

## Overview

The DO GIS model seeks to ensure the easy retention and communication of information about the gardens—from design changes over history, to the maintenance of trees, to the exact location of utility lines. The GIS model collates numerous references of survey work done in the garden into one easily cross-referenced digital mapping system. It also preserves the local knowledge of the gardening staff, ensuring that it will be passed down to future gardeners and historians.

The Dumbarton Oaks GIS model project was commissioned by John Beardsley, the Director of Garden and Landscape Studies, and Gail Griffin, the Director of Gardens and Grounds. It was started by Justin Scherma as a summer intern, aided and advised by Paul Cote during the summer of 2009. The project was continued by David Wooden, the 2010 GIS summer intern. This summer's 2011 GIS intern was Charlie Howe.

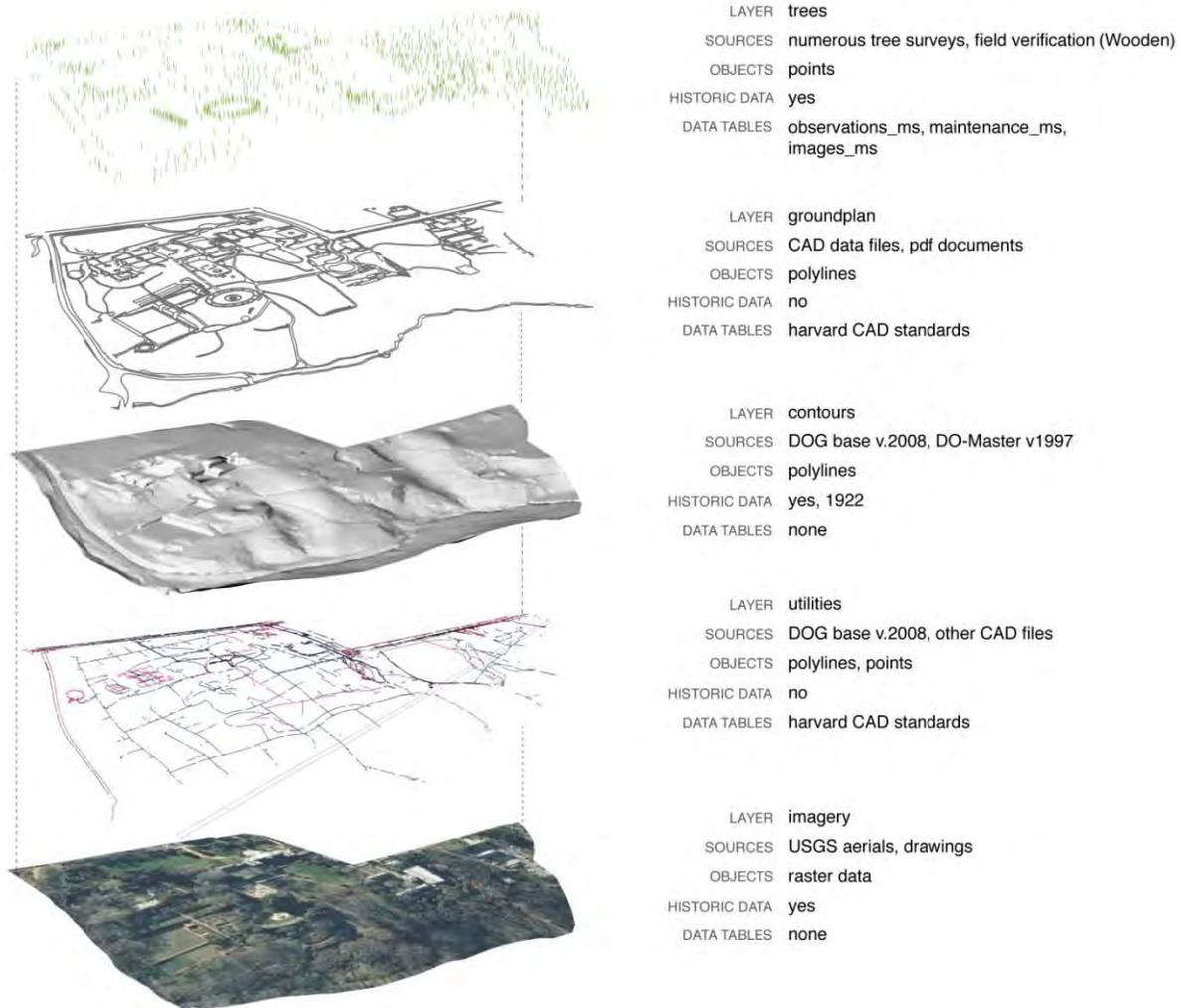


Figure 1. DO GIS Model: conceptual view

## Background

The DO GIS model draws from the ongoing work of the Alliance of Public Gardens GIS (APGG), a consortium of GIS experts at public gardens and zoos led by the University of California Davis and including the Missouri Botanical Garden and the Chicago Botanical Garden. Quoting from their website, "The ArcGIS Botanical Garden & Zoological Park Data Model is evolving free and open source geographic information system (GIS) template for implementing GIS projects at botanical gardens, zoos, and similar public landscapes." This is a unique effort that seeks to utilize the existing, well-documented tool of GIS in a fashion that best suits the need of large, complex gardens. Consequently, utilizing this data model is a good way of ensuring that those working with this data in the future are able to easily understand the structure of the database or add on new features.

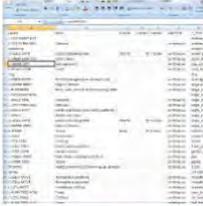
						
	Notes	AutoCAD / Excel	Plant Mapper	BG Base	CityWorks	ArcMap
	individual & group	linked by tree ID	web based	commercial	commercial	commercial
PRECISION	low -loss with time	high -geographic	low	high	high	high
USABILITY	high	moderate -requires care in data handling	high -user friendly interface	user friendly - 90 day support	high -user friendly interface and support	moderate/low
COST	free	free/low	free	\$6,950 + 500 second work station	\$10,000 - 20,000	Free through ESRI grant/Harvard
EXPORT	low - loss of information	high - both common file types	not exportable	low - tedious to export data	low/moderate webbased platform	high - option to export to common file types
SCALABILITY	low - difficult at large scale and over time	high	low - not able to add observations, trees become too close to distinguish	high	high - suitable for city-wide use	high

Figure 2. Garden Data Management Tools: comparative assessment

## Development - data management

Much work was done in the summer of 2009 by Justin Scherma to take several complete CAD databases and Adobe PDF documents representing different aspects of the garden at different time periods, and to cull out the best parts from each into a single consistent representation of **Garden Groundplan Elements** and **Trees**. Justin culled through several CAD data files and Adobe PDF's that had been prepared for various construction and documentation projects over the years. Each document employed a different coordinate system, and a multitude of systems for naming and layering. After a summer of work a single geometric database has been created that uses a single, simple nomenclature for groundplan edges and polygons, as well as tree points and drip lines. With a unified database in place, the first task of summer 2011 was to create a "look-up table" to translate DO GIS nomenclature into the Harvard CAD Standards for data export. This Harvard CAD Standards filter has made it possible to export the unified DO GIS database as a ".dwg" file with layers that correspond to Harvard standards. Likewise, any survey done for the institution can now be incorporated into the DO GIS database with minimal effort (see Figure 3).

