



Land Use Opportunities for Aotearoa

GUIDANCE DOCUMENT

SCION

ETS
Post-1989
Forest Standard Carbon Tables

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ETS Post-1989 Forest Standard Carbon Tables

IMPORTANT NOTE

This brief overview does not provide a complete guide for landowners wanting to claim “carbon credits” through the New Zealand Emissions Trading Scheme (ETS). The system is complex and there are detailed rules covering:

- Which land and trees can and cannot be entered.
- How forest area is defined and measured.
- How carbon credits are calculated.
- The legal obligations that ETS participants have.

Readers should consult the detailed information available from the Ministry for Primary Industries (MPI):

<https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/>

Guidance from people who have had direct experience with forests in the ETS is strongly recommended.

The purpose of this overview is to describe the use of the ETS Standard Carbon Tables (sometimes referred to as the “ETS Lookup tables”) for eligible post-1989 forests. Changes are made from time to time to these tables and the way they are used – for this reason, the best sources of up-to-date information are:

- the MPI website (<https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/>), and
- the ETS forestry Regulations themselves (search for “Climate Change (Forestry) Regulations 2022” on <https://legislation.govt.nz/>).

KEY POINTS

- ETS ‘Carbon credits’ or NZUs are awarded for increases in the carbon stock (i.e. sequestration) in eligible post-1989 forests. NZUs can be sold in the carbon market to generate income for the landowner.
- NZUs may need to be returned if the forest carbon stock decreases, so the forest owner may need to retain some NZUs or buy them in the carbon market.
- There are two approaches for calculating sequestration (and therefore NZUs earned). One is for owners with more than 100 ha of forest registered in the ETS and the other is for owners with less than 100 ha. There are also two accounting methods – stock change and averaging accounting.
- The Standard Carbon Tables are used with both accounting methods, but only for owners with less than 100 ha. By definition, they provide an accurate assessment of the NZUs that will be earned. When combined with projections of future carbon price they provide an estimate of future revenue.
- The Standard Carbon Tables are not used for forest owners with more than 100 ha registered in the ETS. Instead these owners must create a Participant-Specific Carbon Table by measuring and re-measuring trees over time. The Standard Carbon Tables are not a reliable estimate of NZUs likely to be earned by owners with over 100 ha.

CONCEPTS AND DEFINITIONS

- The amount of carbon in a forest at a point of time is the carbon **stock**.
- Increases in this stock due to photosynthesis and tree growth is carbon **sequestration**. This is sometimes referred to as **removals** because carbon dioxide is removed from the atmosphere and stored in trees.
- Carbon can be lost from a forest due to decay, burning or being physically taken from the site (for example, harvesting logs). The loss is referred to as an **emission**.
- If annual sequestration is greater than emissions, the forest carbon stock increases and the forest is considered to be a net carbon **sink**.
- If annual sequestration is lower than emissions, the forest carbon stock decreases and the forest is a net carbon **source**.
- If annual sequestration and emissions are balanced, the forest carbon stock is neither increasing nor decreasing and the forest is said to be carbon **neutral**.
- Carbon reward schemes are based on rewarding the removal of carbon from the atmosphere – that is, carbon sequestration, an increase in carbon stored in the forest. ETS ‘carbon credits’ or **NZUs** are awarded at the rate of 1 NZU for every 1 tonne of carbon dioxide taken out of the atmosphere and stored by growing trees.
- The ETS does not reward a forest that is carbon neutral, and if the carbon stock in the forest decreases, forest owners may have to return or surrender NZUs.
- Financial rewards are earned by selling NZUs on the carbon market. Forest owners can also buy NZUs should they ever need to surrender NZUs without having kept enough in reserve.
- There are also direct costs involved in registering and participating in the ETS. Fees were updated in January 2023.

Changes to the New Zealand Emissions Trading Scheme legislation

The ETS is governed by the **Climate Change Response Act 2002**, with forestry aspects initially defined in the Climate Change (Forestry Sector) Regulations 2008, now replaced by the **Climate Change (Forestry) Regulations 2022** and the **Climate Change (Forestry) Amendment Regulations 2022** (which updates the fees).

