



## EcoShape<sup>1</sup> User's Manual

The purpose of the EcoShape data conversion tool is to convert data collected on a GPS unit and stored in an ESRI shapefile's database file (dbf) to an i-Tree Eco complete inventory project. This script is designed to be run as a script tool in an ArcGIS toolbox. It first validates and then imports tree inventory data from a shapefile into an Access database created by the i-Tree Eco program, populating the appropriate database tables with the data and converting the database into an ESRI personal geodatabase file. Spatial data and user-defined attributes from the shapefile are stored in a feature class within the geodatabase. The database can subsequently be submitted to the USDA Forest Service for analysis using the i-Tree Eco program and the results returned to the user. This script was written using Python 2.5.1 and ArcGIS 9.3.1, so it may not work with earlier versions.

Because of the complexity of Microsoft Access databases, data must be formatted precisely in the shapefile's database file (dbf) for them to be converted properly. GPS units use surveys to collect the various attributes for each tree. These surveys are called Data Dictionaries (Trimble), Feature Files (SoloForest), or Forms (ArcPad). A formatted data dictionary and feature file for the EcoShape tool can be found at [www.urbanforestrysouth.org](http://www.urbanforestrysouth.org) (keyword: EcoShape). Other survey formats may be used, however, the final product must be an ESRI shapefile with the properly formatted attribute fields. Table 1 outlines the required dbf attributes, their field characteristics, and validation limits.

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<sup>1</sup> The EcoShape data conversion tool was developed at the Natural Resources Spatial Analysis Lab, College of Agricultural and Environmental Sciences, University of Georgia; Liz Kramer, Director; Johnny Reed, Developer



**Table 1**

Attribute <sup>2</sup>	Field characteristics	Validation limits
TREEID	Long integer	≥ 1 and unique
SPECIES	Text	8 characters (UFORE species code)
DBH1	Single	≥0.5 and ≤200
DBH2	Single	≥0.5 and ≤200 or -1
DBH3	Single	≥0.5 and ≤200 or -1
DBH4	Single	≥0.5 and ≤200 or -1
DBH5	Single	≥0.5 and ≤200 or -1
DBH6	Single	≥0.5 and ≤200 or -1
TREE_HT	Single	>0 and ≤150
CRWN_BASE	Single	≥0 and ≤150 (or -1 for dead tree)
CRWN_WD1	Single	≥0 and ≤100 (or -1 for dead tree)
CRWN_WD2	Single	≥0 and ≤100 (or -1 for dead tree)
MISSING	Integer	0 to 100
DIEBACK	Integer	0 to 100
STREET	Text	1 character; “Y” for street tree and “N” for non-street tree
CLE	Integer	≥0 and ≤5
COMMENTS	Text	255 characters
<b>Other (non-required) User Attributes</b>		
xAllOtherData <sup>3</sup>	N/A	No limit on the number of user defined attributes

<sup>2</sup> All required attributes names are case sensitive

<sup>3</sup> Limit all other data attribute names to 9 characters and begin each name with an ‘x’



## 1. Download EcoShape Toolbox from Urban Forestry South website.

- At [www.urbanforestrysouth.org](http://www.urbanforestrysouth.org), type EcoShape into the quick search box on the home page.