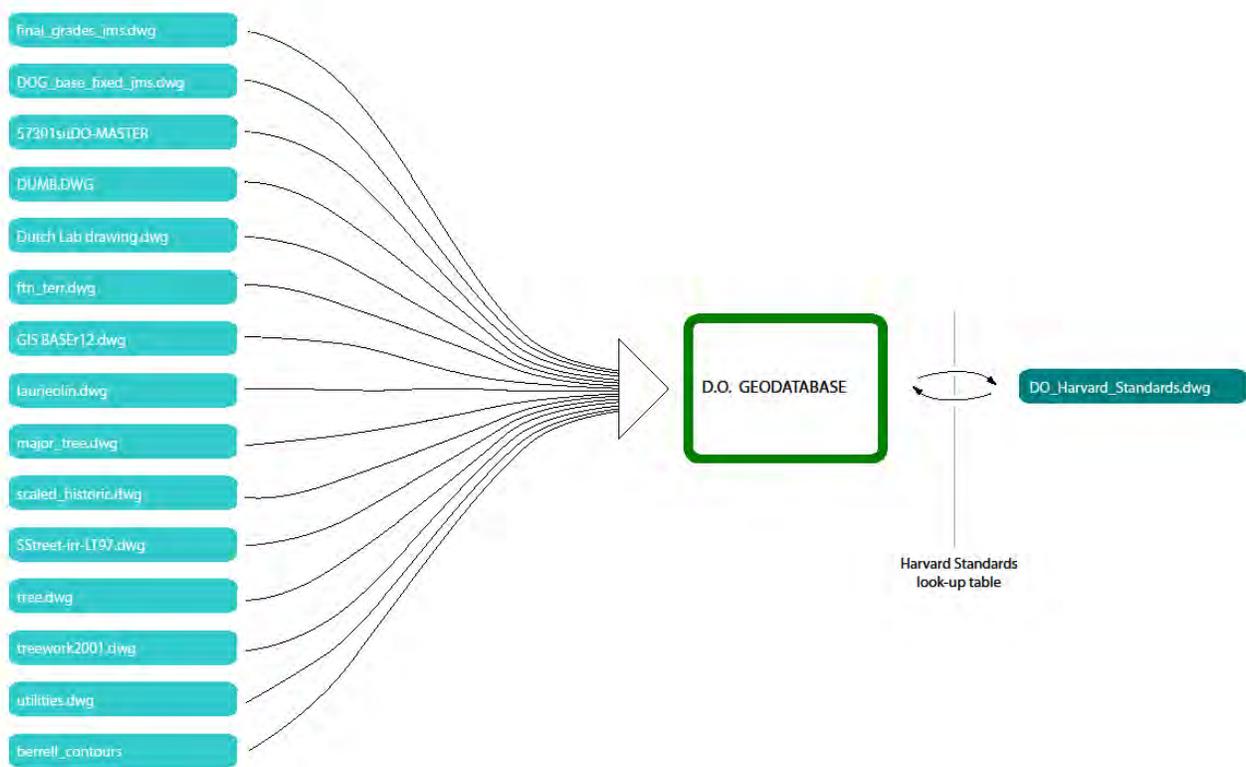


Figure 3. Harvard Standards Look-Up Table: place in data transfer

## Development - database integration/education

The summer 2010 GIS intern, David Wooden, used the geographic database developed by Paul Cote and Justin Scherma to begin recording attributes of existing trees in the garden. The summer was broken into 3 general phases: field observations, data mapping and input, and data verification. David created an up-to-date tree database, one of the most critical datasets for the maintenance of the Dumbarton Oaks Garden. One target of summer 2011 was to teach garden managers the steps to input and export data. These managers had identified the need to accurately record future maintenance records and to be able to access past records quickly. Figure 4, shows the table of contents of the database manual, *Exploring the Dumbarton Oaks Geographic Database*. This 64 page booklet, **APPENDIX: Exploring the Dumbarton Oaks Geographic Database**, gives an introduction to the database and step by step instructions in data input/export with the goal of integrating DO GIS database in everyday garden record keeping.



<u>Content:</u>	
Database Organization	3 - 9
Opening and Saving the ArcMap Document	10 - 11
Introduction to the Workspace	12 - 13
The Identify Tool	14 -17
Adding Trees and Observations	18 - 35
Adding Images	36 - 50
Sorting and Printing Data	51 - 64

Figure 4. Exploring the Dumbarton Oaks Geographic Database: booklet's table of contents

## Development - computation

GIS provided the computation tools to create a slope map, from a recent topographic survey, which classified the Dumbarton Oaks Garden topography in relation to ADA accessibility requirements. Ground with a slope of 0-5% was deemed *accessible*, slopes 5-8% *potentially accessible* (with the addition of landings and railings), and slopes > 8% *not-accessible*. The resulting map aided the identification of two potential paths by which visitors who are mobility impaired can access a large portion of the garden. **APPENDIX: Dumbarton Oaks Garden Accessibility**

Additionally, GIS map algebra provided a new method to explore topography changes over the past 80 years of the Dumbarton Oaks Garden. The 2011 GIS intern created a color coded map (figure 5) showing elevation differences between 1922 era contour lines and those from a recent survey. The complete computation process is detailed in **APPENDIX: Visualizing Topographic Change**.

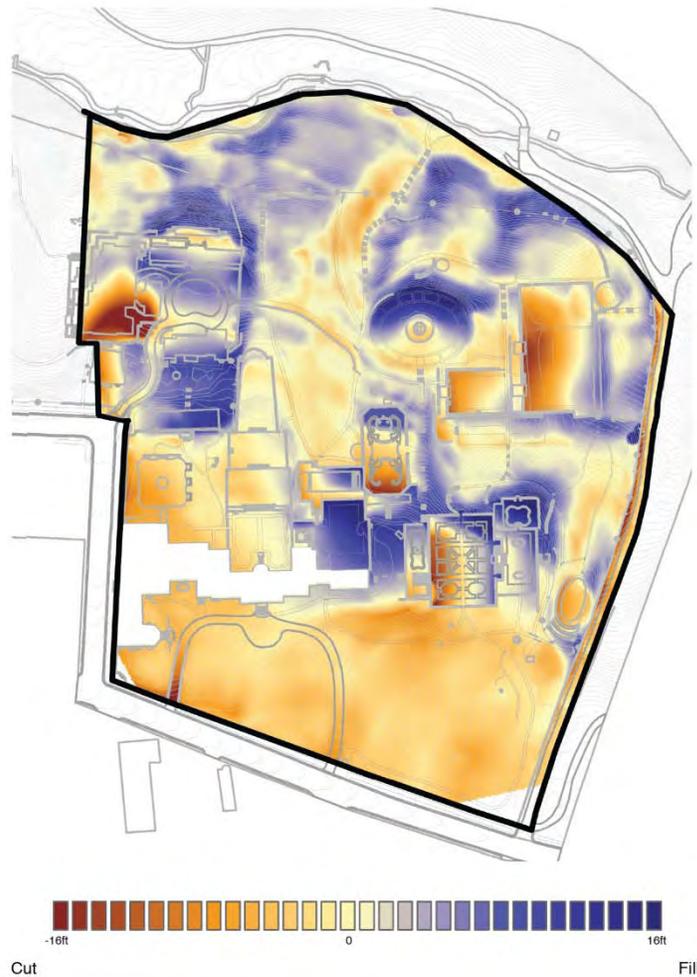


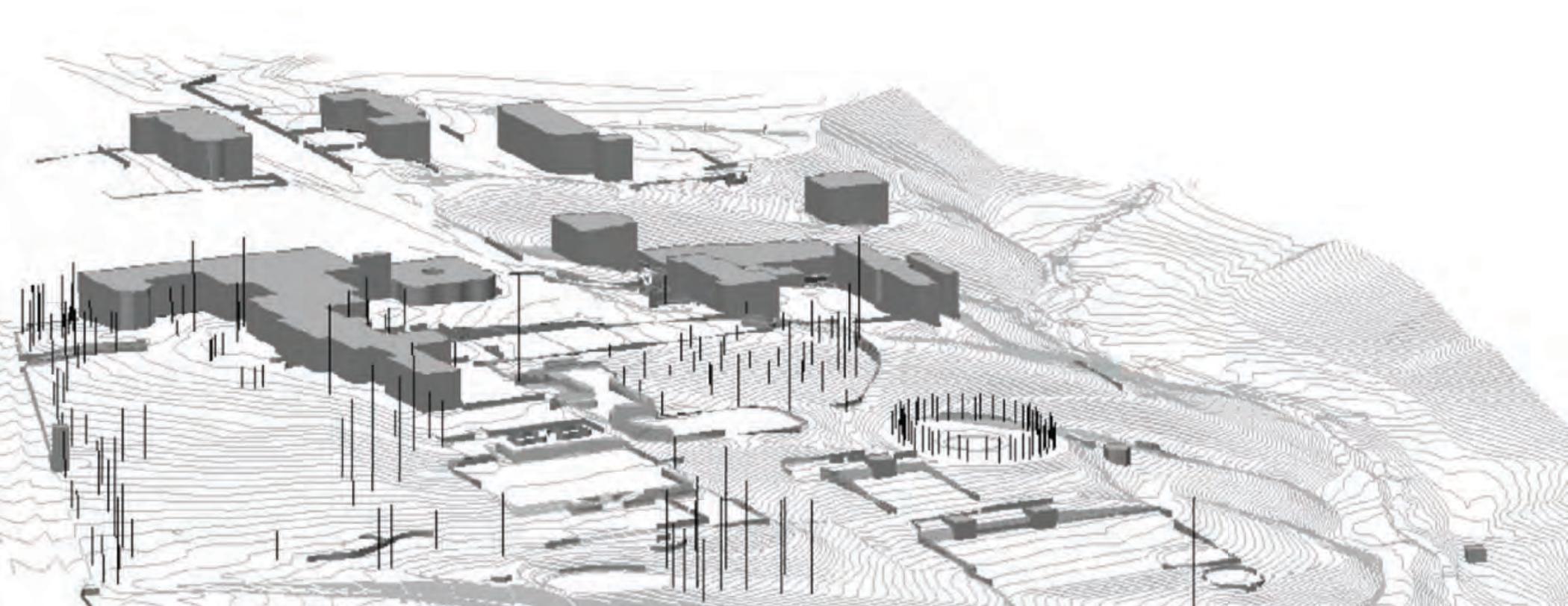
Figure 5. Topographic Change in the DO Garden: a GIS map algebra product

## **Going Further**

Integrating use of the DO GIS database into the workflow of the DO Garden will require further customizations of the database. This might include eliminating data fields that are irrelevant and establishing/expanding domains for fields that are used often. The export of data could also be enhanced as there is, currently, no way to create a report for one tree, which shows all of the associated observations, work records, and photos. Once functioning efficiently DO GIS could be loaded on a tablet computer for use in the garden during routine tree surveying walks.

