



i-Tree

ECO Australia
Users Manual

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About i-Tree

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and community forestry analysis and benefits assessment tools. The i-Tree tools help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and assessing the structure of the urban forest.

i-Tree has been used by communities, non-profit organizations, consultants, volunteers, and students to report on the urban forest at all scales from individual trees to parcels, neighborhoods, cities, and entire states. By understanding the local, tangible ecosystem services that trees provide, i-Tree users can link urban forest management activities with environmental quality and community livability. Whether your interest is a single tree or an entire forest, i-Tree provides baseline data that you can use to demonstrate value and set priorities for more effective decision-making.

Developed by USDA Forest Service and numerous cooperators, i-Tree is in the public domain and available by request through the i-Tree website (www.itreetools.org). The Forest Service, Davey Tree Expert Company, the Arbor Day Foundation, Society of Municipal Arborists, the International Society of Arboriculture, and Casey Trees have entered into a cooperative partnership to further develop, disseminate, and provide technical support for the suite.

i-Tree Products

The i-Tree software suite v 5.0 includes the following urban forest analysis tools and utility programs.

i-Tree Eco provides a broad picture of the entire urban forest. It is designed to use field data from randomly located plots throughout a community along with local hourly air pollution and meteorological data to quantify urban forest structure, environmental effects, value to communities and energy.

i-Tree Streets focuses on the ecosystem services and structure of a municipality's street tree population. It makes use of a sample or complete inventory to quantify and put a dollar value on the trees' annual environmental and aesthetic benefits, including energy conservation, air quality improvement, carbon dioxide reduction, stormwater control, and property value increases.

i-Tree Hydro (Beta) is the first vegetation-specific urban hydrology model. It is designed to model the effects of changes in urban tree cover and impervious surfaces on hourly stream flows and water quality at the watershed level.

i-Tree Vue allows you to make use of freely available national land cover data maps to assess your community's land cover, including tree canopy, and some of the ecosystem services provided by your current urban forest. The effects of planting scenarios on future benefits can also be modeled.

i-Tree Species Selector is a free-standing utility designed to help urban foresters select the most appropriate tree species based on environmental function and geographic area.

i-Tree Storm helps you to assess widespread community damage in a simple, credible, and efficient manner immediately after a severe storm. It is adaptable to various community types and sizes and provides information on the time and funds needed to mitigate storm damage.

i-Tree Design (beta) is a simple online tool that provides a platform for assessments of individual trees at the parcel level. This tool links to Google Maps and allows you to see how tree selection, tree size, and placement around your home effects energy use and other benefits. This beta tool is the first stage in development of more sophisticated options that will be available in future versions.

i-Tree Canopy offers a quick and easy way to produce a statistically valid estimate of land cover types (e.g., tree cover) using aerial images available in Google Maps. The data can be used by urban forest managers to estimate tree canopy cover, set canopy goals, and track success; and to estimate inputs for use in i-Tree Hydro and elsewhere where land cover data are needed.

NB: All beta programs are still in development, therefore feedback is particularly appreciated.

Disclaimer

The use of trade, firm, or corporation names in this publication is solely for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture or the Forest Service of any product or service to the exclusion of others that may be suitable. The software distributed under the label "i-Tree Software Suite v. 5.0" is provided without warranty of any kind. Its use is governed by the End User License Agreement (EULA) to which the user agrees before installation.

Feedback

The i-Tree Development Team actively seeks feedback on any component of the project: the software suite itself, the manuals, or the process of development, dissemination, support, and refinement. Please send comments through any of the means listed on the i-Tree support page: enquiries@arboriculture.org.au

Acknowledgements

Australian Eco adaptation

An Australian-compatible version of the i-Tree Eco application was introduced at the 2011 ISA Conference in Parramatta, Australia. Australian users in New South Wales, Australian Capital Territory and Victoria now have the same easy access and automated processing as Eco users in the U.S.

