> Director, Forests Section
> Climate Change Division
> Department of the Environment and Energy
> T s22 M s22
> s22 @environment.gov.au

FOI 190318
Document 21

s22

s22

From: Graham Kenny [mailto:graham.kenny@leichardt.com.au]
Sent: Monday, 26 November 2018 10:01 AM
To: Emissions Reduction Assurance Committee
Subject: RE: HIR/NFMR review meeting invitation [SEC=UNCLASSIFIED]

Good morning,

Dominic Devine and I will participate via teleconference.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 27, 32 Turbot Street, Brisbane Qld 4000

From: Emissions Reduction Assurance Committee
Sent: Thursday, 22 November 2018 3:22 PM
Cc: Emissions Reduction Assurance Committee
Subject: HIR/NFMR review meeting invitation [SEC=UNCLASSIFIED]

Dear all,

On behalf of the Emissions Reduction Assurance Committee, we would like to invite you to a meeting on the HIR and NFMR method review. At the meeting, the Committee will share the main findings of their review with you, ahead of finalising the review report and providing it to the Minister for the Environment.

The meeting details are as follows.

- Date and time: Monday 3 December, 9.30am-12pm.
- Location: Department of the Environment and Energy, John Gorton Building, King Edward Terrace, Parkes, Canberra.
- For those unable to attend in person, you may participate via teleconference (dial-in number: 1800 047 396; participant passcode: 716464).

Could you please let us know by Tuesday 27 November if you would like to attend.

Please note also that the Clean Energy Regulator would like to discuss some administrative matters with you on the afternoon of Monday 3 December, and will issue a separate invitation.

Kind regards,

s22
Director
Emissions Reduction Fund Governance and Policy
Department of the Environment and Energy | Australian Government
T: s22 | M: s22
E: s22 @environment.gov.au
GPO Box 787, Canberra ACT 2601

FOI 190318
Document 22

s22

From: Erfforests
Sent: Monday, 3 December 2018 9:14 AM
To: s47F @climatefriendly.com'; s22 @climatefriendly.com'; s47F @corporatecarbon.com.au'; s47F @selectcarbon.com'; s47F @greencollargroup.com.au'; s47F @greencollargroup.com.au'; s47F @biodiversecarbon.com'; 'dominic.devine@leichardt.com.au'; 'graham.kenny@leichardt.com.au'; s47F @cleanenergytechnology.com.au'; s47F @countrycarbon.com.au'; s47F @co2australia.com.au'; s47F @ResourceIntel.com.au'; 's22 '; s22 @cleanenergyregulator.gov.au'
Cc: 'Andrew Macintosh'; Mick Keogh s47F ; s22 Katrina Maguire; s22 s22 ; s47F @co2australia.com.au'; s47F @carbonfarmersofaustralia.com.au'; s47F @corporatecarbon.com.au'; s47F @climatefriendly.com'; Hilary Smith (hilary@s22); 'beverley.henry@s22 '
Subject: HIR-NFMR review: stakeholder meeting [SEC=UNCLASSIFIED]
Attachments: ERAC review findings overview 2 Dec 2018.pptx

Good morning everyone,

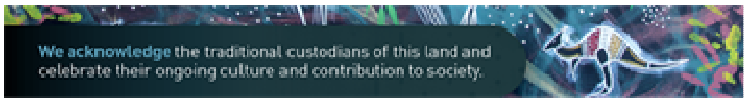
Please find attached the slides for this morning's meeting on the main findings from the Emissions Reduction Fund Assurance Committee's review of the two regeneration methods (HIR-NFMR).

The meeting will commence shortly, at 9:30.

Thank you,

s22

Forests Section
Climate Change Division
Australian Government Department of the Environment and Energy
John Gorton Building, Parkes, ACT 2600
GPO Box 787, Canberra ACT 2601 | s22
s22 @environment.gov.au | Environment.gov.au



FOI 190318
Document 23

s22

From: s22
Sent: Tuesday, 4 December 2018 9:27 AM
To: 'Dominic Devine'
Cc: Katrina Maguire
Subject: Letter from Minister for the Environment and Energy - CFI Rule amendment [SEC=UNCLASSIFIED]
Attachments: Devine Agribusiness reply.pdf

Hi Dominic

A copy of the Minister for the Environment and Energy's reply to your letter to the former Minister about amendments to the CFI Rule is attached for your information. The Minister's reply has been posted to you.