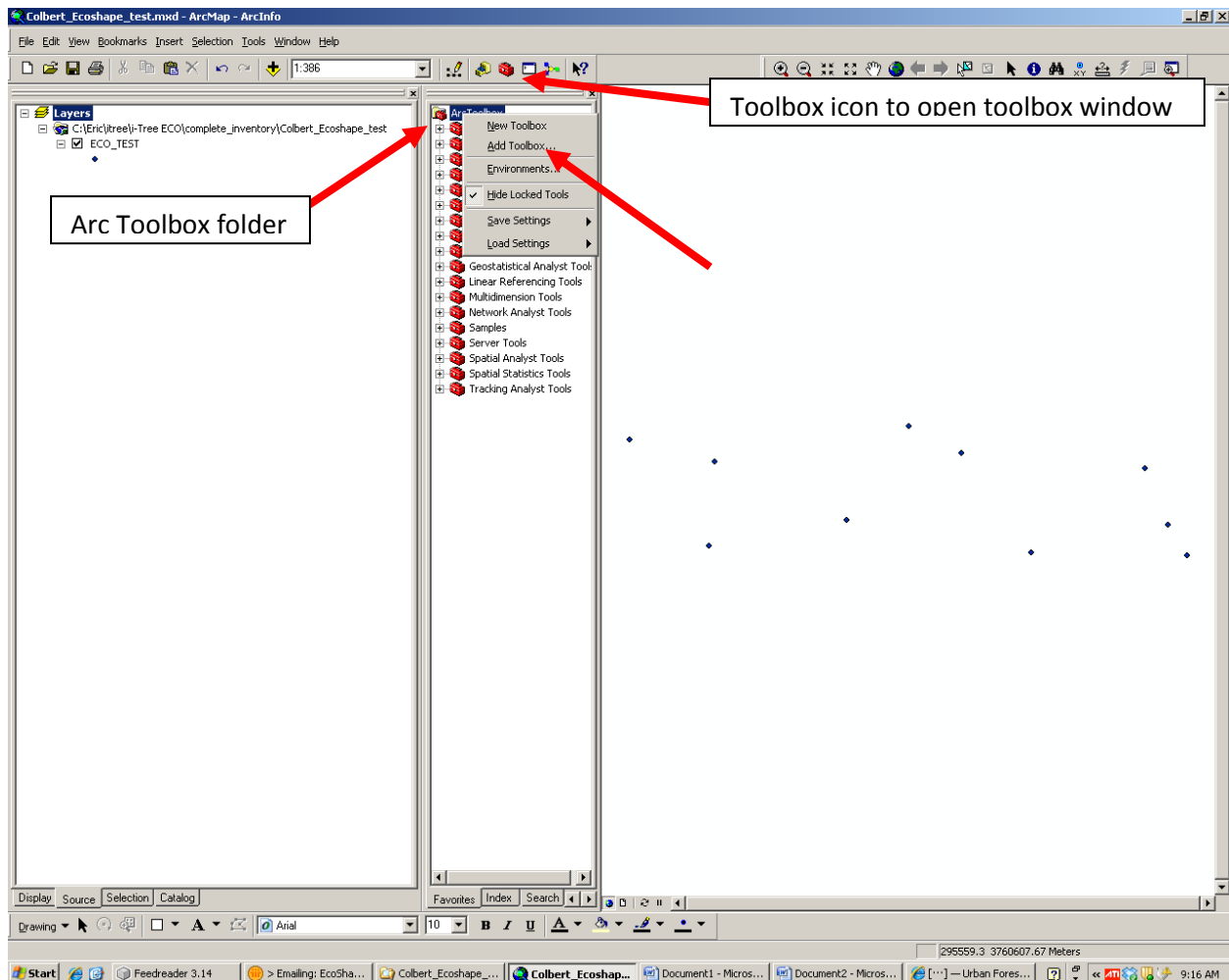
The screenshot shows the website's home page with a search box in the left sidebar containing the text 'EcoShape'. A red circle highlights the search box, and a red arrow points to the text. The main content area includes a section titled 'URBAN FOREST PLANNING TOOL...' with a description and a photo of people at a table. Other sections include 'The Grove...' and 'Share your story—inspire others.' The right sidebar contains 'Topics of Interest' and 'A Guide to UFS'.

- Click on the EcoShape ArcMap Toolbox item.
- Download the tool located under “Attachments and Links”.
- Once downloaded, **unzip the file** in a folder on your pc (remember where that file is located).