In Version 5.0 all Australian pollution and weather data have been integrated into the Eco application eliminating the need to acquire local pollution data. Therefore, Eco results can typically be processed in a few hours after data is submitted. Though Eco is fully functional, and many former limitations have been overcome, there are some considerations Australian users need to be aware of---namely the fact that tree-building energy interactions are based on US parameters.

Craig Hallam and Chris Spencer of ENSPEC Environment and Risk part funded and coordinated efforts with the i-Tree Development Team to collect species, location, environmental and economic data to retool i-Tree Eco for Australia.

Stage 1. (Victoria ACT and New South Wales) Thanks go to the Melbourne Urban Forests Accord Group, Arboriculture Australia and City of Sydney who provided the additional support and funding for the pilot project.

Stage 2. (Queensland, Northern Territory, Western Australia, South Australia and Tasmania). Thanks goes to Nursery and Garden Industry Australia (NGIA), City of Brisbane who provided the additional support and funding for the bring Stage two (Version 5) project online.

Other contributors to Stage 1 and 2 where the City of Melbourne (Vic), City of Port Phillip (Vic), Moonee Valley City Council (Vic), City of Darwin (NT), Launceston City Council and City of Campbelltown (SA) for assisting in providing local data.

This manual was edited and designed by ENSPEC Pty. Ltd.

i-Tree Acknowledgments

Components of the i-Tree software suite have been developed over the last few decades by the USDA Forest Service and numerous cooperators. Support for the development and release of i-Tree v. 5.0 has come from USDA Forest Service Research, State and Private Forestry, and their cooperators through the i-Tree Cooperative Partnership of Davey Tree Expert Company, the Arbor Day Foundation, Society of Municipal Arborists, the International Society of Arboriculture, and Casey Trees.

i-Tree Eco Acknowledgments

i-TreeEco is an adaptation of the Urban Forest Effects (UFORE) model, which was cooperatively developed by US Forest Service Northern Research Station (NRS), the USDA State and Private Forestry's Urban and Community Forestry Program and Northeastern Area, the Davey Tree Expert Company, and SUNY College of Environmental Science and Forestry. The UFORE model was conceived and developed by David J. Nowak and Daniel E. Crane (USFS, NRS) and Patrick McHale (SUNY-ESF). The UFORE software was designed and developed by Daniel E. Crane and its graphical user interface (GUI) by Lianghu Tian and Mike Binkley (The Davey Institute).

Many individuals contributed to the design and development process of the UFORE application including Mike Binkley (The Davey Institute), Jaewon Choi (SUNY-ESF), Daniel E. Crane (NRS), Greg Ina (The Davey Institute), Robert E. Hoehn (NRS), Jerry Bond and Christopher J. Luley (Urban Forestry LLC), Patrick McHale (SUNY-ESF), David J. Nowak (NRS), Jack C. Stevens (NRS), Lianghu Tian (The Davey Institute), and Jeffrey T. Walton (Paul Smiths College).

Revisions for i-Tree Eco versions were carried out by members of The Davey Institute, including Lianghu Tian, Michael Kerr, Al Zelaya, Scott Maco, and Mike Binkley based on input and newly available research from NRS and feedback from i-Tree users. The manual was edited and designed by Kelaine Vargas.

Introduction

Eco was developed to help managers and researchers quantify urban forest structure and functions based on standard inputs of field, meteorological, and pollution data. The model currently calculates the following parameters based on local measurements:

- Urban forest structure, including species composition, tree cover, tree density, tree health (crown dieback, tree damage), leaf area, leaf biomass, and information on shrubs and ground cover types.
- Hourly pollution removal by the urban forest for ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and particulate matter (PM10). The model accounts for potential negative effects of trees on air quality due to BVOC emissions.
- Effect of trees on building energy use and related reductions in carbon dioxide emissions.
- Total carbon stored and net carbon sequestered annually by trees.
- Rainfall interception and value
- Susceptibility to significant pest and diseases
- Exotic species composition.