Regards

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 23a

THE HON MELISSA PRICE MP
MINISTER FOR THE ENVIRONMENT

MC18-015257

Mr Dominic Devine
Devine Agribusiness Carbon Pty Ltd
GPO Box 948
BRISBANE QLD 4001

21 NOV 2018

Dear Mr Devine

Thank you for your letter to the former Minister for the Environment and Energy, the Hon Josh Frydenberg MP, regarding the Department of the Environment and Energy's proposal to amend the *Carbon Credits (Carbon Farming Initiative) Rule 2015*. This correspondence has been referred to me as it falls under my responsibilities as the Minister for the Environment.

The Emissions Reduction Fund is successfully supporting Australian businesses, communities and landholders to reduce emissions. So far it has secured more than 190 million tonnes of emissions reductions. Vegetation projects such as yours are making a significant contribution to the Fund's success and providing an income stream for participants.

The integrity of the Fund is paramount and the independent Emissions Reduction Assurance Committee (ERAC) has an important role in advising me whether the methods meet the Offsets Integrity Standards. As you know the Committee is currently reviewing the Native Forest from Managed Regrowth and Human-Induced Regeneration methods. The object of both methods is to regenerate native forest. The ERAC has indicated it is reviewing them at the same time because, while there are some differences, there are enough similarities in the two methods to warrant concurrent reviews. I understand the ERAC expects to complete its review in the next few months, and I look forward to seeing its report.

During the review, the ERAC has identified a risk that crediting could exceed the actual carbon that is stored if regenerating vegetation does not reach forest cover in a reasonable period of time. The ERAC identified this risk is relevant for both methods. While existing projects are in early stages of regeneration, this risk could arise in future, when the vegetation reaches an age at which it would be expected to have reached forest cover. The ERAC identified a need for the risk to be managed by the Australian Government being clear about its expectations of a reasonable timeframe for reaching forest cover; the means of assessing whether forest cover has been achieved; and aligning crediting with progress towards achieving forest cover.

As you know the Department released a proposed rule that would apply to projects under the Human-Induced Regeneration method for public consultation. This was released ahead of the proposed rule for projects operating under the Native Forest from Managed Regrowth method.

I approved the rule applying to projects under the Human-Induced Regeneration method on 21 November 2018. The rule is designed to clarify project reporting and crediting requirements. It also specifies, based on available science, a reasonable period of time to reach forest cover. The rule is designed to work in conjunction with the existing method and the Clean Energy Regulator's guidance on the methods. The Regulator's guidance will assist in cost-effectively identifying, and removing from projects, areas of land that are not progressing towards forest cover. The rule and the guidance are intended to provide more certainty about projects' performance over time.

I understand my Department, the Clean Energy Regulator and the Chair and members of ERAC worked closely with project participants to design the rule in a way that enhances the integrity of the methods and can be implemented. I encourage you to continue working with my Department to achieve the same outcome for projects under the Native Forest from Managed Regrowth method.

Thank you for bringing your concerns to my attention. I have copied this letter to the Hon David Littleproud MP, Member for Maranoa.

Yours sincerely

MELISSA PRICE

cc: The Hon David Littleproud MP

FOI 190318
Document 24

s22

From: s22
Sent: Monday, 10 December 2018 1:03 PM
To: 'Graham Kenny'
Cc: 'Dominic Devine'
Subject: RE: Confirming 2.00 Tuesday for phone call on HIR/NFMR [SEC=UNCLASSIFIED]

Hi Graham

ERAC members participating in the discussion tomorrow will be Andrew Macintosh and Hilary Smith, with Beverley Henry still subject to confirmation. I'll be on the line from the Department.

Regards

s22

From: s22
Sent: Friday, 7 December 2018 4:17 PM
To: 'Graham Kenny'
Cc: 'Dominic Devine' ; Katrina Maguire
Subject: Confirming 2.00 Tuesday for phone call on HIR/NFMR [SEC=UNCLASSIFIED]

Hi again Graham

I can confirm the discussion with ERAC members for 2-3pm Canberra time on Tuesday. I'll get back to you once we have confirmed all participants.

The dial-in number is 1800 047 396
The participant code is 716464

We'll look forward to speaking with you then.

s22

From: s22
Sent: Friday, 7 December 2018 2:54 PM
To: 'Graham Kenny' <graham.kenny@leichardt.com.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Katrina Maguire <Katrina.Maguire@environment.gov.au>
Subject: RE: HIR/NFMR review meeting - suggested further discussion [SEC=UNCLASSIFIED]

Hi Graham

I am checking availability with the ERAC members. I might not be able to get back to you before Monday morning.