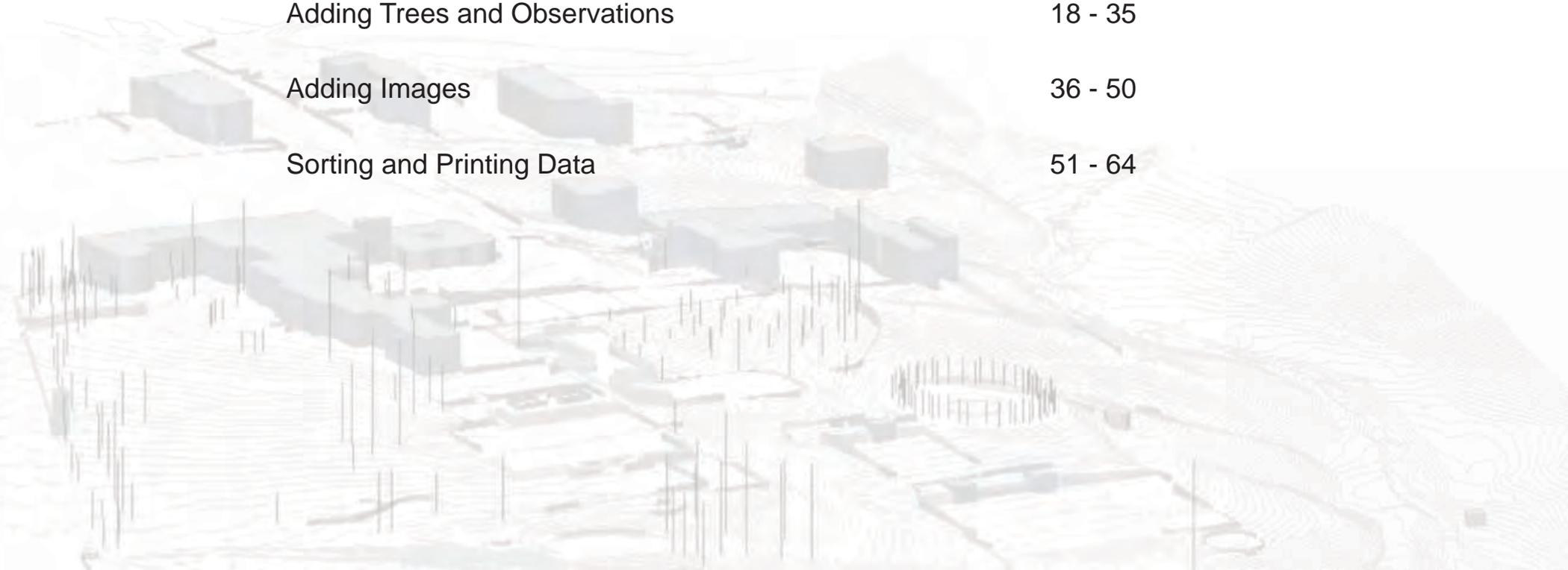
These tasks are extremely relevant as many public and private gardens are searching for an appropriate data management tool like GIS.

# Exploring the Dumbarton Oaks Geographic Database

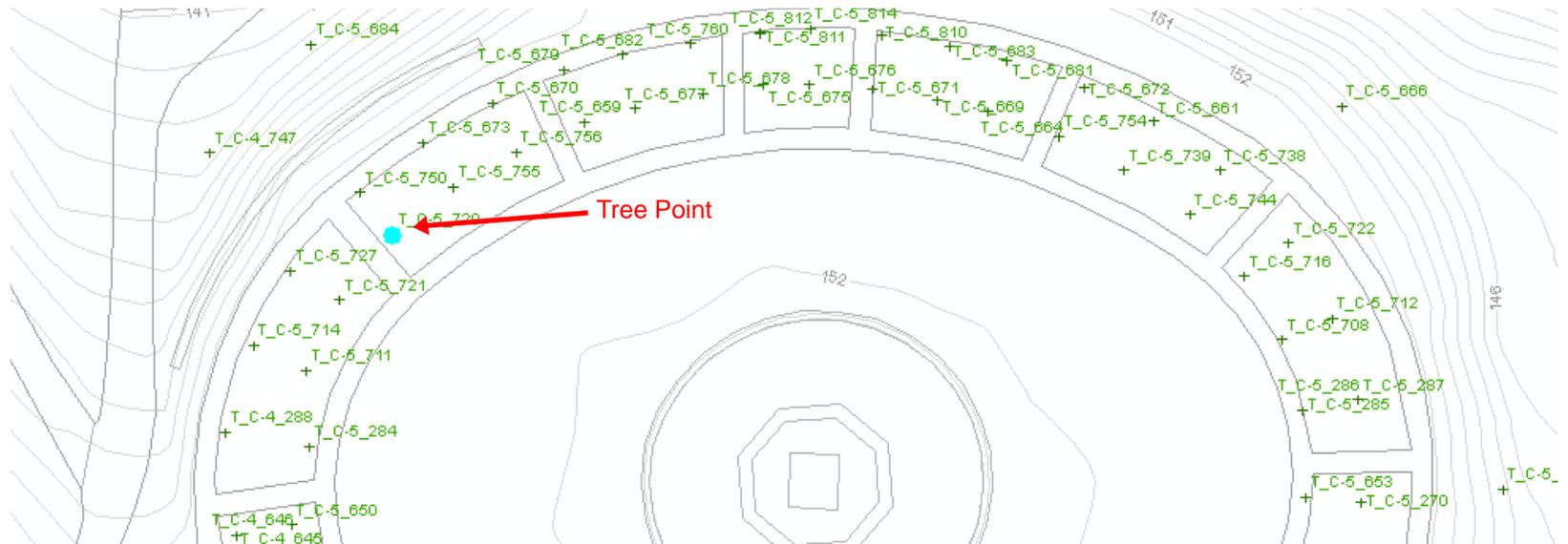


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# DATABASE ORGANIZATION



Within ArcMap, every object on the map is linked to a record.

Table

tree\_points\_ms

OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_enter	dt_planted	dt_died	dt_removed	abs_gnd_cl	Page_ref	elevation	dt_first_obs	dt_final_obs	status	short
1203	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	130.88743	<Null>	<Null>	<Null>	1160
1204	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	128.00949	<Null>	<Null>	<Null>	1183
1205	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	126.71621	<Null>	<Null>	<Null>	1184
1206	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	125.27751	<Null>	<Null>	<Null>	1187
939	Point	T_C-5_721	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	
940	Point	T_C-5_722	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	727
941	Point	T_C-5_727	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	729
942	Point	T_C-5_729	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	738
943	Point	T_C-5_738	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	730
944	Point	T_C-5_733	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	744
945	Point	T_C-5_744	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	750
946	Point	T_C-5_750	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	754
947	Point	T_C-5_754	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	755
948	Point	T_C-5_755	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	756
949	Point	T_C-5_756	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	761
950	Point	T_C-5_761	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	761

Tree Record

In the Dumbarton Oaks tree database every record has a unique identification code called 'Tree\_ID'.

'List by Drawing Order' view

The screenshot displays the ArcMap interface with the following components:

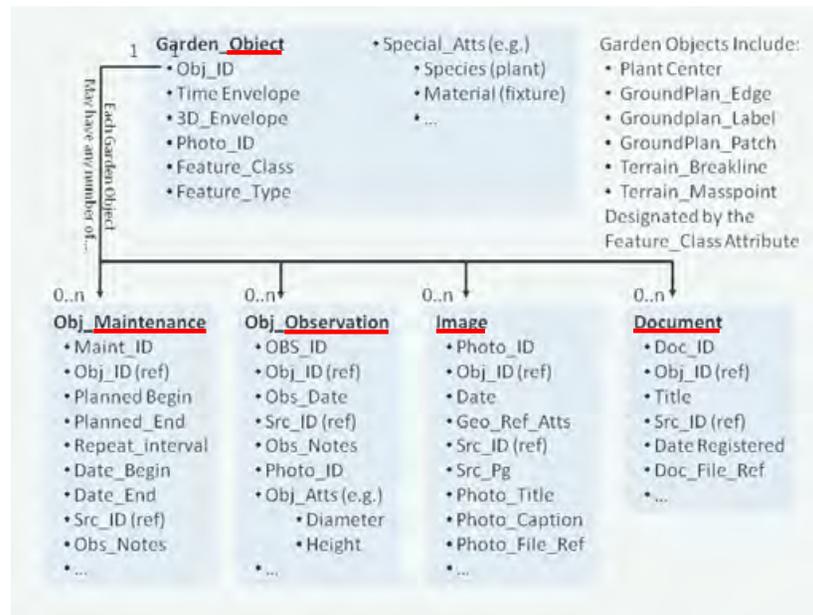
- Table of Contents:** Located on the left, it lists various layers. The 'tree\_points\_ms' layer is checked and highlighted with a red box. A red arrow points to it with the label 'Tree Layer'.
- Map:** The central map area shows a site plan with numerous green points labeled 'Tree Points'. A red arrow points to the map area with the label 'Tree Points'.
- Table:** At the bottom, the 'tree\_points\_ms' data table is open. A red arrow points to the table header with the label 'Tree Record Table'. The table contains 17 columns and 14 rows of data.

OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_center	dt_planted	dt_died	dt_removed	abs_gnd_cl	Page_ref	elevation	dt_first_obs	dt_final_obs	status	short_
1203	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	H-4	131.88743	<Null>	<Null>	<Null>	1181
1204	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	128.00940	<Null>	<Null>	<Null>	1183
1205	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	126.71621	<Null>	<Null>	<Null>	1184
1206	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	125.27751	<Null>	<Null>	<Null>	1187
939	Point	T_C-5_721	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	721
940	Point	T_C-5_777	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	157	<Null>	<Null>	<Null>	777
941	Point	T_C-5_727	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	727
942	Point	T_C-5_729	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	729
943	Point	T_C-5_738	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	738
944	Point	T_C-5_739	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	739
945	Point	T_C-5_744	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	157	<Null>	<Null>	<Null>	744
946	Point	T_C-5_750	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	750
947	Point	T_C-5_754	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	754
948	Point	T_C-5_755	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	755
949	Point	T_C-5_750	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	756
950	Point	T_C-5_761	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	157	<Null>	<Null>	<Null>	761

The tree layer, called *tree\_points\_ms*, can be turned on and off in the *table of contents* at the left side of the screen. The standard view in the *table of contents* is 'List by Drawing Order' which shows only those layers that are represented by objects on the map.

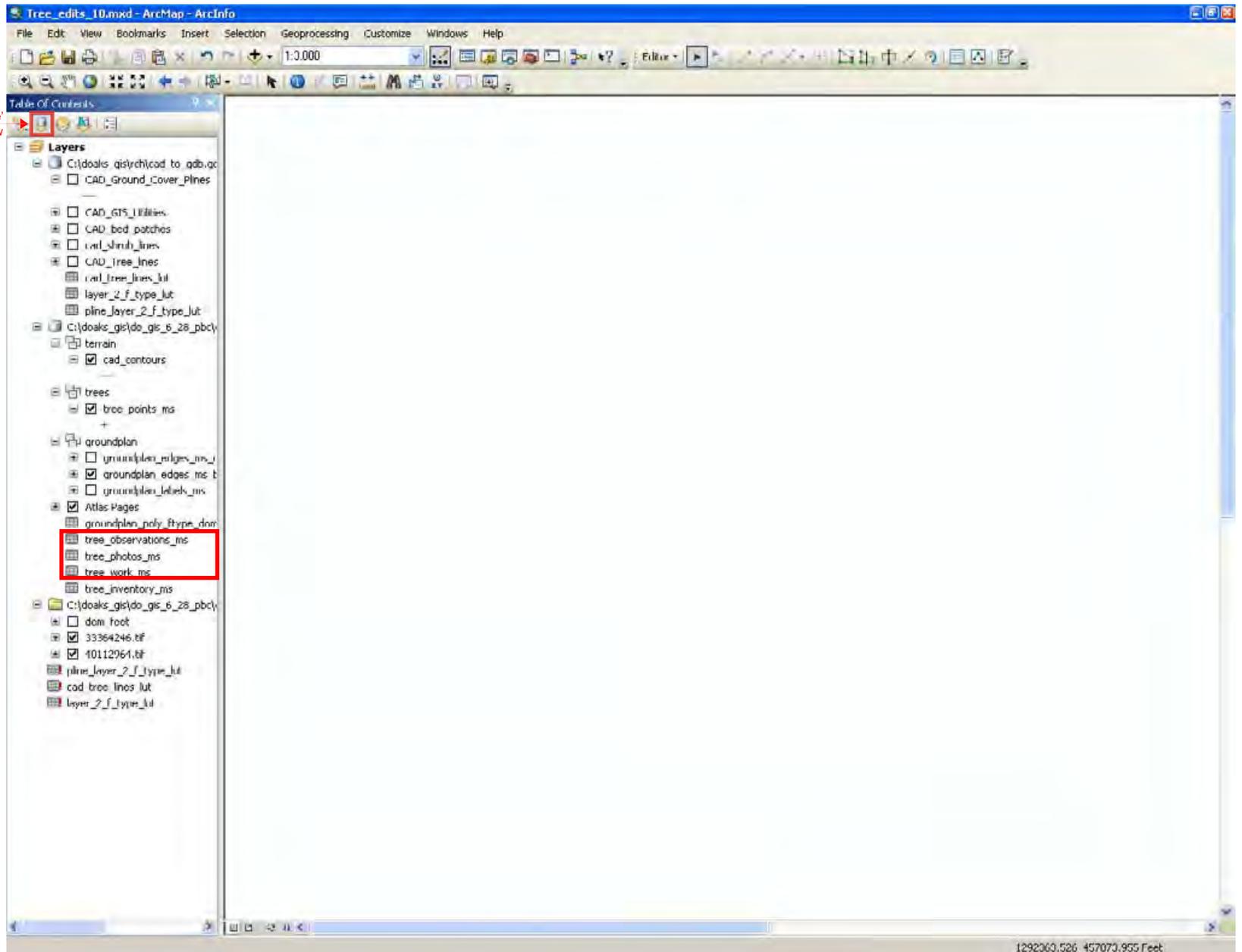
OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_enter	dt_planted	dt_died	dt_removed	abs_gnd_of	Page_ref	elevation	dt_first_obs	dt_final_obs	status	short
1203	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	130.88743	<Null>	<Null>	<Null>	1180
1204	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	128.00949	<Null>	<Null>	<Null>	1183
1205	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	126.71621	<Null>	<Null>	<Null>	1184
1206	Point	T_B-4_118	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	125.27751	<Null>	<Null>	<Null>	1187
934	Point	T_C-5_721	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	721
940	Point	T_C-5_722	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	722
941	Point	T_C-5_727	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	727
942	Point	T_C-5_729	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	729
943	Point	T_C-5_738	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	738
944	Point	T_C-5_739	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	739
945	Point	T_C-5_744	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	744
946	Point	T_C-5_750	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	750
947	Point	T_C-5_754	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	754
948	Point	T_C-5_755	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	755
949	Point	T_C-5_756	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	756
950	Point	T_C-5_791	<Null>	Carpinus	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-5	152	<Null>	<Null>	<Null>	791

The unique *Tree\_ID* number for every tree point allows us to associate additional information tables with each tree point.



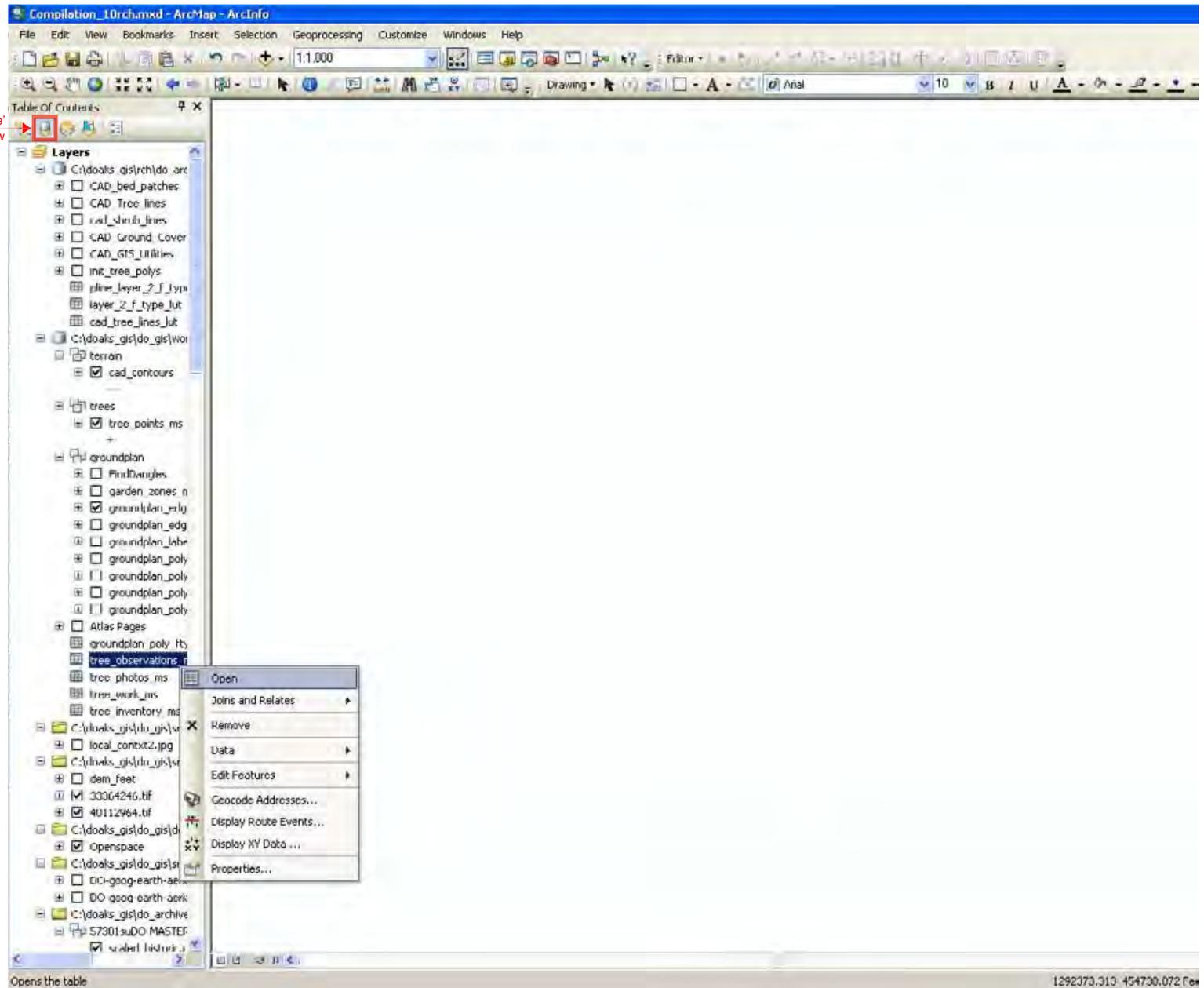
The DO tree database has 'maintenance', 'observation', and 'image' tables. Each entry in these tables is linked to a specific tree point using the *Tree\_ID* number.