## 2. Load Toolbox into ArcMap 9.3.1 or newer version

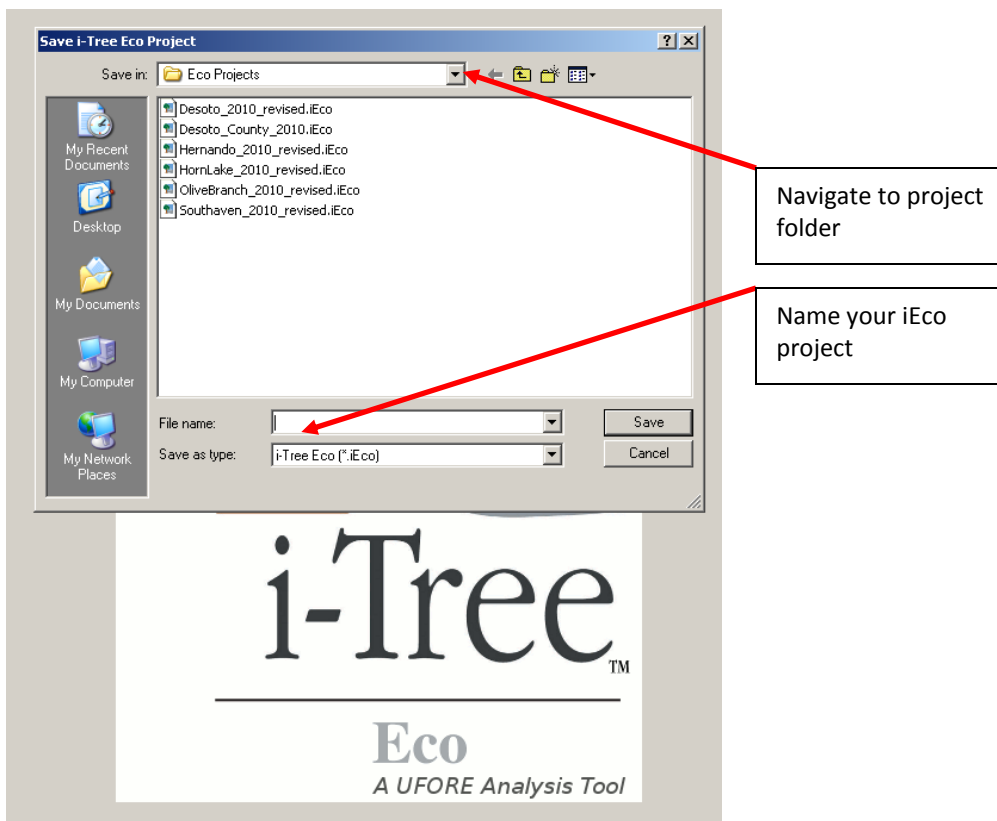
- In ArcMap, open the Arc Toolbox window by clicking on the toolbox icon.
- Right click on the Arc Toolbox folder in the Toolbox window.
- Select "Add Toolbox..."
- Navigate to the folder where you stored the downloaded and unzipped EcoShape tool.
- The toolbox should be displayed in the Arc Toolbox window as "5\_EcoShape".