Regards

s22

From: Graham Kenny [mailto:graham.kenny@leichardt.com.au]
Sent: Friday, 7 December 2018 11:45 AM
To: s22 s22 @environment.gov.au>

Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Katrina Maguire <Katrina.Maguire@environment.gov.au>
Subject: RE: HIR/NFMR review meeting - suggested further discussion [SEC=UNCLASSIFIED]

s22

How is 2:00 PM on Tuesday? (That will be 1:00 PM in QLD).

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 27, 32 Turbot Street, Brisbane Qld 4000

From: s22 s22 @environment.gov.au>
Sent: Wednesday, 5 December 2018 11:15 AM
To: Graham Kenny <graham.kenny@leichardt.com.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Katrina Maguire <Katrina.Maguire@environment.gov.au>
Subject: RE: HIR/NFMR review meeting - suggested further discussion [SEC=UNCLASSIFIED]

Hi Graham

Thanks for getting back to us. We'll look forward to hearing from you.

Regards

s22

From: Graham Kenny [mailto:graham.kenny@leichardt.com.au]
Sent: Tuesday, 4 December 2018 4:44 PM
To: s22 s22 @environment.gov.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>; Katrina Maguire <Katrina.Maguire@environment.gov.au>
Subject: Re: HIR/NFMR review meeting - suggested further discussion [SEC=UNCLASSIFIED]

Hi s22

I'm on the road for the next couple of days, so could we come back to you on Friday with some possible times for next week? We will also both be in the same place then so will make it a lot easier for us.

Graham.

On 3 Dec 2018, at 4:28 pm, s22 s22 @environment.gov.au> wrote:

Hi Dominic and Graham

Following on from the meeting this morning to discuss the Emissions Reduction Assurance Committee's findings from its review of the HIR and NFMR methods, I wanted to check your availability to discuss findings relating to the NFMR method with committee members. They would be happy to discuss the issues summarised in the slides circulated this morning (thanks for dialling in Graham), and the review more broadly.

Are you available any time this week?

Regards

s22

From: s22
Sent: Thursday, 29 November 2018 5:30 PM
To: 'Dominic Devine' <dominic.devine@leichardt.com.au>; Graham Kenny <graham.kenny@leichardt.com.au>
Cc: Katrina Maguire <Katrina.Maguire@environment.gov.au>
Subject: HIR/NFMR review meeting - suggested further discussion [SEC=UNCLASSIFIED]

Hi Dominic and Graham

Thanks for letting us know you will be able to dial in to the Emissions Reduction Assurance Committee's briefing on findings of its review of the Human-Induced Regeneration and Native Forest from Managed Regrowth methods on Monday 3 December.

The Committee Chair, Andrew Macintosh, has also asked me to contact you to suggest a separate discussion with you on findings specific to the NFMR method. Would you be able to indicate a time that would suit you, either later on Monday or on another day?

You are also welcome to dial in for the discussion on Monday about the review's broader findings.

Regards

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

From: Graham Kenny [mailto:graham.kenny@leichardt.com.au]
Sent: Monday, 26 November 2018 10:01 AM
To: Emissions Reduction Assurance Committee <ERAC@environment.gov.au>
Subject: RE: HIR/NFMR review meeting invitation [SEC=UNCLASSIFIED]

Good morning,

Dominic Devine and I will participate via teleconference.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 27, 32 Turbot Street, Brisbane Qld 4000

From: Emissions Reduction Assurance Committee <ERAC@environment.gov.au>
Sent: Thursday, 22 November 2018 3:22 PM

Cc: Emissions Reduction Assurance Committee <ERAC@environment.gov.au>
Subject: HIR/NFMR review meeting invitation [SEC=UNCLASSIFIED]

Dear all,

On behalf of the Emissions Reduction Assurance Committee, we would like to invite you to a meeting on the HIR and NFMR method review. At the meeting, the Committee will share the main findings of their review with you, ahead of finalising the review report and providing it to the Minister for the Environment.

The meeting details are as follows.

- Date and time: Monday 3 December, 9.30am-12pm.
- Location: Department of the Environment and Energy, John Gorton Building, King Edward Terrace, Parkes, Canberra.
- For those unable to attend in person, you may participate via teleconference (dial-in number: 1800 047 396; participant passcode: 716464).

Could you please let us know by Tuesday 27 November if you would like to attend.

Please note also that the Clean Energy Regulator would like to discuss some administrative matters with you on the afternoon of Monday 3 December, and will issue a separate invitation.