Eco makes use of user-collected field data. For large-scale areas (entire cities, councils or regions), a random sample of fixed area plot can be analyzed. For smaller-scale sites, a complete inventory option is available that will provide information on urban forest structure, pollution removal, carbon sequestration and storage, and resource value. Model outputs are given for the entire population and, for smaller scale projects making use of complete inventories, results are also provided for individual trees.

i-TreeEco Version 5.0 will be available for use for the entirety of Australia. Limitations of use outside the United States of America are outlined in Appendix 5 of the i-TreeEco User Manual (<http://www.itreetools.org/resources/manuals.php>).

Upgrades of earlier versions have automated standard weather and air quality data requirements and data analysis. Additionally, updates have been made to the air quality model, including improved leaf area index simulations, weather and air pollution data processing and interpolation, updated monetary values for reduced pollutant levels, and improved charts and tables that now display yearly, monthly, or hourly results. Due to these changes, users can expect more refined calculations of air pollution effects when compared with earlier versions of Eco.

For more information on the methodology that underlies Eco and the specific model updates, visit www.itreetools.org > Resources > Archives under Eco.

Accessing i-TreeEco

To access the latest version of the program, click the "Get the Tools" icon at <http://www.itreetools.org/>.

Project Design

Several key decisions must be made before starting an i-TreeEco assessment.

Primary questions that need to be addressed are:

- What are the boundaries of the analysis area?
- Will the analysis be a sample or an inventory?
- If sampling; will plots be randomised or stratified?
- Can an existing inventory be used for analysis?
- What kind of field data will be collected?
- What format will the data be collected in? I.e. i-Tree PDA tool, paper forms, digital spreadsheet or non-i-Tree inventory platform?

The positives and negatives of the above project questions, and methodologies for sampling are provided in the i-TreeEco User Manual: (<http://www.itreetools.org/resources/manuals.php>).

Starting a new i-TreeEco project

To start a new project, open i-TreeEco.

1. Click File > New project. The Save i-Tree Eco Project window will appear. Navigate to the location where you want to save the project, give it a name, and click Save.
2. The Creating a New Project window will appear. It asks you for the location of four required databases (Species, Location, Input, and Report) and three optional images (Land Cover, Impervious Cover, and Tree Cover) to be used for mapping results.
 - a) The species and location database fields are filled in automatically and should be left as they are.
 - b) The Input and Report databases are unique to a given project. Click Create and navigate to the location where you want to create each file. In the File Name field, supply a name (e.g., MyTown_2011_Input and MyTown_2011_Report), and click Save.

You can return to this window to make changes later by clicking File > Update Project. If you have already started data collection, however, avoid making changes that would affect the quality or integrity of the data.

Creating/configuring inventories

Once all four tables have been entered:

1. Click Configure Input. The Creating/Configuring Inventories window will open.
2. Create a name for your location in the Location Name field and choose nation, state, county, and place from the drop-down menus. [Note: If the community that includes your study area extends across more than one county, you may have to try all relevant county names before the community name appears in the menu.]
3. To select a Weather Station ID
 - a) Click Select next to the Weather Station ID box. The Select a Weather Station dialog box will appear with a red cross indicating your approximate location based on the information entered above and

green markers indicating nearby weather stations offering hourly weather data. The Map Type can be changed between Normal, Satellite and Hybrid images as desired.

