



## TĀNE'S TREE TRUST CARBON CALCULATOR

*Written by Mark Kimberley and David Bergin*

Global warming will affect us all and we will need to make changes to our lifestyles to reduce our carbon footprints. We can reduce CO<sub>2</sub> emissions by using less electricity, reducing air travel, increasing our use of public transport, and recycling. But we can also directly remove CO<sub>2</sub> from the atmosphere by planting trees. Trees tie up large amounts of carbon in their stems, roots and branches as they grow, and this remains safely locked in place while the trees remain standing. Forests can be established using both exotic and native tree species, but there is increasing interest in planting native trees for their environmental, social and cultural benefits as well as their potential to store carbon.

Tāne's Tree Trust (TTT) recently launched a National Carbon Calculator for Planted New Zealand Native Forests. This tool allows users to work out how much CO<sub>2</sub> can be removed from the atmosphere by planting native trees. It can also estimate how many native shrubs and trees are required to offset the carbon footprint for specific activities. Note, that TTT Carbon Calculator can currently only be used for planted trees and shrubs rather than naturally regenerating native forest.

### **TTT Planted Native Forest Database**

The TTT Carbon Calculator for planted natives was developed from the TTT Native Forest Plantation Database. TTT has surveyed growth data from native tree plantations throughout the country and now has the largest growth database for planted native forest, containing measurement data collected from lowland coastal sites to inland sites over 500m above sea level.

The stands cover both tall tree species and shrub plantings. While most of the tree plantations were of a single species, virtually all shrub and small tree plantings consisted of a mixture of species. Almost 10,000 planted trees and shrubs in over 120 stands were measured during the survey. Ages ranged from 3-110 years with most stands less than 50 years of age. Stand density averaged 1900 stems/ha for high forest trees and 3500 stems/ha for shrubs and small trees which are often used as a nurse for establishing an initial cover on open sites.

### **Estimating carbon sequestration in planted native forests**

The tree measurements were used to develop growth models to determine typical growth rates of commonly planted New Zealand native tree and shrub species. Carbon sequestration rates were determined by applying equations for predicting carbon in native trees and shrubs developed by Scion for the Ministry of the Environment using measurements from felled or fallen trees mostly from old-growth natural forest stands. These equations predict the carbon stored in a tree from its diameter and height.

### **Shrub nurse species vs tree species**

Unlike most exotic plantation forestry which is normally dominated by a single planted species, native forest is typically established using a mixture of shrubs and trees. A nurse cover of fast-growing, hardy, early pioneer shrub species provides inter-planted trees like kauri, totara, rimu, puriri and rewarewa with side shelter during the establishment phase, which helps boost survival, and early growth, and improves lower stem form.

Because of their initially faster growth rate, shrubs and small trees contribute substantially to early carbon sequestration, as the tree species become established. The Carbon Calculator provides a default setting of 3:1 for the ratio of shrubs to trees but allows users to override this and select their own proportion of shrubs and trees.

### **TTT Planted Forestry Toolkit**

The Carbon Calculator is one of a suite of calculators and tools being developed by TTT for planted native forest with funding from the Ministry for Primary Industries' Sustainable Management Fund, co-funding from The Tindall Foundation as part of the Our Forests Our Future programme managed by Tāne's Tree Trust, and support from Project Crimson's Trees That Count. Other calculators include a planting and budgeting calculator, growth and yield calculator from the planted native forest database, and an economics calculator for planted natives. These will be available as they are completed on the TTT website over the next 12 months.

## How to use the Calculator

The Carbon calculator allows users to work out how much CO<sub>2</sub> is removed from the atmosphere by planted native trees and shrubs over a defined period of time or determine how many shrubs and trees are needed to off-set the carbon footprint of selected activities. The following three option buttons are available:

How many native trees are required to offset emissions from common activities?

How many native trees are required to offset my CO<sub>2</sub> emissions?

How much CO<sub>2</sub> will my planted native trees remove from the atmosphere?

## *Offsetting your carbon footprint*

The Calculator can determine how many trees and shrubs are required to offset a specified level of CO<sub>2</sub> emissions. There are various websites available for estimating carbon emissions. These include household calculators for quantifying greenhouse gas emissions from domestic activities, travel and tourism calculators for domestic and overseas air travel, accommodation and recreational activities, and more comprehensive calculators for businesses which estimate emissions and offer management plans to reduce them.

The TTT Carbon Calculator can also provide emissions for various common activities and determine how many native trees are required to offset them. For example, the Calculator can estimate the number of native trees and shrubs required to be planted per year to offset the annual emissions from use of a car, to offset emissions for internal or overseas travel, or to cover the annual emissions of a typical household.