Kind regards,

s22
Director
Emissions Reduction Fund Governance and Policy
Department of the Environment and Energy | Australian Government
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GPO Box 787, Canberra ACT 2601

FOI 190318
Document 25

s22

From: s22
Sent: Friday, 21 December 2018 9:13 AM
To: Dominic Devine; 'Graham Kenny'
Cc: 'Andrew Macintosh'; Hilary Smith; Beverley Henry; mjkeogh@s22; Katrina Maguire; s22 s22 s22
Subject: Native forest from managed regrowth method: meeting notes and next steps [SEC=UNCLASSIFIED]
Attachments: Consultation_ERAC_Devine Agribusiness_ 11Dec2018_Notes.docx; CSIRO_Final report_Stand biomass and canopy cover_0818.pdf; Biomass to canopy cover report and data [SEC=UNCLASSIFIED]

Hi Dominic and Graham

Thank you for making the time to speak with the Emissions Reduction Assurance Committee members on 11 December.

As requested, the Department has prepared meeting notes for your reference. They aim to capture the main points discussed. Let me know if you have any questions or comments.

You asked the Department for any further information we had on the work done to assess the relationship between crown cover and biomass to inform the review of the methods. The CSIRO report on biomass to canopy cover (attached) and analysis conducted by s22 of the Queensland Department of Environment and Science (included in the attached email) were both shared with you in August. I can confirm this is the complete set of information the Department holds on this work. I have provided a short overview of this analysis below.

As discussed during the meeting last week, the ERAC would be happy to consider any information you would like to provide by early next year in relation to its concerns about the NFMR method. You can send information to me, and we'll forward it to ERAC members.

Overview of biomass to canopy cover analysis

CSIRO's analysis looked at the biomass to canopy cover relationship, and found regrowth contains on average 3.85 tonnes of carbon per hectare in the above and below ground biomass when forest cover is attained (minimum 20% canopy cover and 2 metres in height, with canopy cover being the later of these two thresholds typically reached). Please refer to Figure 8 in the CSIRO report on canopy cover, as well as Figure 9 for height. The 3.85 tonne figure is multiplied by an expansion factor of 1.43 to convert the figure for the above-and-below ground biomass to that covering both the trees and debris pools within FullCAM. NCAS: Review of Allometric Relationships for Estimating Woody Biomass has further information on this expansion factor. This converts 3.85 tonnes of carbon per hectare in trees to approximately 5.5 tonnes of carbon per hectare in the trees and debris pools.

s22 analysis of tree biomass, canopy cover and height suggests regrowth reaching 2.5 metres height and 25% canopy cover (above the 2 metre height / 20% canopy cover thresholds for forest cover as defined by the National Inventory) can be expected to have about 3.6 tonnes of carbon per hectare, after accounting for carbon in debris. See the second point beneath Figure 2 in the attached email.

s22 also reviewed the CSIRO analysis before it was finalised. The CSIRO report and s22 's work show the sources of the data they used. The species and regions they cover give good representation of regions with HIR and NFMR projects.

Using the results from these analyses, the Department has looked at the canopy cover to biomass relationship from another angle. We used FullCAM to model the time it would take regrowth to reach the

levels of biomass equating to 20% crown cover in the analyses. The results showed regrowth in regions with existing NFMR projects reaching 3.6-5.5 tonnes of carbon (trees and debris) per hectare after 8-11 years.

As I mentioned following your discussion with ERAC members last week, the Department would like to discuss next steps on the CFI Rule amendment with you. We would like to meet you to discuss this during the week commencing 7 January, with a view to starting public consultation on the amendment later in January. We are happy to come to Queensland, or to discuss by phone if you aren't able to meet in person. Could you please let me know when you might be available?

We'll look forward to speaking with you next year. Best wishes for Christmas and the new year.

Regards

s22
Director, Forests Section
Climate Change Division
Department of the Environment and Energy
T s22 M s22
s22 @environment.gov.au

FOI 190318
Document 25a

Emissions Reduction Assurance Committee's review of the Human-Induced Regeneration (HIR) and Native Forest for Managed Regrowth (NFMR) methods