For example, the default Standard Carbon Tables for eligible post-1989 forests are defined in Schedule 4, Tables 1 and 2 of the **Climate Change (Forestry) Regulations 2022** (search for “Climate Change (Forestry) Regulations 2022” on <https://legislation.govt.nz/>).

Further guidance on all aspects of the system can be found on the MPI website (<https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/>),

Note that recent changes made to the ETS may not be covered by older guides or described accurately by other information sources.

Two approaches for calculating sequestration in post-1989 forests

There are two approaches for calculating sequestration, which determines the quantity of NZUs that will be earned. Both approaches involve calculating sequestration as the difference between forest carbon stock estimates at two different ages, taken from a table of carbon stocks by age. The difference is in the source of the carbon tables, which depends on whether the forest owner has more or less than 100 ha registered in the ETS.

1. ETS participants with more than 100 ha of registered forest

These forest owners must apply the Field Measurement Approach (FMA), which involves measuring and re-measuring a sample of trees in the forest over time and using the data to create a Participant-Specific Carbon Table. Sequestration is calculated from this table as the difference between carbon stocks at different ages.

This approach provides relatively accurate estimates of the sequestration that has actually taken place and is likely in future but is more expensive for the forest owner to apply, has more uncertain future outcomes as forests may not grow as expected, and is more expensive to monitor and verify.

2. ETS participants with less than 100 ha of registered forest

These forest owners are not required to measure their trees. Instead they must calculate sequestration from the default Standard Carbon Tables defined in the Regulations. These tables define exactly how many units the owner will be awarded through time, no matter how well or poorly their forest grows (as long as it continues to meet the ETS eligibility requirements and does not suffer from a major disturbance).

This is cheaper for the forest owner and provides more certainty but may not capture the true amount of sequestration being achieved by the forest.

Two accounting approaches for post-1989 forests

There are now two accounting approaches which determine how much of the calculated sequestration is rewarded. These accounting approaches apply to all forest owners regardless of the area they have registered.

1. Stock Change accounting

Stock Change accounting is the original approach, which was mandatory for new registrations before 2021 and optional for 2021-2022 registrations. Since 1 January 2023 it is only available for the new ETS Permanent Forest category.

Under stock change accounting, forest owners are rewarded with NZUs as the forest grows and the carbon stock increases but must surrender units if the carbon stock decreases (for example, when the trees are harvested). As replanted trees grow, owners can start to claim NZUs again.

2. Averaging accounting

Averaging accounting is mandatory for new registrations from 1 January 2023, unless the forest is registered in the ETS Permanent Forest category in which case stock change accounting is applied.

Under averaging accounting, NZUs are rewarded for carbon sequestration during the first rotation only up until the point that the long-term average carbon stock is considered to have been reached. This is called the “average age” and is defined in the Regulations for the five forest types recognised in the ETS (Table 1). No further NZUs are earned after that point and no NZUs need to be surrendered when the forest is harvested as long as it is replanted.

Table 1. Average ages recognised under Averaging Accounting

Forest type	Examples	Average age
Radiata pine		16
Douglas-fir		26
Other exotic softwoods	Cypress (e.g. macrocarpa), redwood, cedar, fir, other pines.	22
Exotic hardwoods	Eucalypts, poplars, willows, oaks, alder, acacia, paulownia	12
Indigenous (native) forest	Regenerating native bush, plantations of kauri, tōtara, pūriri, mānuka.	23

For example, a new radiata pine forest will earn NZUs from the time it is planted to age 16, then no further NZUs will be earned. For owners with more than 100 ha, NZUs will be calculated up to age 16 based on the Participant-Specific Carbon Table derived from their plot measurements, while for participants with less than 100 ha their NZU entitlement will instead be calculated up to age 16 based on the default Standard Carbon Tables.