- b) Go to Location can be used to move the red cross hairs to a specific geographic location. Zoom and Pan Functions can be operated by manipulating the mouse as specified in the directions at the lower right of the screen or by moving the zoom slide bar.
 - c) Click on the green marker nearest your project location. Data may not always be readily available within your city and the nearest location will have to be used unless you have access to other local resources to acquire and submit properly formatted weather data.
 - d) Once a weather station is selected, the details will be populated in the ID number and station name fields. Click OK to proceed with configuration steps.
- 4.** Give the series a name to identify the exact nature of the project, e.g., "Park Trees" or "City," to distinguish it from other Eco projects done at the same time in the same place, if necessary. Series should be used sparingly. Their advantage is that they can allow for more efficient data management, although there are some risks associated with possible overrides of data. However, series cannot be compared against each other within one project, but must be submitted separately. It is therefore generally better to group data into separate Eco projects with their own file names when such grouping is necessary.
 - 5.** If you plan to re-inventory your plots in the future, check the box marked Data collected permanent? This option is only valid for sample inventories.
 - 6.** Indicate whether you will be collecting a complete inventory (Inventory - 100% census) or sampling with random field plots.
 - a) For sample inventories, select the sampling method from the drop-down box: If you stratified your sample, select Stratified Random Sample. If your sample was unstratified and plots were completely randomized, select Simple Random Sample. If your sample was unstratified and you used the fixed grid or randomized grid methods to randomize the plots, select accordingly. This is for information only and does not affect analysis.
 - 7.** Type in the year of the inventory and choose between English and metric units.
 - 8.** Check the Pest Detection or Energy Benefits Included box if you decided to collect these attributes as part of your project.
 - 9.** When you are finished, click Add to Database.

If you are conducting a sample analysis, then there are several more key components to configuring your inventory. Details of these can be found on Pages 16-18 of the i-TreeEco User Manual: (<http://www.itreetools.org/resources/manuals.php>).

Furthermore, details for creating field data collection materials and configuring an i-Tree PDA tool are also detailed in the aforementioned document on pages 18-20.

On the following pages are the attributes required for an i-TreeEco inventory project.

Details of assessment methodologies can be found in the i-TreeEco User Manual 23-47.

i-Tree data field collection

The following fields are the minimum required for importing into an i-TreeEco project (not for plot-based projects). Data must be presented in Microsoft Access with these exact headers.

All column headers (attributes) must be included in the MS Access database, but optional data fields may be left blank.

Data collectors must be familiar with the criteria in the i-Tree Eco User's Manual available from <http://www.itreetools.org>. The data import process is described in Appendix 3 of the manual.

Field	Data collection	Format	Database field type
TreeID	Yes	must be a unique number and must not have a field length greater than 6 digits	Integer or Long
Date	Yes	YYYYMMDD	Date
Crew	Optional	A unique collector ID is required for use with the Carbon Farming Initiative.	Text, 100 characters max.
X	Optional	Longitude	Double
Y	Optional	Latitude	Double
PhotoID	Optional		Text, 100 characters max.
TreeAddress	Optional		Text, 100 characters max.
STAT	Yes	Status. Must be one of these codes <ul style="list-style-type: none"> • When re-inventorying your study area, indicate changes in a tree's status using the following codes: <ul style="list-style-type: none"> ○ N: No change in status. ○ P: Planted, new—the tree has been planted since the last inventory ○ I: Ingrowth, new—the tree existed in the last inventory, but has now reached tree size or has seeded in and has reached tree size ○ U: Unknown, new—the tree is new but planted vs. ingrowth cannot be determined 	Text, 1 character

Field	Data collection	Format	Database field type
		<ul style="list-style-type: none"> ○ H: Hazard/health problem, removed–the tree has been removed since the previous inventory for health or safety reasons ○ C: Healthy, removed–a healthy tree was removed by the property owner ○ L: Land use change, removed–the tree was removed due to land use change (e.g., development of site) ○ R: Unknown, removed–tree removed for unknown reason 	
Species	Yes	<p>Must be the species code from the i-Tree species master list published on the Arboriculture Australia website http://arboriculture.org.au</p> <p>Must be a species code, if it is an unknown species or not in the list identify by Genus and sp. If the Genus is unknown use the generic hardwood or softwood code</p>	Text, 8 characters
FieldLandUse	Yes	<p>Must be one of these codes.</p> <ul style="list-style-type: none"> • Residential (R): Freestanding structures serving one to four families each. • Multi-family residential (M): Structures containing more than four residential units. <ul style="list-style-type: none"> ○ [Note: A block of attached one- to four-family structures would be considered multi-family residential. A residential complex consisting of many separate one- to four-family structures and related greenspace would be also considered multi-family residential.] • Commercial/Industrial (C): In addition to standard commercial and industrial land uses, this category includes outdoor storage/staging areas as well as parking lots in downtown areas that are not connected with an institutional or residential use. • Park (P): Parks include undeveloped (unmaintained) as well as developed areas. • Cemetery (E): Includes any small unmaintained areas within cemetery grounds. • Golf Course (G): Self-explanatory. • Agriculture (A): Cropland, pasture, orchards, vineyards, nurseries, farmsteads and related buildings, feed lots, rangeland, 	Text, 1 character