Notes from teleconference, Tuesday, 11 December 2018

ERAC:
- Andrew Macintosh (Chair)
- Beverley Henry
- Hilary Smith

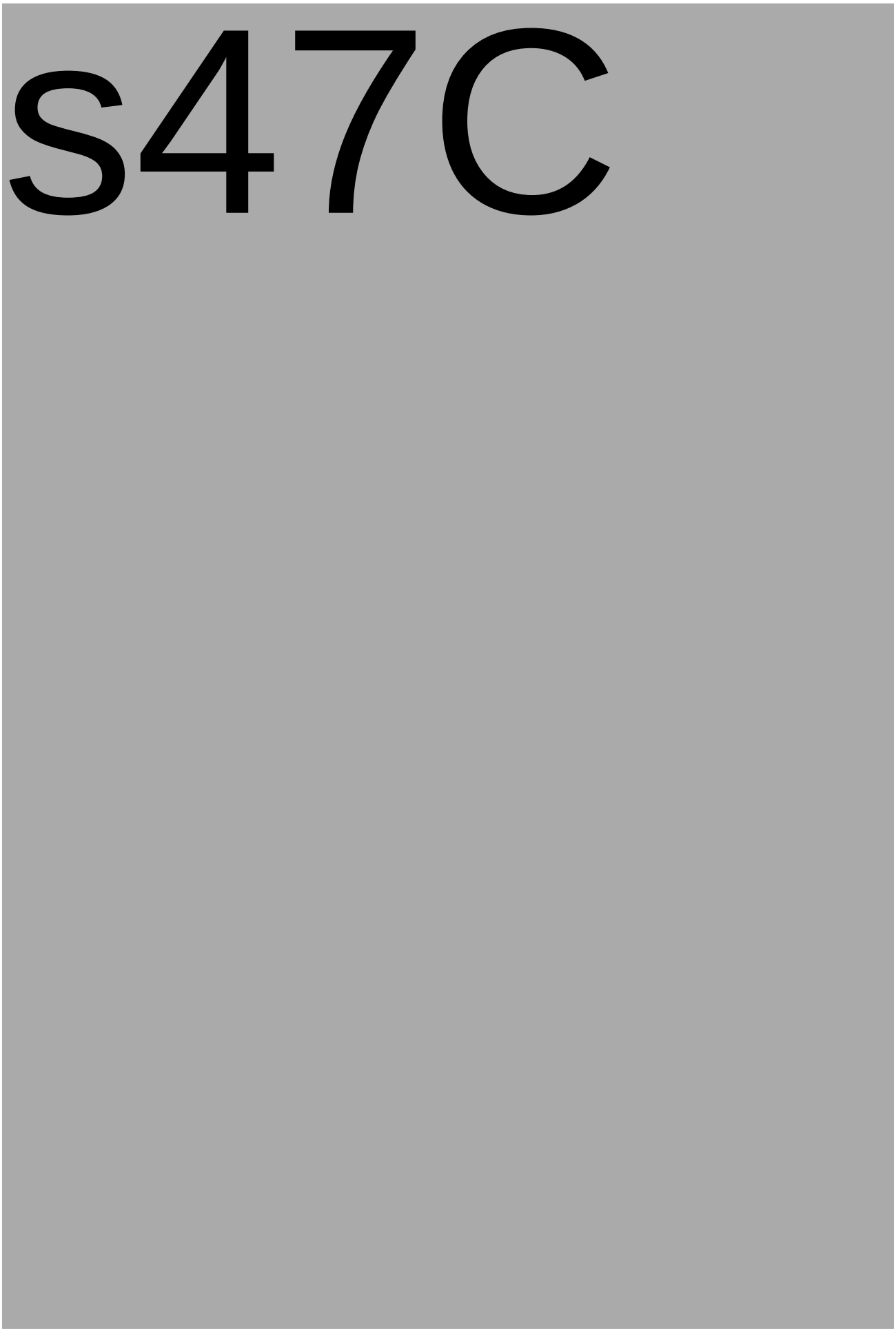
Department of the Environment and Energy:
- s22
- s22

Devine Agribusiness:
- Dominic Devine
- Graham Kenny

Purpose

Emissions Reduction Assurance Committee (ERAC) members discussed the findings and recommendations of the review of the HIR and NFMR methods with carbon service providers on 3 December 2018. The purpose of the teleconference was to discuss in more detail three concerns about the NFMR method outlined by the ERAC on 3 December, and offer Devine Agribusiness an opportunity to provide further evidence for the ERAC to consider in finalising its review report s47C

s47C


s47C

Next steps

1) Devine Agribusiness will consider other evidence they may be able to provide for the ERAC to consider in relation to aspects of the method it has concerns about.
2) The Department will check for any information on the CSIRO and Queensland Department of Environment and Science assessments of the relationship between crown cover and biomass not already provided to Devine Agribusiness, and forward on any additional information.

s22

From: s22
Sent: Friday, 25 January 2019 4:34 PM
To: Dominic Devine; 'Graham Kenny'
Cc: s22 ; s22
Subject: Proposed further CFI Rule amendment for regeneration projects [SEC=UNCLASSIFIED]
Attachments: Rule amendment 2019 draft.docx

Hi Dominic and Graham

As mentioned in my email on 21 December and discussed with Dominic today, we would like to discuss next steps on the CFI Rule amendment with you. We have prepared a new draft amendment that would apply the same requirements adopted in the amendment made last year for Human-Induced Regeneration projects, to Native Forest from Managed Regrowth projects. Those amendments require HIR projects to attain forest cover within a specified period to continue to obtain certificates of entitlement.