See: <https://www.mpi.govt.nz/forestry/forestry-in-the-emissions-trading-scheme/emissions-returns-and-carbon-units-nzus-for-forestry/accounting-for-carbon-in-the-ets/averaging-accounting/>

Default Standard Carbon Tables

The default Standard Carbon Tables for forest owners with less than 100 ha of eligible post-1989 forests are defined in Schedule 4 of the **Climate Change (Forestry) Regulations 2022**:

- **Schedule 4, Table 1** provides carbon stock per hectare by age for radiata pine by region. These regions are defined in Schedule 1 of the regulations in terms of local government boundaries existing before 1 January 1990.
- **Schedule 4, Table 2** provides national carbon stock per hectare values for the other forest types: Douglas-fir, Other exotic softwoods, Exotic hardwoods and Indigenous Forest.
- Tables 1 and 2 are used for both the Stock Change and Averaging Accounting approaches.
- **Schedule 4, Tables 3** (radiata pine) and 4 (other types) provide information used to initialise post-harvest residues given different harvest ages. These tables are only used for stock change accounting when clearfell harvesting occurs. The assumption made in the ETS is that these post-harvest residues will decay at a constant rate in the ten years following harvesting. This decline in carbon stock is increasingly offset over time by the gain due to the growth of replanted seedlings. Under averaging accounting these tables are not required, as there is no liability associated with harvest and no credit for sequestration by the next rotation. If a forest is permanently cleared, the full liability is incurred at the time of clearance, so these tables are not required.

How well do the Standard Carbon Tables reflect actual forest sequestration?

The Standard Carbon Tables are designed for a specific purpose – to incentivise planting of new forests as part of New Zealand’s climate change mitigation response, while meeting other government objectives. These tables are not used by New Zealand for international reporting under the United Nations Framework Convention on Climate Change (UNFCCC) or the Paris Agreement. For that purpose, New Zealand uses the LUCAS national forest inventory plot network, and also accounts for other carbon stock changes associated with afforestation that are not included in the ETS, such as soil carbon change.

Ideally the Standard Carbon Tables would accurately represent the actual sequestration achieved but this is impossible to determine in advance without knowing where forests will be planted, which species will be used, how forests will be managed, how climate change and other events will affect growth, among other factors. Even if the average sequestration rates achieved match the tables, there would still be winners and losers – owners with badly managed, poorly performing forests will be over-compensated, while owners with well managed forests on ideal sites will receive fewer NZUs than their true sequestration warrants. This is an inevitable consequence of the trade-off between cost and accuracy when using a default table approach.