Field	Data collection	Format	Database field type
FieldLandUse (cont...)	Yes	<p>timberland/plantations that show evidence of management activity for a specific crop or tree production are included.</p> <ul style="list-style-type: none"> • Vacant (V): This category includes land with no clear intended use. Abandoned buildings and vacant structures should be classified based on their original intended use.²³ • Institutional (I): Schools, hospitals/medical complexes, colleges, religious buildings, government buildings, etc. <ul style="list-style-type: none"> ○ [Note: If a parcel contains large unmaintained areas, possibly for expansion or other reasons, treat the area as Vacant. However, small forested islands in a maintained landscape would be considered Institutional.] • Utility (U): Power-generating facilities, sewage treatment facilities, covered and uncovered reservoirs, and empty stormwater runoff retention areas, flood control channels, conduits. • Water/wetland (W): Streams, rivers, lakes, and other water bodies (natural or man-made). Small pools and fountains should be classified based on the adjacent land use. • Transportation (T): Includes limited access roadways and related greenspaces (such as interstate highways with on and off ramps, sometimes fenced); railroad stations, tracks and yards; shipyards; airports; etc. If plot falls on any other type of road, or associated median strip, classify according to nearest adjacent land use. • Other (O): Land uses that do not fall into one of the categories listed above. This designation should be used very sparingly as it provides very little useful information for the model. Clarify with comments in Notes. <p>[NOTE: For mixed-use buildings, land use is based on the dominant use, i.e., the use that receives the majority of the foot traffic. It might not always occupy the majority of space in the building. For example, a building with commercial use of the first floor and apartments on upper floors would be classified as Commercial/Industrial.]</p>	
DBHHT	Yes	Height at which DBH was measured. Standard is <u>1.4 meters</u> . Recorded as a number.	Single or Double

Field	Data collection	Format	Database field type
DBH1	Yes	Number in <u>centimetres</u> between 0.5 and 200 <ul style="list-style-type: none"> • Record the tree's DBH on the uphill side of the tree to the nearest cm. • <i>Forked (multi-stemmed) tree</i>: If the point of pith separation is above ground (Fig. 7), the plant is considered to be one tree. Measure the DBH of up to six stems separately. If the tree has more than six stems with DBH ≥ 2.5 cm, lower the measurement height to 30 cm above the ground and record the diameter of up to six stems (selecting the largest and ignoring any others). If the pith union is below ground, each stem is considered a separate tree (included bark down to ground line is a good indicator that pith union is below ground). • <i>Root sprouts</i>: Any root sprouts with DBH ≥ 2.5cm should be measured as separate trees. Root sprouts with DBH < 2.5 cm can be ignored. • <i>Tree with butt-swell or bottleneck</i>: Measure these trees 45 cm. above the end of the swell or bottleneck if the swell or bottleneck extends 90 cm. or more above the ground. • <i>Tree with irregularities at DBH</i>: On trees with swellings, bumps, depressions, branches at DBH height, diameter will be measured immediately above the irregularity at the place it ceases to affect normal stem form. • <i>Tree on slope</i>: Measure diameter at 1.4 metres from the ground along the bole on the uphill side of the tree. • <i>Leaning tree</i>: Measure diameter at 1.4 metres from the ground along the bole. The 1.4 metre distance is measured along the underside face of the bole. 	Single or Double
DBH2	Optional	Bifurcated – Co dominant	
DBH3	Optional	Trifurcated – Tri dominant	
DBH4	Optional	Multi trunked (Four trunks)	
DBH5	Optional	Multi trunked (Five Trunks)	
DBH6	Optional	Multi trunk (Six largest trunks)	
TOTHT	Yes	Total height of Tree in metres – can be whole or partial metres	Single or Double
LiveTop	Yes	Height to live tree top in metres – can be whole or partial metres	Single or Double