## *Calculating carbon sequestration from a measured stand*

Landowners can also calculate how much CO<sub>2</sub> will be removed from the atmosphere by their planted native stands. To do this they will need to know the number of planted trees and shrubs in the stand, and its age. The Calculator will estimate CO<sub>2</sub> removals based on national average growth rates. The Calculator also allows users to estimate the CO<sub>2</sub> removals of an actual planted stand based on a measurement of diameters and heights. The Calculator can also be used to predict removals of CO<sub>2</sub> by the stand into the future.

For more information and to access the Tāne's Tree Trust National Carbon Calculator for Planted Native Forests, go to this link on the TTT website: <https://www.tanestrees.org.nz/resource-centre/carbon-calculator/>





# TĀNE'S TREE TRUST AGM & FIELD DAY - NOVEMBER 2020

*Written by Gerard Horgan & Ian Brennan*

Friday 13 November 2020 turned out to be a 'Goldilocks day' – not too hot, not too cold in fact just right for the site visit by approximately 40 people to Cassie's Farm – Ian and Trisha Brennan's 88-hectare property near Cambridge. Trisha runs an equestrian training business on the property while Ian, when not organizing the planting and care of his new native forests, runs a dry stock grazing operation. Our thanks go to both for hosting the visit, which was held in conjunction with the Tāne's Tree Trust (TTT) Annual General Meeting.

Cassie's Farm lies along the Te Miro crest and overlooks Cambridge. The farm's main race runs more or less along the ridge line with the area of the farm east of the race draining into the Waihou River (and ultimately the Hauraki Gulf). The six gullies on the west drain of the farm into the Waikato (and eventually the Tasman sea), and over the last 10 years Ian and Trisha have planted virtually all these headwaters into native species - with only two small gullies remaining to be planted in 2021.

In the last year, the farm's tracks have been extensively upgraded, so there was no difficulty in getting vehicles around the property to the three sites visited. The first of these was to the initial planting on the farm at the headwaters of the Topehaehae Stream. This planting was done in 2012 – so it is now 8 years old.

This second site was a large area planted over last winter (2020). Kahikatea and rimu were planted in a central flat portion of this area and totara (at 4m spacing) with a manuka nurse crop on the slopes above the road. The third area consisted of about half an acre of 11-year-old totara and kanuka surrounded by 3 hectares of totara with 3:1 mixed nurse crop planted in 2016 – and we walked into this area from the impressive quarry that supplied the metal for the upgraded tracks. The quarry is impressive not just for how tidy it is but for the care taken with bunding to control and minimize erosion and runoff during storms.

Each area visited had a story to tell. The first visited – the Topehaehae Stream headwaters – was where Ian first began with budget plants (the cheapest he could get) in the winter of 2012. Quality of the planting stock was variable and many of the trees planted died in the drought that occurred in the following summer. So, 2013 saw a replanting/infilling effort. In discussing the planting Ian said he learnt a lot of lessons but perhaps the two most important were the importance of quality planting stock and the need to plan to ensure that what has been planted survives. The area encompassed by this planting includes a couple of ponds that are rapidly infilling with raupo and will become permanent wetlands.

The second site visited was planted in the winter of 2020 – so is the latest area of the farm to have been planted. Quality stock has been used and professional contract planters to plant it. David Bergin led a discussion at this site about the

importance of measuring and monitoring. The discussion was highly relevant and timely for several reasons. We'd just come from a site where a number of trees had died in the first year after planting; the site we were at is part of the 'Trees that Count' programme – and while it's great to know just how many native trees have been planted in the last year the really important long term impact of those plantings in terms of sequestering carbon, adding to biodiversity and enhancing the environment is going to depend not on the number of trees planted but on the number that survive and flourish. Issues briefly covered included establishment of sample plots and the need to ensure enough of these provide a true representation of a site – so not just picking the best or the worst area or the area with easy access – use of GPS to ensure monitoring/measuring of the same sample plot through time and how measurements of planted trees in permanent sample plots contribute to the development and ongoing enhancement of TTT's growth and carbon sequestration models for native forestry.

Most of the totara on the third site visited are now four/five years old and near complete cover has been achieved. Discussion at this site invariably turned to questions of silviculture - of form pruning, thinning of the inter-planted trees, or the trimming or removal of the nurse crop (manuka and kanuka) and when, or whether, work was required. Opinions varied, and the discussion could have gone on for some time but after three sites and a remarkably interesting two and a half hours there was a fourth site and activity calling - the QEII covenanted native block and lunch! It was a great, enjoyable, and educational day made even more interesting by the fact it was being filmed by a team from Pure Advantage as part of the O Tātou Ngāhere (Our Forest) project launching in the coming months.