The Department is also proposing further additions to the rule to ensure that where HIR and NFMR project proponents have stratified in accordance with the Clean Energy Regulator's *Guidelines on stratification, evidence and records for projects under the Human-Induced Regeneration of a Permanent Even-Aged Native Forest and Native Forest from Managed Regrowth methods*, they are able to repeat the process used to identify forest for the assessment of forest cover attainment. The proposed changes are set out in the attachment and further explained below.

The Department and Regulator plan to hold a teleconference to discuss these proposed amendments on Tuesday, 29 January, from 1.00 to 2.00 pm AEDT. We are inviting carbon service providers for HIR and NFMR projects to participate. Dial in details are: phone 1800 047 396, participant code 716 464.

We can discuss the proposed changes separately with you, if you prefer. As mentioned previously, we are happy to come to Queensland to do this, or otherwise we can discuss over the phone. We would also welcome any comments you'd like to send by email.

Explanation of revisions

Section 9AA of the *Carbon Credits (Carbon Farming Initiative) Rule 2015* sets out requirements for the assessment of forest cover at each carbon estimation area's 'forest cover assessment date'. There are currently two methods of demonstrating forest cover in subsection 9AA(4), namely:

a) "over 90% of the area of the carbon estimation area is identified as having forest cover in accordance with the most recent version of the maps that form the basis of the National Inventory Report"; or
b) "when assessed in 0.2 hectare portions, over 90% of those portions have attained forest cover such that the land in each portion has trees that are 2 metres or more in height and provide crown cover of at least 20% of the land".

Subsection 9AA(5) requires the second method of assessment to meet requirements in the CFI Mapping Guidelines and take into account guidelines published by the Regulator.

The Department is considering whether the rule should be amended so that:

1. The first method could only be used if *the most recent version of the maps that form the basis of the National Inventory Report do not identify any pre-existing forest cover in the carbon estimation area taking into account any guidelines published by the Regulator on its website for the purpose of this subparagraph, as in force from time to time*. Essentially this means that the latest Inventory does not see pre-existing forest cover in the baseline period but now sees over 90% forest cover in the carbon estimation area. The amendments provide that relevant provisions of the Regulator's guidelines are taken into account when

applying this method to pre-existing forest cover, which could include instructions for interpreting the available Inventory maps for example.

2. Subsection 9AA(5) of the rule makes it explicit that the assessment of forest cover at the forest cover assessment date (the second method) must *use the same data sources and data processing approaches as are relied upon to demonstrate that the carbon estimation area does not have any pre-existing forest cover*. This is currently a matter to be dealt with in the Regulator's guidelines, but would now be included in the rule. It would ensure a consistent approach to excluding pre-existing forest and attaining forest cover is used. The amendments also provide that those sources and approaches *are approved by the Regulator on a list published on its website or are otherwise approved by the Regulator in writing*. For example, the Regulator may list a range of generally approved data sources and processes, but is also able to individually approve particular data sources and processes for individual projects or proponents where that is appropriate.

To support these changes, the definition of 'pre-existing forest cover' previously included in the consultation draft of the rule would be included in subsection 9AA(7). That definition is available here: http://www.environment.gov.au/climate-change/government/emissions-reduction-fund/consultation/erf-native-forest-regeneration and is in the attachment.

The wording of subparagraph 70(3A)(a)(v) has also been clarified as the word 'boundaries' was always intended to include the concept of 'stratification' as understood by the method.

To apply the various rules to NFMR projects, the term 'human-induced regeneration project' would be replaced with the simpler term 'regeneration project' and that defined to include both HIR and NFMR projects. This is then relevant to:

- Certificates of entitlement in s 9AA;
- Offsets reporting in s 70;
- Documents to accompany offsets reports in s 71; and
- Audits in s 79A.

Regards

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s22

From: Graham Kenny <graham.kenny@leichardt.com.au>
Sent: Sunday, 17 February 2019 10:48 AM
To: s22
Cc: Dominic Devine
Subject: RE: Proposed further CFI Rule amendment for regeneration projects [SEC=UNCLASSIFIED]

Hi s22 ,

I am just confirming that we have secured a meeting room at the venue advised below; Swiss Bel-Hotel, 218 Vulture Street, South Brisbane.