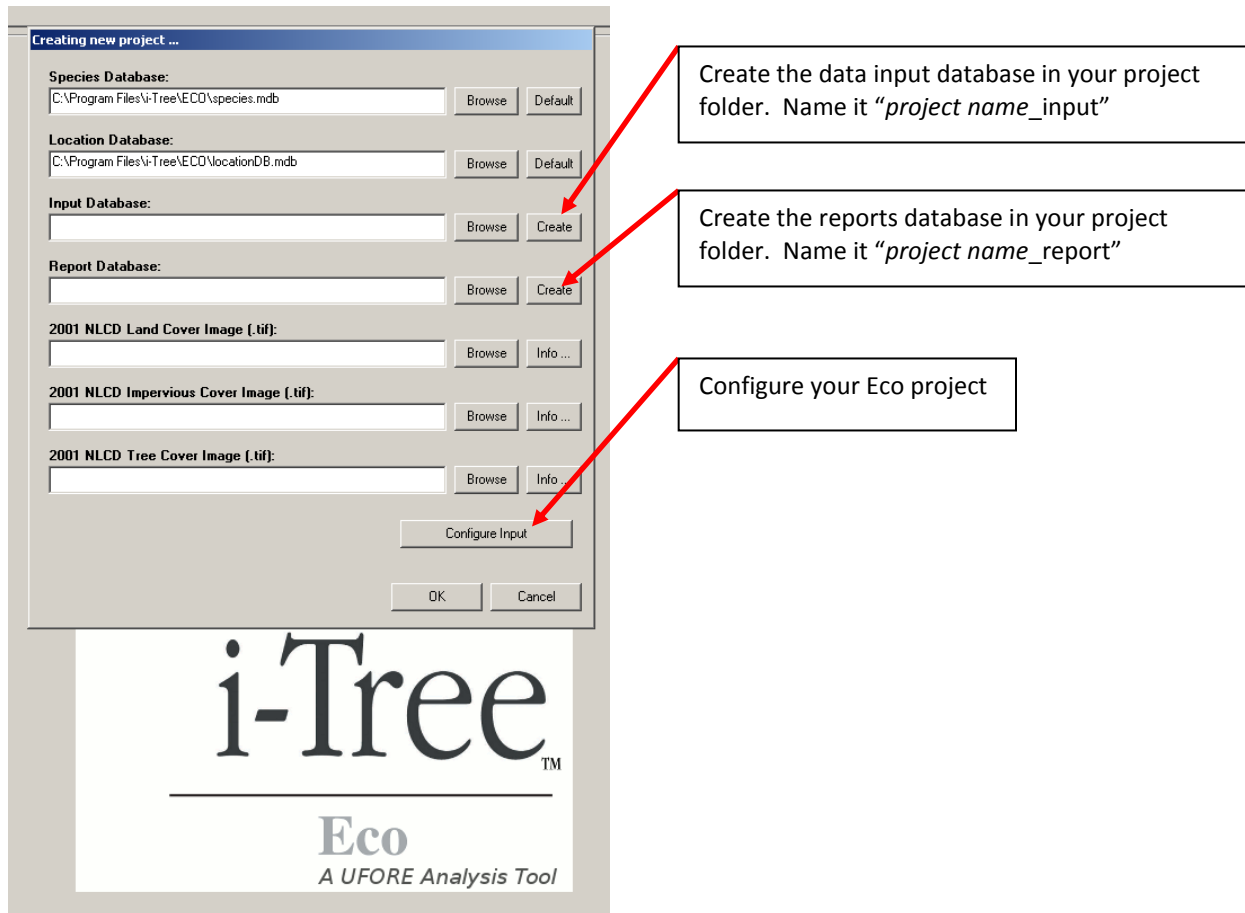
**3. Create an i-Tree Eco project using the Eco user's interface per the Eco User's Manual and enter one tree into the database**

- a. Open i-Tree Eco (Start > All Programs > i-Tree > Eco).
- b. In Eco, select File and then New Project.
- c. The "Save i-Tree Eco Project" window will pop-up asking you to name and save your project.
  - i. Navigate to the folder where your shapefile for the project is located
  - ii. Name the project to identify the area of interest (i.e. WilsonPark\_inventory.iEco) and click Save





- d. The “Creating new project...” window will pop-up asking you to create new project databases



- i. Click on Create next to the Input Database box (this is the database where all of your tree data will be stored)
  - Navigate to the folder where your project is located (see c. above)
  - Name the input database (i.e. WilsonPark\_input.mdb)
  - Click Save
- ii. Click on Create next to the Report Database box (this is the database where all of your tree results will be stored after analysis)
  - Navigate to the folder where your project is located (see c. above)
  - Name the report database (i.e. WilsonPark\_report.mdb)
  - Click Save
- iii. Click on the “Configure Input” box to bring up the “Creating/Configuring inventories...” window



The screenshot shows the 'Creating/Configuring inventories ...' window in the i-Tree software. The interface is divided into several sections: Location, Series, Year and Other, Plot Info, and Data Coll. Red arrows point from callout boxes to specific fields and buttons. The callouts provide instructions on how to enter project information and save it to the database.

**Location**  
Location Name: [Text Box] State: [Dropdown]  
Nation: United States of America County: [Dropdown]  
Weather Station ID: [Text Box] Select Place: [Text Box]

**Series**  
Series Name: [Text Box] Sampling:  Inventory - 100% census  Sampling with field plot Sample Method: [Dropdown]  
 Data collected permanent?