'List by Source'  
view



To view these associated information tables, you must switch the *table of contents* to *List by Source* view. Now the associated 'maintenance', 'observation', and 'image' tables are shown within the *table of contents*.

'List by Source'  
view



You can view the tables themselves by right-clicking on the table listing. *Table of Contents* > *tree\_observations\_ms*, right click > *open*.

OBJECTID	tree_id	tree_photo_id	name	dt_taken	caption	photographer	file_path	photo
1	T_G-5_A_077	A_077_P1	Test Photo	5/5/2010	This is a test	Ansel Adams	<Null>	<Raster>
2	T_G-5_A_077	A_077_P2	Tree Damage	5/5/2010	We think a sasquatch accidentally stomped on this tree	Rud Serling	<Null>	<Raster>
3	T_G-5_A_077	A_077_P3	Cable Fix	5/30/2010	The tree after cabling	Dr. Kibira	<Null>	<Raster>
4	T_G-5_A_015	A_015_P1	My Ash	5/30/2010	No Caption	Unknown	<Null>	<Raster>



This is a view of the 'image' database called *tree\_photos\_ms*. Each entry is linked to a particular tree by the *Tree\_ID* field. There may be multiple entries for each tree. The database can be sorted like an excel database and the images are contained within this table.

OBJECTID	tree_id	tree_obs_id	Species	Common Name	DBH	Stem_Count	condition	Obs_date	observer	Site	Eet_Height	Eet_Agc	Health	Hazard	Arb_Rce	Protection_rce	page_ref	all
129	<Null>	T_F-6_T_F-6_B_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	F-6	<Null>
40	<Null>	T_F-3_T_F-3_M_20	Quercus ph	<Null>	4	<Null>	<Null>	6/16/2010	DAW	<Null>	20	<Null>	<Null>	<Null>	<Null>	<Null>	F-3	<Null>
714	T_B-4_1001	T_B-4_T_B-4_1001_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
715	T_B-4_1005	T_B-4_T_B-4_1005_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
716	T_B-4_1008	T_B-4_T_B-4_1008_20	Cornus flori	<Null>	8	4	multi-stem	7/6/2010	DAW	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
717	T_B-4_1010	T_B-4_T_B-4_1010_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
718	T_B-4_1018	T_B-4_T_B-4_1018_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
719	T_B-4_1019	T_B-4_T_B-4_1019_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
720	T_B-4_1154	T_B-4_T_B-4_1154_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
721	T_B-4_1156	T_B-4_T_B-4_1156_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
722	T_B-4_1161	T_B-4_T_B-4_1161_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
723	T_B-4_1164	T_B-4_T_B-4_1164_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
724	T_B-4_1173	T_B-4_T_B-4_1173_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
725	T_B-4_1179	T_B-4_T_B-4_1179_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
726	T_B-4_1180	T_B-4_T_B-4_1180_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
727	T_B-4_1183	T_B-4_T_B-4_1183_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
728	T_B-4_1184	T_B-4_T_B-4_1184_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
729	T_D-4_1107	T_D-4_T_D-4_1107_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	D-4	<Null>
730	T_B-4_1193	T_B-4_T_B-4_1193_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
707	T_B-4_790	T_B-4_T_B-4_790_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
700	T_D-4_970	T_D-4_T_D-4_970_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	D-4	<Null>
709	T_B-4_977	T_B-4_T_B-4_977_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
710	T_B-4_981	T_B-4_T_B-4_981_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
711	T_D-4_995	T_D-4_T_D-4_995_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	D-4	<Null>
712	T_B-4_988	T_B-4_T_B-4_988_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>
713	T_B-4_999	T_B-4_T_B-4_999_20	Cornus flori	<Null>	3.5	3	multi stem	7/6/2010	DAW	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	B-4	<Null>

This is a view of the observation database called *tree\_observations\_ms*. Each entry is linked to a particular tree by the *Tree\_ID* field. There may be multiple entries for each tree. The database can be sorted like an excel database and copied into excel.

The image shows a map of a campus with many cyan-colored tree points overlaid on the buildings and grounds. Below the map is a software interface window titled 'Table' showing a table of tree observations. A red arrow points to the 'Related Tables' button in the interface.

OBJECTID *	tree_id *	tree_obs_id	Species	Common_Name	DBH	Stem_Count	condition	Obs_date	obs
5	T_F-3_79	T_F-3_T_F-3_79_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
6	T_F-3_80	T_F-3_T_F-3_80_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
9	T_F-3_85	T_F-3_T_F-3_85_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
10	T_F-3_86	T_F-3_T_F-3_86_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
11	T_F-3_88	T_F-3_T_F-3_88_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
13	T_F-3_91	T_F-3_T_F-3_91_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
14	T_F-3_92	T_F-3_T_F-3_92_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
15	T_F-3_94	T_F-3_T_F-3_94_20	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

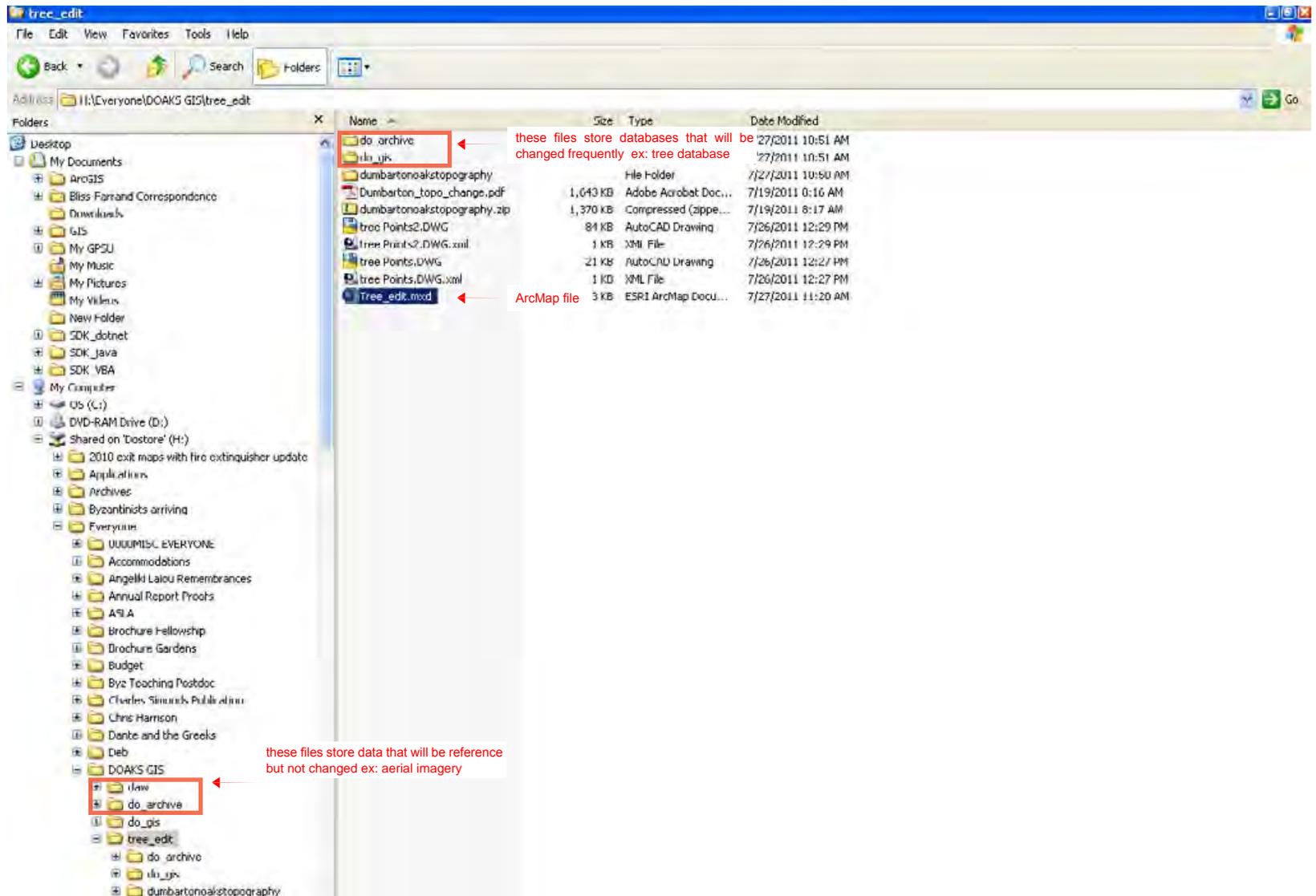
(942 out of 942 Selected)