Also just want to confirm that we are working on 10am QLD time, which will be 11am Canberra time. Just let us know if you have any delays on the way up.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 27, 32 Turbot Street, Brisbane Qld 4000

From: Graham Kenny
Sent: Monday, 11 February 2019 5:03 PM
To: s22
Cc: Dominic Devine
Subject: RE: Proposed further CFI Rule amendment for regeneration projects [SEC=UNCLASSIFIED]

Hi s22 ,

Thanks for getting back to us. Let's make it a 10am start. Yes no problem for s22 to attend.

The tentative venue is Swiss Bel-Hotel, 218 Vulture Street, South Brisbane. We will organise a meeting room there.

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 27, 32 Turbot Street, Brisbane Qld 4000

From: s22 s22 @environment.gov.au>
Sent: Monday, 11 February 2019 3:16 PM

To: Graham Kenny <graham.kenny@leichardt.com.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>
Subject: RE: Proposed further CFI Rule amendment for regeneration projects [SEC=UNCLASSIFIED]

Hi Graham

Thanks for the offer. Monday would work for us. s22 and I can come. Would it suit you if we planned to start around 9.00 and allow up until lunchtime? If not, we'll work in with your availability.

Would you be comfortable for s22 from the Regulator to come as well, so we can talk about how the proposed rule changes tie in with the Regulator's guidelines?

Regards

s22

From: Graham Kenny [mailto:graham.kenny@leichardt.com.au]
Sent: Monday, 11 February 2019 9:36 AM
To: s22 s22 @environment.gov.au>
Cc: Dominic Devine <dominic.devine@leichardt.com.au>
Subject: RE: Proposed further CFI Rule amendment for regeneration projects [SEC=UNCLASSIFIED]

Hi s22 ,

Dominic will be in Brisbane next week and would like to know if you would be available to come up and meet with us, as suggested below, on Monday 18 February?

Regards

Graham Kenny
Devine Agribusiness Carbon Pty. Ltd.

graham.kenny@leichardt.com.au
T: 07 3226 7777
GPO Box 948, Brisbane Qld 4001
Level 27, 32 Turbot Street, Brisbane Qld 4000

From: s22 s22 @environment.gov.au>
Sent: Friday, 25 January 2019 3:34 PM
To: Dominic Devine <dominic.devine@leichardt.com.au>; Graham Kenny <graham.kenny@leichardt.com.au>
Cc: s22 s22 @environment.gov.au>; s22 s22 @ags.gov.au>
Subject: Proposed further CFI Rule amendment for regeneration projects [SEC=UNCLASSIFIED]

Hi Dominic and Graham

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The Department is also proposing further additions to the rule *to ensure that where HIR and NFMR project proponents have stratified in accordance with the Clean Energy Regulator's Guidelines on stratification, evidence and records for projects under the Human-Induced Regeneration of a Permanent Even-Aged Native Forest and Native*

Forest from Managed Regrowth methods, they are able to repeat the process used to identify forest for the assessment of forest cover attainment. The proposed changes are set out in the attachment and further explained below.

*The Department and Regulator plan to hold a teleconference to discuss these proposed amendments on Tuesday, 29 January, from 1.00 to 2.00 pm AEDT. We are inviting carbon service providers for HIR and NFMR projects to participate. Dial in details are: p*hone 1800 047 396, participant code 716 464.

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To support these changes, the definition of 'pre-existing forest cover' previously included in the consultation draft of the rule would be included in subsection 9AA(7). That definition is available here: http://www.environment.gov.au/climate-change/government/emissions-reduction-fund/consultation/erf-native-forest-regeneration and is in the attachment.

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To apply the various rules to NFMR projects, the term 'human-induced regeneration project' would be replaced with the simpler term 'regeneration project' and that defined to include both HIR and NFMR projects. This is then relevant to:

- Certificates of entitlement in s 9AA;
- Offsets reporting in s 70;
- Documents to accompany offsets reports in s 71; and
- Audits in s 79A.

Regards

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s42

FOI 190318
Document 29

s22

From: s22
Sent: Tuesday, 26 February 2019 5:41 PM
To: Dominic Devine; 'Graham Kenny'
Cc: Katrina Maguire; s22 ; s22
Subject: Proposed CFI Rule amendments - follow up to last week's discussions [SEC=UNCLASSIFIED]

Hi Dominic and Graham

Thanks for meeting s22 , s22 and me in Brisbane on 18 February and for the phone call with Katrina and me on 19 February to discuss the proposed changes to the CFI Rule. From our perspective it was useful to talk through how the proposed changes to the Rule, together with the Clean Energy Regulator's guidelines, would apply to your Native Forest from Managed Regrowth projects.