**Year and Other**  
Year: [Text Box] Data units:  English (inches, feet, acres etc)  Metric (cm, m, hectares etc)

**Buttons:** Delete from Database, Add to Database, Define Plots, Print, Launch PDA Program Generator, Exit

**Callout Boxes:**  
1. Type the name of your project location (i.e. Wilson Park)  
2. It is possible to have several inventory series within your main project (i.e. sports complex, walking trail, etc.). Name your project series (i.e. Wilson Park inventory). Select "Inventory – 100% census"  
3. Enter year data were collected and if data were collected in English or metric  
4. Click "Add to Database" after entering project information. Click "Exit" to return to "Creating new project..." window

**i-Tree Eco**  
A UFORE Analysis Tool

- Under Location, type in a location name (i.e. Wilson Park) and identify the state, county, and city of your project as well as the closest whether station (avoid using "Null" for place identification)
- Under Series, give the project a series name (i.e. Wilson Park inventory) and select inventory-100% census
- Under Year and Other, type in the year of data collection and either English or metric data units
- Click "Add to Database" and then OK to the pop-up window indicating that your database is added, and lastly to Exit
- Click on OK in the "Creating new project..." window to end the configuring process



- e. Select Edit and then “Enter or Edit Data” to add one tree to the database

The screenshot shows the 'Paper Data Entry for Inventory' window in i-Tree Eco. At the top, there is a table with the following data:

Tree ID	Field Landuse	Species	HeighttoCrownBase	TreeHeightLiveTop	TreeHeightTotal	CrownWidthNS	CrownWidthEW
1	A	AB	5	25	25	15	15

A red arrow points to the 'Field Landuse' cell containing 'A'. Below the table is a callout box that says 'Ensure the added tree was saved to the database'. Below the table is a form with various input fields:

- Tree ID: 1
- Date: 11/10/2010
- Crew: EK
- Photo ID: [empty]
- Tree Address: [empty]
- Tree Notes: [empty]
- Switch Display Name: [button]
- NR: 0
- Tree Species (Species Code): AB(Genus)
- Land Use: Agriculture
- HT DBH: 4.5
- DBH1: 5
- DBH2: [empty]
- DBH3: [empty]
- DBH4: [empty]
- DBH5: [empty]
- DBH6: [empty]
- Height: TOTHT: 25, LiveTop: 25, CrownBase: 5
- Crown Width: NS: 15, EW: 15
- %Missing: 0
- DB: 0
- CLE: 5
- Trees Near Buildings (disabled for now): D1, S1, D2, S2, D3, S3
- Tree Site: N

At the bottom of the form are three buttons: 'Add Tree' (highlighted with a red box), 'Edit Tree', and 'Delete Tree'. Below these are 'Save', 'Abort', and 'Exit' buttons. A callout box points to the 'Add Tree' button with the text 'Add one tree to the database'.