The *Observation* table is linked to the tree points on the map via the *tree\_id* number.

Use the *Related Tables* button it is possible to select tree points based on the *tree\_observations\_ms* records.

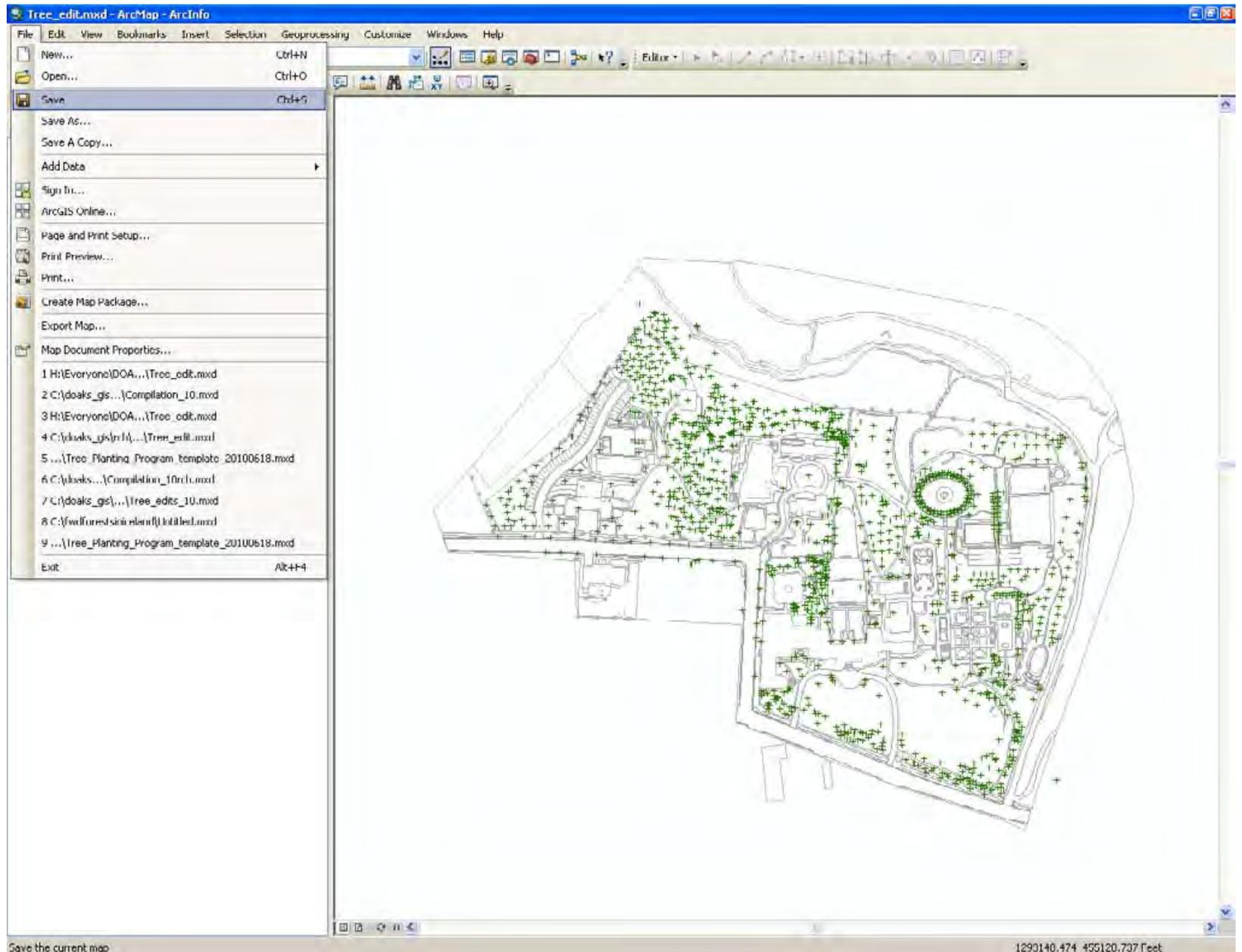
For example: If we wanted to see all of the trees that have at least one observation record we could highlight all of the *tree\_observation\_ms* records - click the *Related Tables* button  and choose *tree\_points\_ms*. Above we see selected all of the tree points with related observations. \*For more on sorting data 'Sorting and Printing Data', pages 51-64

# OPENING AND SAVING



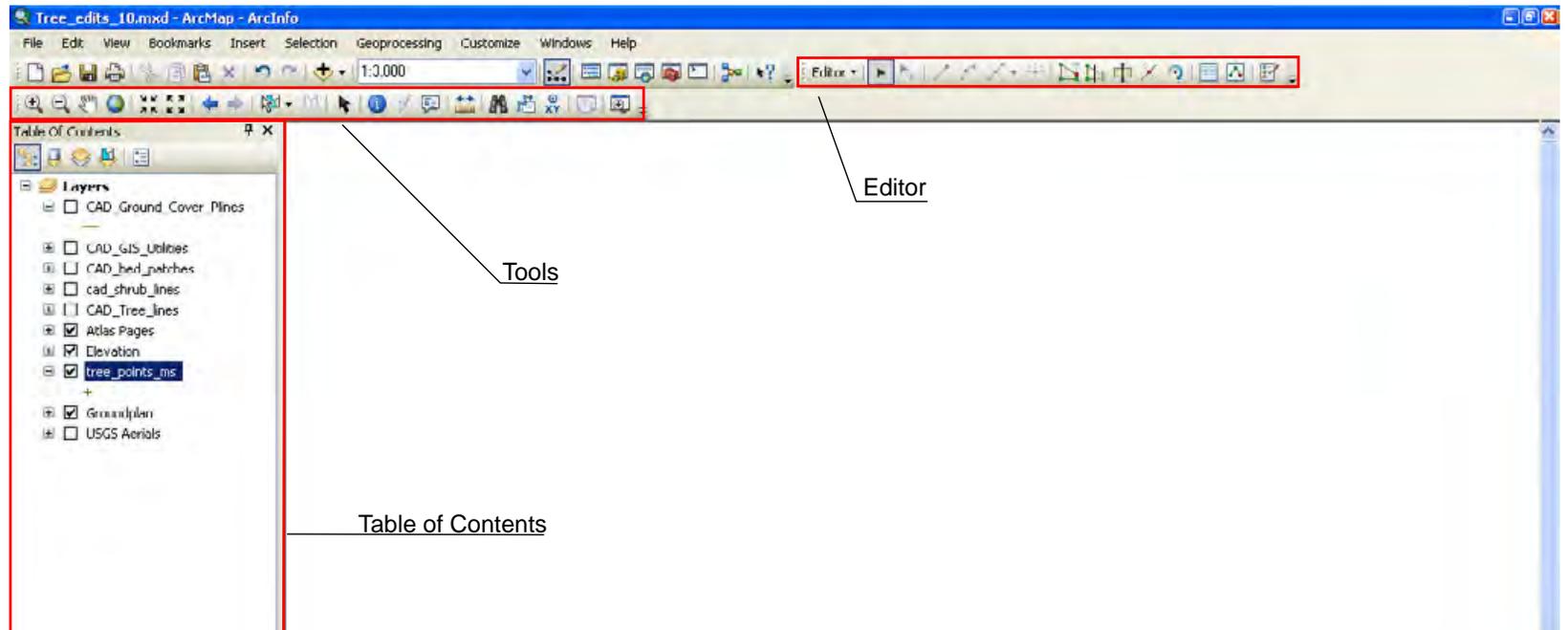
Open the map document customized for tree editing. Navigate to `H:\Everyone\DOAKS GIS\tree_edit` > double click `Tree_edit.mxd`. Notice the associated files as highlighted above. These files hold information that ArcMap displays when you open `Tree_edit.mxd`. If you wish to copy `Tree_edit.mxd` to use outside of the Dumbarton Oaks network, you must copy all of the linked files (this is a lot of data). You can however save a copy of the `.mxd` file to your local computer if you wish to change visibility settings.