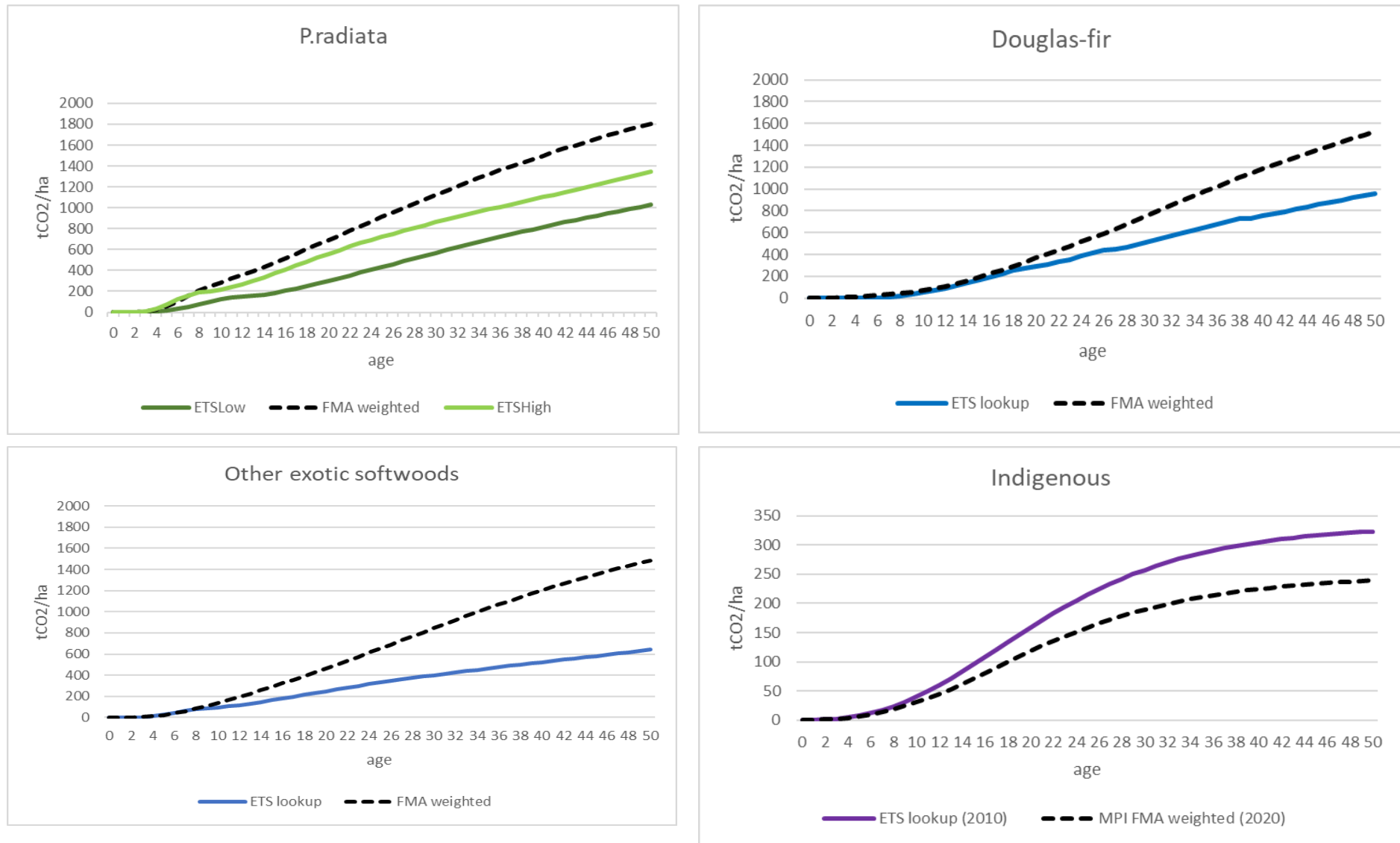
It would not be practical to develop lookup tables for every combination of tree species, site quality, local climate and management practice (e.g. stocking), and it is not currently possible to accurately and cheaply measure carbon stock change using remote sensing methods.

In Figure 1, four of the five Standard Carbon Tables (carbon stock by age) are compared with an equivalent weighted table released by MPI based on data from Field Measurement Approach. The exotic species Standard Carbon Tables appear to under-estimate the average sequestration achieved while the opposite is true for indigenous forest.

For radiata pine, the best and worst regional default ETS tables are compared with the weighted FMA table. MFE used LUCAS plot data to derive a post-1989 ‘all planted forests’ carbon table, published in the Annex to the 1990-2020 greenhouse gas inventory. This is very similar to the radiata pine weighted FMA table.

Caveats for this comparison are that ETS forest area and FMA data are limited for species other than radiata pine (details of the species mix, locations and number of FMA plots were not released), and these weighted tables are for the subset of forests owned by participants with more than 100 ha who believed their forests were growing well enough to justify the cost of installing plots. It should also be remembered that there are hundreds of tree species that qualify as exotic softwoods and hardwoods or indigenous tree species, and the few selected for afforestation and ETS registration could be expected to perform significantly better than the average.

Figure 1. Comparison of Standard Carbon Tables with Field Measurement Approach estimates



Source: FMA weighted carbon tables released in Microsoft Excel file on <https://www.mpi.govt.nz/consultations/managing-exotic-afforestation-incentives> (Exotic hardwood table from FMA data was similar to the ETS Standard Carbon Table)