We understand your concerns about the proposed changes to the Rule centre on the effects the changes would have on business certainty for you and your clients and investors. Thanks also for forwarding Katrina a copy of your letter to the Minister today, and apologies for the time taken to get back to you on the main concerns you raised last week. We thought it would still be useful to send you our responses to those concerns.

Time to attain forest cover

Based on the discussions last week, we understand one of your main concerns is about the additional assessment tasks, and associated costs, involved with the proposed requirement to demonstrate forest cover 15 years after the project declaration date.

47G

Analysis we have discussed previously with you indicates regenerating vegetation typically attains forest cover in the regions where projects are located when the biomass reaches five tonnes of carbon per hectare in the tree and debris pools. FullCAM estimates for these regions show this level is reached within 15 years. Under the Rule, existing projects would be allowed 15 years from project declaration, in addition to the preceding period from commencement of modelling of regeneration, to reach forest cover. 47G

The proposed Rule also allows extra time, where appropriate, to take into account eligible growth disturbances or situations where slow growth results in vegetation not reaching 5 tonnes of carbon per hectare within 15 years.

Assessing forest cover

The other main concern you raised last week is the proposed requirement to use consistent data sources and data processing approaches for excluding pre-existing forest cover and assessing attainment of forest cover for all regeneration projects.

47G

The National Inventory Report mapping is continuously improved, and can be expected to provide for robust assessment of forest cover attainment by the time the assessment dates are reached. Where the latest mapping

shows that areas identified as forest and excluded on the basis of earlier mapping did not actually have forest cover at the time, those areas could be included as eligible land in carbon estimation areas and generate credits if they have subsequently attained forest cover.

In addition to improving consistency of assessment over time, the Rule already provides flexibility in the requirements for demonstrating attainment of forest cover, by allowing carbon estimation areas to be accepted as meeting the requirement if over 90 per cent of their area shows forest cover.

During our meeting last week we undertook to get back to you about two other concerns you raised.

Reference to other instruments as in force from time to time

The first of these concerns was that the proposed new subparagraph 9AA(4)(a)(ii) providing for reference to guidelines published by the Regulator from time to time creates uncertainty by allowing for the guidelines to be changed over time. As explained in Item 3 in Attachment A of the explanatory statement for the previous and new Rule amendment, this provision is in line with section 304 of the CFI Act.

Audits

The second concern was about the provision in section 79A of the Rule for an audit of a regeneration project that has passed the forest cover assessment date. An audit would not be required if forest cover has already been attained or where the Regulator agrees it is unnecessary. You would be able to initiate revisions to your audit schedules with the Regulator to align timing with forest cover assessment dates, to avoid a need for an additional audit.

The Department has taken recent discussions and consultation over the last few months with you and Human-Induced Regeneration project proponents into account in developing the proposed changes to the Rule. Our recommendations to the Minister on releasing the further Rule changes for public consultation reflect the version we showed you last week. These proposed changes are designed to apply a consistent and equitable approach across the Native Forest from Managed Regrowth and Human-Induced Regeneration methods. We will consider all submissions before making any further recommendations to the Minister. We would be happy to work with you on any communications with your clients, banks and others to explain the proposed changes and respond to any concerns they may have.

Regards

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FOI 190318
Document 30

s22

From: s22
Sent: Thursday, 28 February 2019 9:18 AM
To: Dominic Devine; 'Graham Kenny'
Subject: Consultation on amendments to Emissions Reduction Fund rules for native forest regeneration projects [SEC=UNCLASSIFIED]

Hi Dominic and Graham

I am writing on behalf of the Department of the Environment and Energy, to invite you to comment on proposed amendments to the *Carbon Credits (Carbon Farming Initiative) Rule 2015.*

The proposed amendments apply to the *Carbon Credits (Carbon Farming Initiative) (Human-Induced Regeneration of a Permanent Even-Aged Native Forest—1.1) Methodology Determination 2013* and the *Carbon Credits (Carbon Farming Initiative) (Native Forest from Managed Regrowth) Methodology Determination 2013*. These proposed amendments link to the amendments made in November 2018.

This public consultation follows our recent preliminary discussions with you and others about the proposed amendments. The details of the proposed amendments are the same as those we showed you last week.

The exposure draft amendment rule, a document showing how the amendments would be incorporated, and the draft explanatory statement are available at: https://www.environment.gov.au/climate-change/government/emissions-reduction-fund/consultation

Comments are invited by Thursday 14 March 2019. Information on how to make a submission is available at the above web address. We would welcome your comments and are happy to discuss the proposed amendments with you. Please feel free to contact me if you would like to discuss them.

Regards

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