\*See the GIS Manual for more information on linked data. <<http://www.gsd.harvard.edu/gis/manual/beginning/index.htm>>

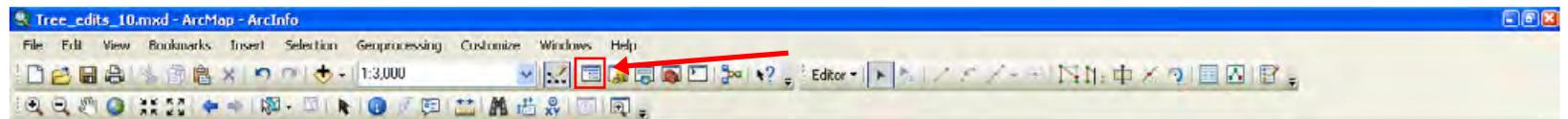


As you edit the tree database and save your edits (page 18) the file is updated automatically, there is no way to undo the save other than to do so manually. When you save the document itself: File > Save, you are saving the configuration of the map document - layer color, which layers are on and which are off, etc. You may save another copy of the map document on your local computer to retain your layer and workspace settings: File > SaveAs..., this document will still reference the same information tables on the H: drive.

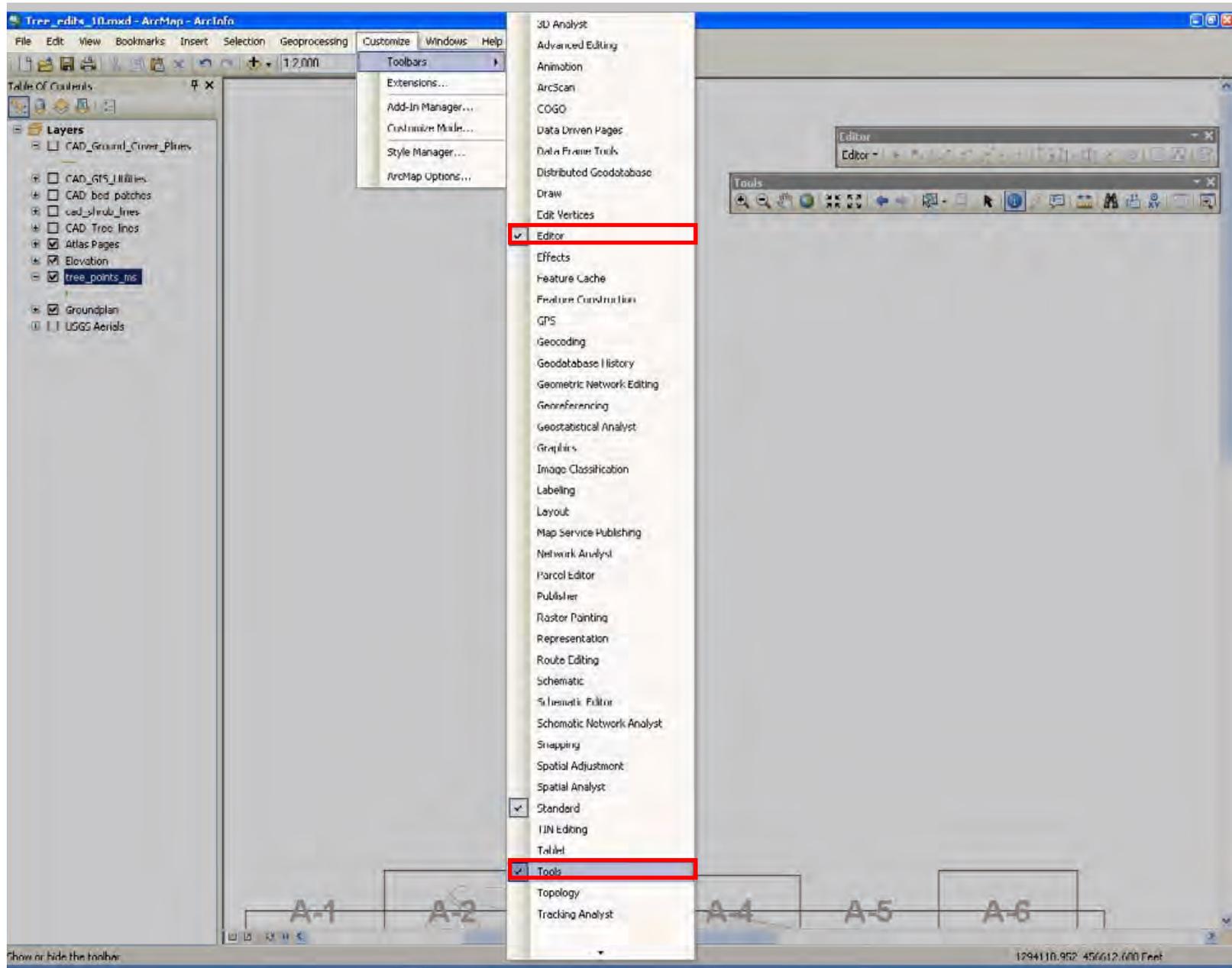
# THE WORKSPACE



*Tools*, *Editor*, and *Table of Contents* toolbars will be necessary to view and edit the DO tree database. If these toolbars are hidden, follow the next few steps to display them. If unnecessary toolbars are present you may drag them to the middle of the screen and close them. drag > close (x)



Display the *Table of Contents* by simply clicking the *Table of Contents Window* button above

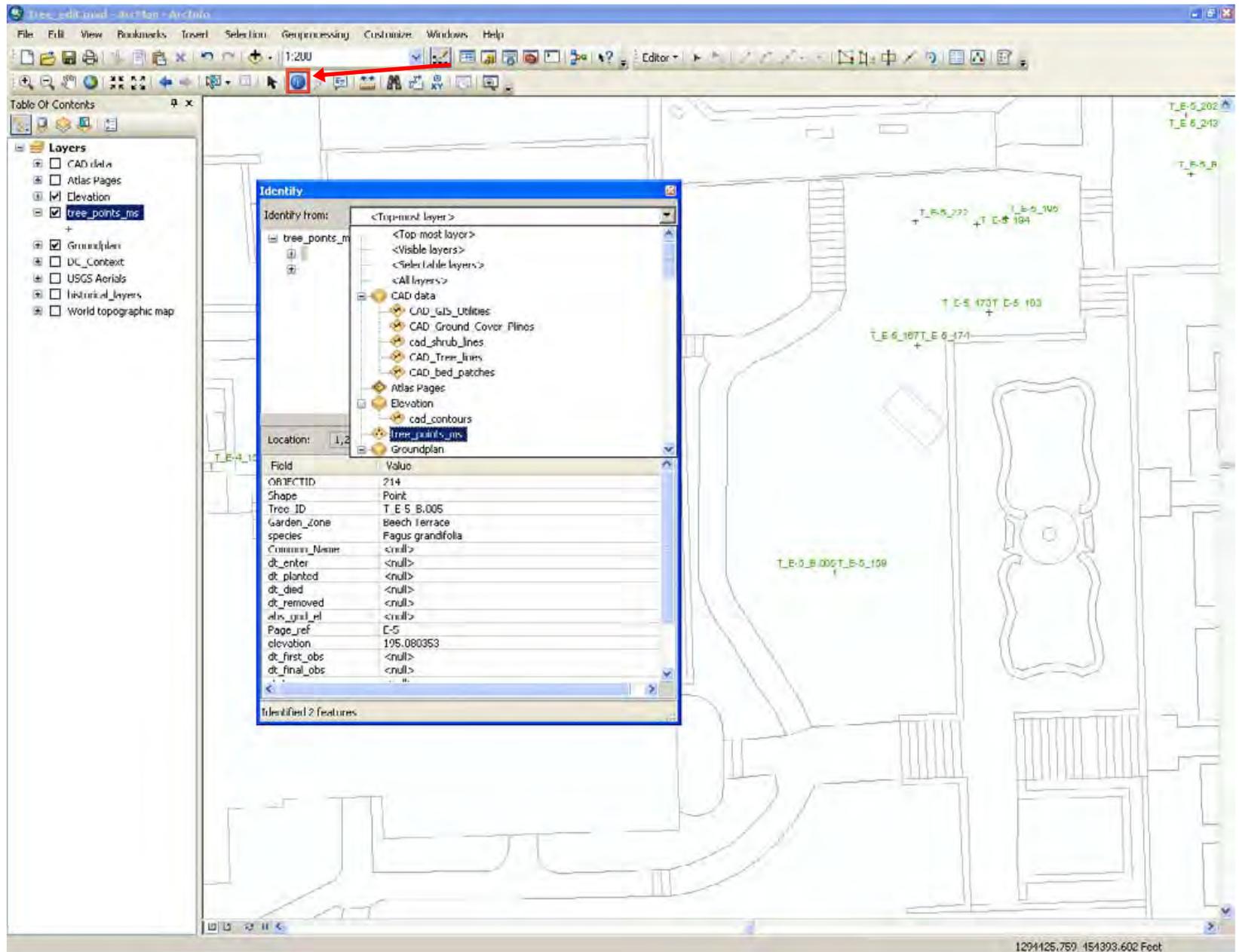


to show *Tools* and *Editor* toolbars: go to *customize > toolbars >* and select from dropdown menu. Once displayed the bars may be dragged to the menu at the top of the workspace.