Field	Data collection	Format	Database field type
CrownBase	Yes	Height to base of crown (lowest point of foliage) in metres – can be whole or partial metres	Single or Double
CrownWidthNS	Yes	Canopy width in metres North-South	Single or Double
CrownWidthEW	Yes	Canopy width in metres East-West	Single or Double
PercentCrownMissing	Yes	Percent of crown silhouette missing <ul style="list-style-type: none"> Record percent canopy missing as 0%, 100% or mid-points of 5% intervals (1-5% =3, 6-10% = 8, 11-15% =13, 16-20% =18, etc.). 	Integer or long
CrownDieback	Yes	Percent of crown dieback <ul style="list-style-type: none"> Record crown dieback as 0%, 100% or mid-points of 5% intervals (1-5% =3, 6-10% = 8, 11-15% =13, 16-20% =18, etc.). 	Integer or long
CLE	Yes	Crown Light Exposure -1: Dead trees. 0: The tree receives no full light because it is shaded by trees, vines, or other vegetation. 1: The tree receives full light from the top or 1 side. 2: The tree receives full light from the top and 1 side (or 2 sides without the top). 3: The tree receives full light from the top and 2 sides (or 3 sides without the top). 4: The tree receives full light from the top and 3 sides. 5: The tree receives full light from the top and 4 sides.	Integer or long
TreeSite	Yes	N – not a street tree (in a reserve or private property) S – street tree (in a road reserve)	Text, 1 character
Comments	Optional		Text, 255 characters max.

Additional fields required for the energy (heating/cooling) i-Tree analysis.

Field	Required	Format	Database field type
D1	Optional	First Building Direction In degrees, north =1 <ul style="list-style-type: none"> Generally for trees ≥ 6 metres tall that are located within 18 metre of a space-conditioned residential buildings that are three stories or fewer in height (two stories and an attic), record the direction (azimuth in degrees) from the tree to the closest part of the building. For multi-family dwellings, treat all the units in the building as a single building. The building does not have to be located on the plot. The energy analyses are currently set to run for typical building types and climate zones of the United States. All locations in Australia have been aligned to a closely related zone of the United States based on climate, building types and landscape geography. This feature will be converted to an Australian specific calculation in the near future. 	Single or Double or Integer
S1	Optional	First Building Distance In metres >0 Distance from tree to nearest protected building in metres. Maximum calculated input is 18 metres; larger input distances will be discounted or not calculated. All measurements should be $\frac{1}{2}$ metre increments. For buildings recorded above, measure the shortest distance from the tree to the closest part of the building.	Single or Double or Integer
D2	Optional	Second Building Direction	Double
S2	Optional	Second Building Distance	Double
D3	Optional	Third Building Direction	Double
S3	Optional	Third Building Distance	Double

Amenity tree valuation

i-Tree Eco will use data from the above fields such as dieback for condition, field land use for location information and species to determine structural value estimates based on methods from the Council of Tree and Landscape Appraisers (1992) Compensatory Value. This provides an approximate of value for a population. **The Eco structural value is not intended to provide or replace an individual tree valuation.**

To calculate individual tree values, an individual calculation is needed for each tree. The specific data for your chosen method needs to be collected.