# OUR FOREST, OUR FUTURE UPDATE

*Written by Warwick Silvester*

Tasked with the job of writing a piece on the contribution of phase three Our Forests Our Future (OFOF), I decided it was opportune to recast the task to provide an overview of both the general and specific ways in which OFOF has enriched and catalysed the total output of TTT over the past few years.

First a bit of history. OFOF funding has been provided by The Tindall Foundation. Firstly, phase one, as a small start up fund to allow us to put together a plan of action. Secondly, phase two was funded, in response to a developed programme of four carefully focussed projects areas. This three-year project allowed us to widen our reach and develop partnerships and accumulate large amounts of data. Phase three, concluding this year, foreshadowed a large expansion of activity bringing in collaborations and funding partners who, recognising our capability would seek our expertise. The requirement of funding agencies, specifically Te Uru Rākau (TUR) Billion Tree Fund, the Ministry for Primary Industries' Sustainable Farming Fund (SFF) and the Department of Conservation (DOC) for us to provide both co-funding and in-kind contributions have been more than met by the availability of OFOF funding which has catalysed an enormous expansion of our reach into many areas of native forest research and advocacy. One important way in which OFOF funds have helped has been in providing the overhead that any organisation needs to deliver reliable

administration. Our trustees are all volunteers who give their time freely, but we do have a small and amazingly effective administration team. When we bid for funds our overhead costs are minimal. We do value our admin team enormously.

So as phase three concludes in a few months' time it is opportune to add up the outputs that OFOF has made possible, and in particular to consider the amplification of activity that OFOF has generated. The funds that OFOF has provided have done three things for us. Firstly, the projects funded and the work we have conducted have provided national credibility in native forest management such that we are consulted by a large number of local and national organisations. Secondly the funding has been used to directly fund specific projects. But finally, and most importantly our base OFOF funding has co-funded and supported directly and indirectly a wide range of additional projects.

The OFOF funding over the last three years has underwritten a wide variety of projects but more importantly OFOF co-funding has directly enabled five major projects to be obtained resulting in a doubling of those funds. Over and above that 12 other projects have been funded such that the total TTT projects funded over the past three years have resulted in a fourfold increase in the investment made by OFOF.

The funding is one thing, but it is the many and varied outputs from the team that add up to our success. To name just a few that are completed or in progress.

- A suite of calculators as part of the TTT toolkit project that includes the recently launched carbon calculator for planted native forests, and the soon to be released planting and budgeting calculator for planting natives, a growth and yield calculator, and the economics of native forest calculator that will follow
- The Tōtara Industry Pilot project (TIP) which determined the business case for a regional industry based on sustainable management of farm-tōtara.
- The many demonstration sites where best practice is displayed across multiple sites from Northland to Southland.
- Demonstration of best-practice harvesting of tōtara forests using Continuous Cover Forestry principles, and timber testing.
- A factsheet series on best practice establishment and management of native forest.
- Remeasurement of Permanent Sample Plots in managed regenerating totara forest for the Northland Totara Working Group.
- An in-depth analysis of the non-timber values of native forest.
- Development of a series of videos on the practice of establishing native forest.
- A guide to the establishment and management of tōtara on private land.
- A comprehensive range of illustrated fact sheets for TUR's Billion Tree Programme on establishing native forests.
- Consultation with many local and regional bodies including iwi and more recently with the Climate Change Commission.

**OFOF has been the catalyst to generate this prodigious output by a group of dedicated volunteers and researchers committed to seeing *"the majority of New Zealand landowners successfully planting and sustainably managing indigenous trees for multiple uses"*.**

**Take a look online to see a wide range of activities we have been able to fund and report on [www.tanestrees.org.nz](http://www.tanestrees.org.nz)**

## **DONATIONS: A note from the Treasurer**

All members should be aware that all donations, but not subscriptions, are eligible for a 33.33% tax rebate on your income tax. If required, we can send you a certificate of donation for you to submit to IRD with your tax return.

Please remember us in your bequests.

## **SUBSCRIPTIONS:**

Membership renewal notices are enclosed or being posted out if you receive your newsletter by email).

All new and renewed subscriptions entitle you to a range of free publications – go to [www.tanestrees.org.nz](http://www.tanestrees.org.nz) to order your copies.