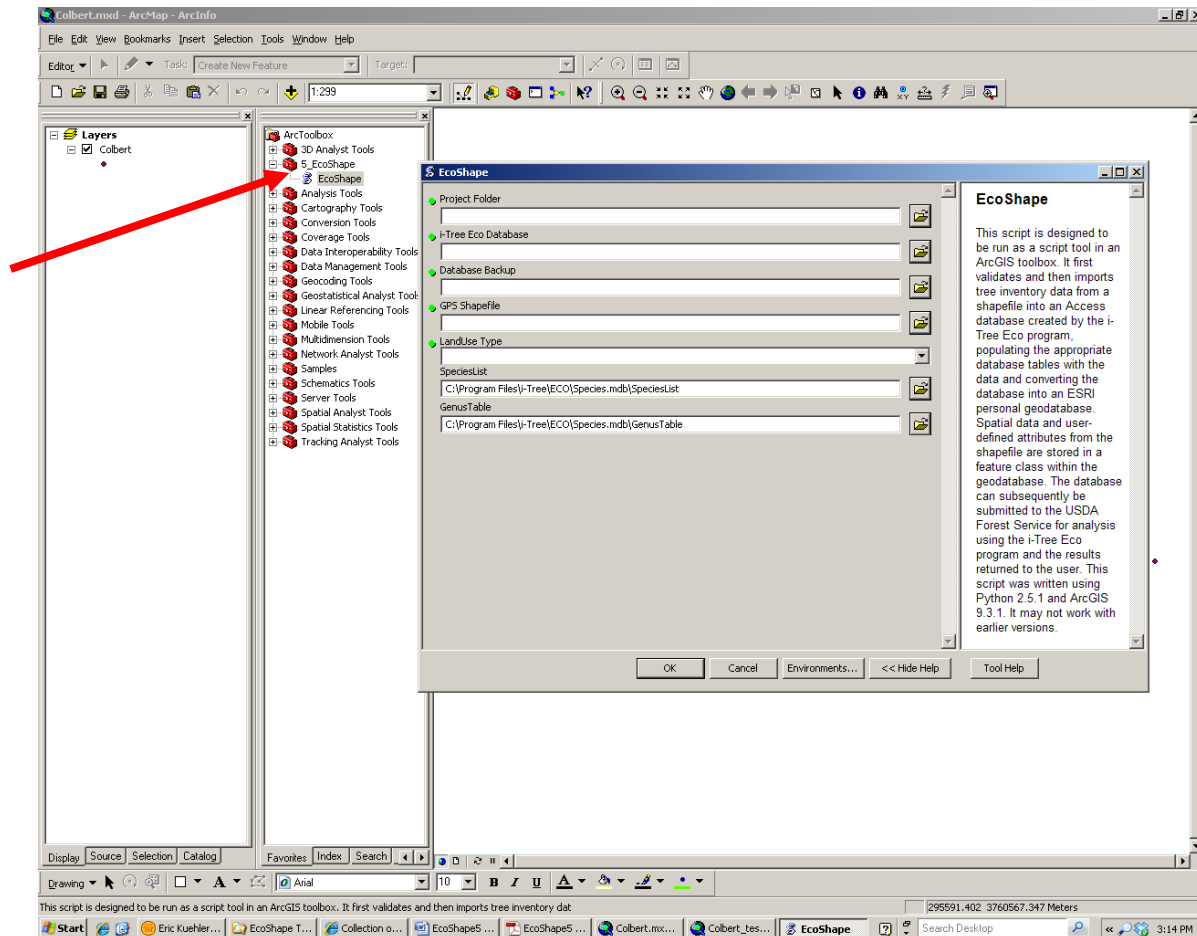
- Click on *Add Tree* and enter data for one tree to set-up relationships within the database (these data will be deleted when the EcoShape imports your data into the tables so enter bogus tree information)
  - Use the drop-down menus where provided to avoid errors
  - Select Save when done
  - Ensure that the tree is added to the database and select Exit
- f. Save your Eco project (File > Save Project) and **exit i-Tree Eco** (Eco must be closed for the EcoShape tool to convert data).





#### 4. Using the EcoShape tool in ArcMap

- Add your Eco-formatted shapefile to your ArcMap project (File > Add Data)
- Open the EcoShape tool by double-clicking it



- In the **Project Folder** box, navigate to and select your project folder where your Eco project is stored (select the folder, don't open the folder). This is where the tool will look for the project database.
- In the **i-Tree Eco Database** box, navigate to and select your Eco input database (i.e. WilsonPark\_input.mdb).
- In the **Database Backup** box, navigate to the folder where your Eco input database is stored and name this file "Backup.mdb". The tool will create a backup of the original project data with the single tree entry. **Note:** each time the tool is run the backup file specified in the dialog box is deleted and then recreated. It is recommended to use a different name for this backup



file each time the tool is run (for the same project) to prevent loss of data if the script fails to convert the data. To be extra cautious keep a copy of the original data in a different location.

f. In the **GPS Shapefile** box, navigate to the folder where your shapefile data are stored and select the shapefile.

g. In the **Landuse** box, use the drop-down list to choose the land use type where the trees in your project are growing (i.e. park, residential, commercial, etc.).

h. Do not change the path in the SpeciesList and GenusTable box.

The dialog box uses a default location for the SpeciesList and GenusTable tables based on the assumption that the i-Tree Eco program is running on the computer. If for some reason i-Tree Eco is not on the computer or the default location is incorrect, the user would need to browse to a location containing copies of these tables.

i. Click OK and the tool will run in a separate pop-up window. A log of all messages generated by the tool will be created in the project folder. The log will be a text file named "EcoShapeLog.txt".

## 5. Check tree data in Eco database

a. Open your i-Tree Eco project.

b. Click on Edit and then "Enter or Edit Data" to ensure your tree data are in the database.

## 6. Submit your project to be processed per i-Tree Eco user's manual instructions.