The following data fields are recommended as best management practice for the calculation - see Guide for Plant Appraisal 9th edition, Table 4.3, p34.

Field	Required	Format	Database field type
Root structure	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Root health	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Trunk structure	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Trunk health	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double

Field	Required	Format	Database field type
Scaffold branches structure	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Scaffold branches health	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Small branches and twigs health	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Foliage and/or buds health	Optional	4 – no apparent problems 3 – minor problems 2 – major problems 1 – extreme problems	Single or Double
Site rating (Tree location)	Optional	Relative market value of the site compared to the area in which it occurs. Recorded as a decimal or percentage based on the following ranges - Very high 90-100% High 80-89% Average 70-79% Low 60-69% Very low 10-59%	Single or Double
Contribution rating (Aesthetic & Potential benefit)	Optional	Functional and aesthetic benefits of the plant. Recorded as a decimal or percentage from .1-1.0 or 10-100%.	Single or Double
Placement rating	Optional	How well the Contribution of the plant is delivered based on its placement in the site.	Single or

Field	Required	Format	Database field type
(Actual benefit)		Recorded as a decimal or percentage from .1-1.0 or 10-100%.	Double
Species modifier	Optional	Not collected in the field as the data is species based. <ul style="list-style-type: none"> • Short life span (<50 years) and fast growth rate (>10 mm) 0.5 • Short life span (<50 years) and slow growth rate (<5 mm) 0.6 • Medium life span (50-150 years) and fast growth rate (>10 mm) 0.7 • Medium life span (50-150 years) and slow growth rate (<5 mm) 0.8 • Long life span (>150 years) and fast growth rate (>10 mm) 0.9 • Long life span (>150 years) and slow growth rate (<5 mm) 1.0 	Single or Double
Species factor	Optional	0 Not applicable -0.1 Undesirable species + 0.1 Significant tree	Single or Double
Base value	Optional	Not collected in the field. Arboriculture Australia will publish base values for use annually, these can be located at http://arboriculture.org.au	

Importing Data Inventory

To import data from Microsoft Access into an Eco complete inventory project, you need to know the following:

1. Some inventory fields **must** be included in the Access database; others are optional (Please refer to the previous tables). For example, every database must include a field for PhotoID, even if you don't have information on Photo ID. You will simply leave the relevant entries blank.
2. The pest detection fields, in contrast, should only be present in the database if you carried out the pest detection protocol.
3. For some fields, *data* are required. For example, every tree must have a species code, but it need not have a DBH2. If you chose to carry out the Pest Detection protocol and included these fields in your database, all data are required.
4. Eco has certain rules that serve as data integrity checks and all values must fall within the accepted limits. These limits are given in the previous tables. The import function will not import trees that do not have required data or if the data do not adhere to validation rules.
5. Database field names and field types must match the format specified in the previous tables in the field name column.

To import a data inventory:

1. Select File > Import Data Inventory from the main menu to open the Import dialog function.
2. Select Browse to locate the template Access database with the FullInventoryTrees table.
3. Click the Import button.
4. A window will appear with the following tabs:
 - A) Results tab: The number of imported trees will be reported as well as whether any were skipped or overwritten if duplicate Tree ID numbers were present
 - B) Overwriting tab: If you import a database that contains records with identical TreeID numbers, the overwriting tab will be activated and you will need to select records to overwrite or de-select to leave existing records in the input database. Click Proceed will complete the process.
 - C) Error tab: Import errors are shown here and importing will not be permitted until errors are resolved. You will need to address these errors in the Access database itself. Once addressed, save and close your Access database first and then repeat the Eco Import process.
5. Close the Import dialog box and save the project to continue. Imported records can be viewed or modified as needed by selecting Edit > Edit or Enter Data from the main menu.

Submitting Data

To begin data transfer:

1. Click Tools > Submit Data for Processing.
2. The Contact Information dialog box will open. Fill in the boxes, being particularly careful with your email address. It is also advised that the name of your project be entered in the "Name" dialogue box.
3. When you have filled in and checked all the information, click OK. If you receive a dialog box informing you of errors or issues to resolve, make the necessary corrections and resubmit.
4. You will receive an auto-generated email from info@itreetools.org to let you know that your data has been received for analysis. Please check your spam folders if you do not receive the email. Typically data will be processed within 24 hours after submission.

Downloading Results

To download results:

1. Open the i-TreeEco program and then open your project.
2. Click Tools > Load Results.
3. In the File window, enter the name of the file from the email notification you received. The recommended method is to copy the file name from the email, then paste it into this dialog box to avoid errors.
4. Click OK. I-TreeEco will automatically download your results from the server and place them in the correct database location on your computer.
5. Click on Reports to access results.

Appendix 1 - Submitting species to the i-Tree species list.

A range of information is required on a tree species for use in an i-Tree calculation. New species will be added periodically. For a new species to be considered for inclusion on the list, the following data must be provided and submitted to Arboriculture Australia (enquiries@arboriculture.org.au) in a Microsoft Excel spreadsheet.

The field codes have been presented vertically but should be used as horizontal headers in the spreadsheet.

The current Excel spreadsheet for new species and the instructional manual are posted on the i-Tree website on the following page <http://www.itreetools.org/eco/international.php> and also under the Resources – Archives UFORE/Eco Resources section. **See i-Tree Eco International Input Form & i-Tree Eco International Input Manual** for most recent version of the template and instruction document.

* *All data for new species must be based on the tree growing in its endemic environment.*

Field Code	Description
Genus Name	Genus <ul style="list-style-type: none"> • ensure it is the most up to date name, correct spelling and no spaces
Species Name	Species <ul style="list-style-type: none"> • ensure it is the most up to date name, correct spelling and no spaces. For Australian natives check the Australian Plant Name Index http://anbg.gov.au/win/index.html
Species Code	Proposed i-Tree species code – first 2 letters of genus and species. A sequential number should be added if the code is a duplicate.
Species Code Check	Check that code does not already exist in i-Tree list
Common Name	Common name. Select a name that is not region-specific if possible.
Common Name Check	Check that name does not already exist in i-Tree list
Native Continent	
Native Nation Name	
Native Primary Partition Name	Use state for Australia, US.

Native Location Ref ID	Numerical ID of reference used to verify this data from the published reference list. If using a new reference provide reference information separately, in the same format as the reference list, and leave this field blank.
Species Leaf Type	Select from the following list – <ul style="list-style-type: none"> • Deciduous • Evergreen • Herbaceous • Summer deciduous • Semi-evergreen • Unknown
Leaf Type Ref ID	Numerical ID of reference used to verify this data from the published reference list. If using a new reference provide reference information separately, in the same format as the reference list, and leave this field blank.
Species Growth Form	Select from the following list – <ul style="list-style-type: none"> • Shrub or small tree • Herb • Palm • Shrub • Tree • Vine • Cactus • Unknown
Growth Form Ref ID	Numerical ID of reference used to verify this data from the published reference list. If using a new reference provide reference information separately, in the same format as the reference list, and leave this field blank.
Species Percent Leaf Type	Select from the following list – <ul style="list-style-type: none"> • Hardwood • Herbaceous • Palm • Picea • Pinus • unknown
% Leaf Type Ref ID	Numerical ID of reference used to verify this data from the published reference list. If using a new reference provide reference information separately, in the same format as the reference list, and leave this field blank.
Growth Rate	Select from the following list – <ul style="list-style-type: none"> • Slow (0-0.6cm annual DBH increment) • Moderate (0.6-1cm annual DBH increment) • Fast (>1cm annual DBH increment)
Longevity	Select from the following list – <ul style="list-style-type: none"> • Short (<35 years) • Moderate (35-55 years) • Long (55+ years)
Mature Height (ft)	
Comments	