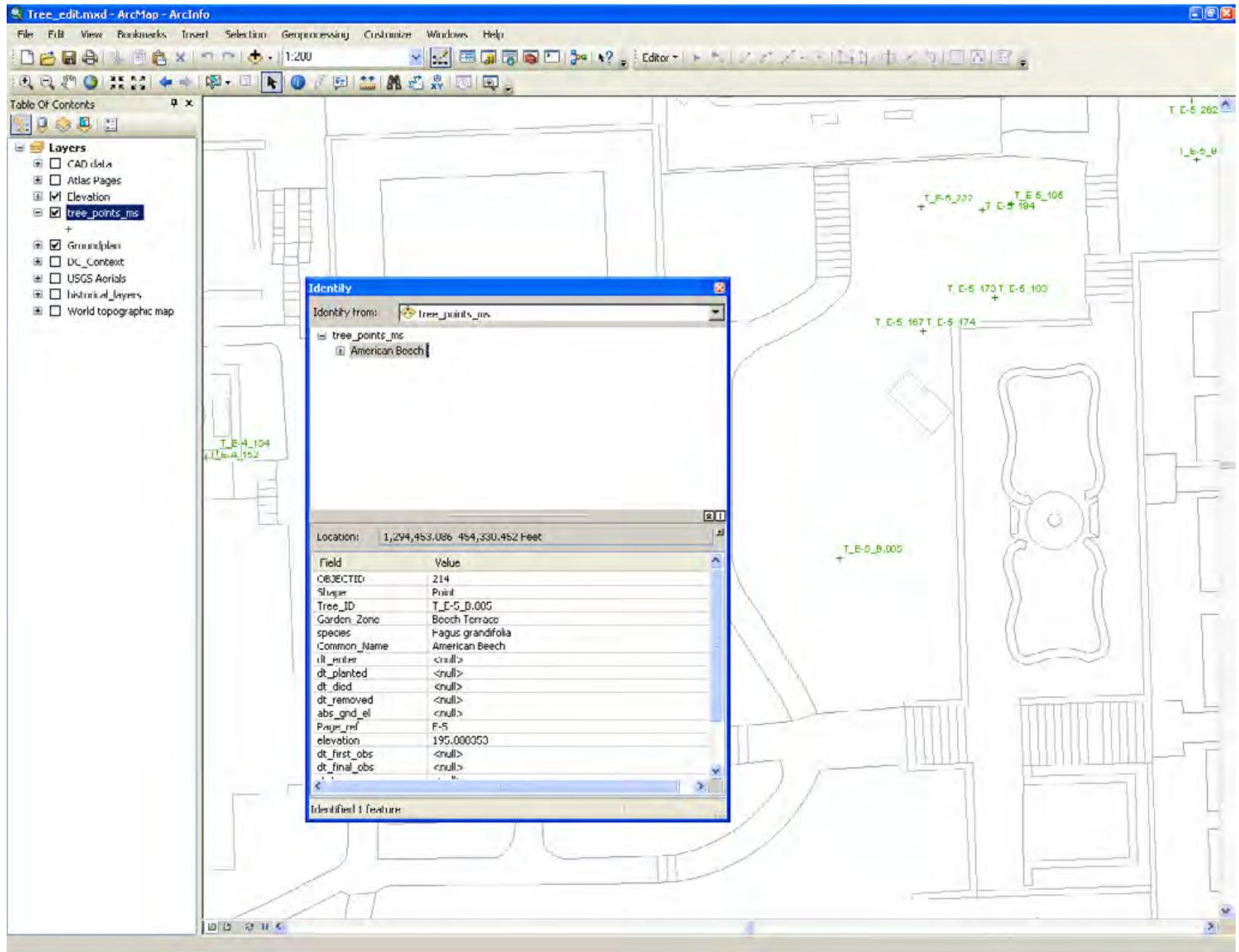
# IDENTIFY



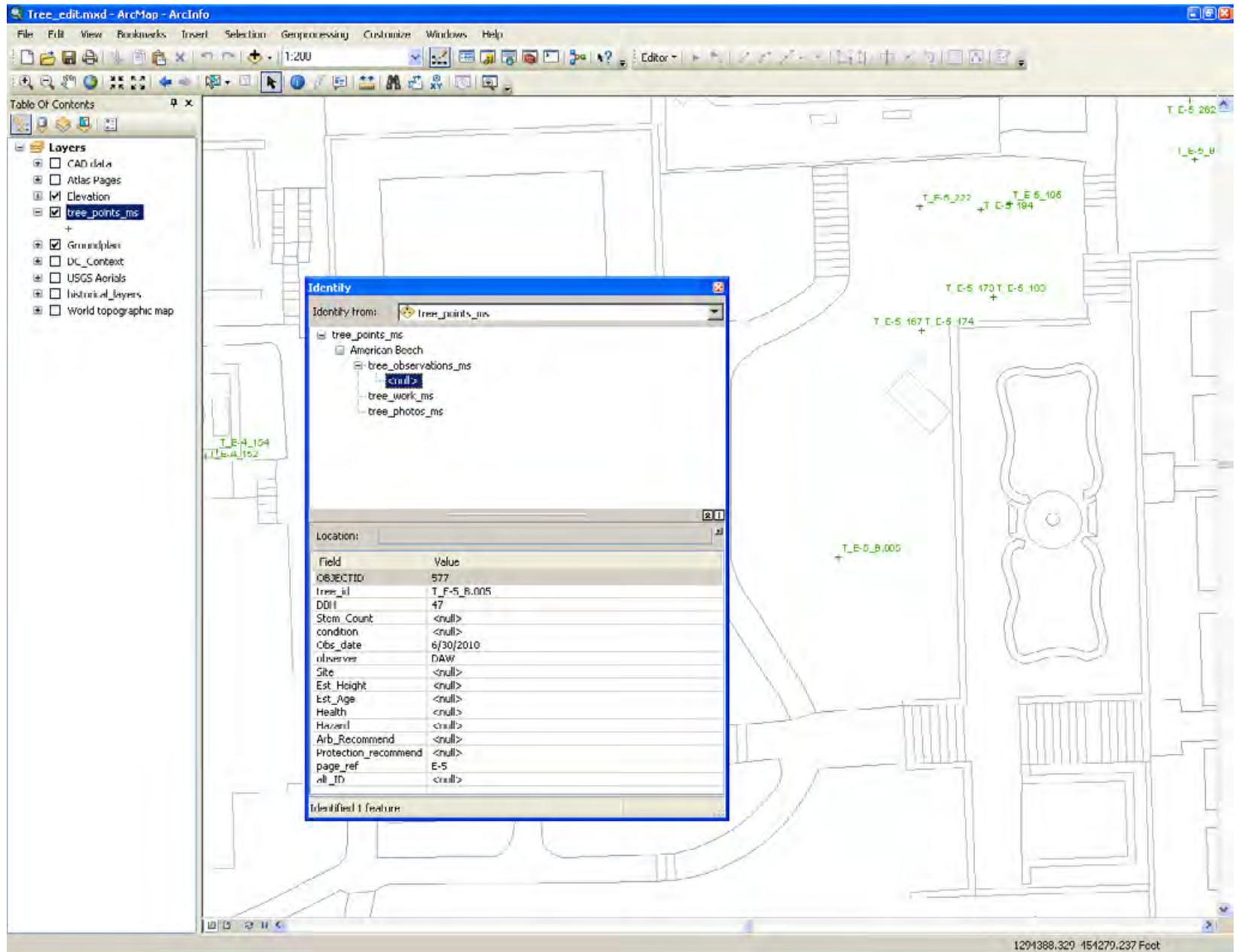
The *Identify Tool*  provides the most direct method for accessing object information through the map interface. To learn what information the DO tree database contains for a particular tree, such as the American Beech on beech terrace, simply find the tree on the map, activate the *Identify Tool* by clicking it in the toolbar, and click the tree point.



Click *Identify* in the *Tools* toolbar > click the tree symbol on the map.  
 When the Identify window first pops up you must specify which layer you are interested in. From the Identify drop-down menu choose the tree points layer: *Identify Window* > *Identify from* drop-down menu > *tree\_points\_ms*.

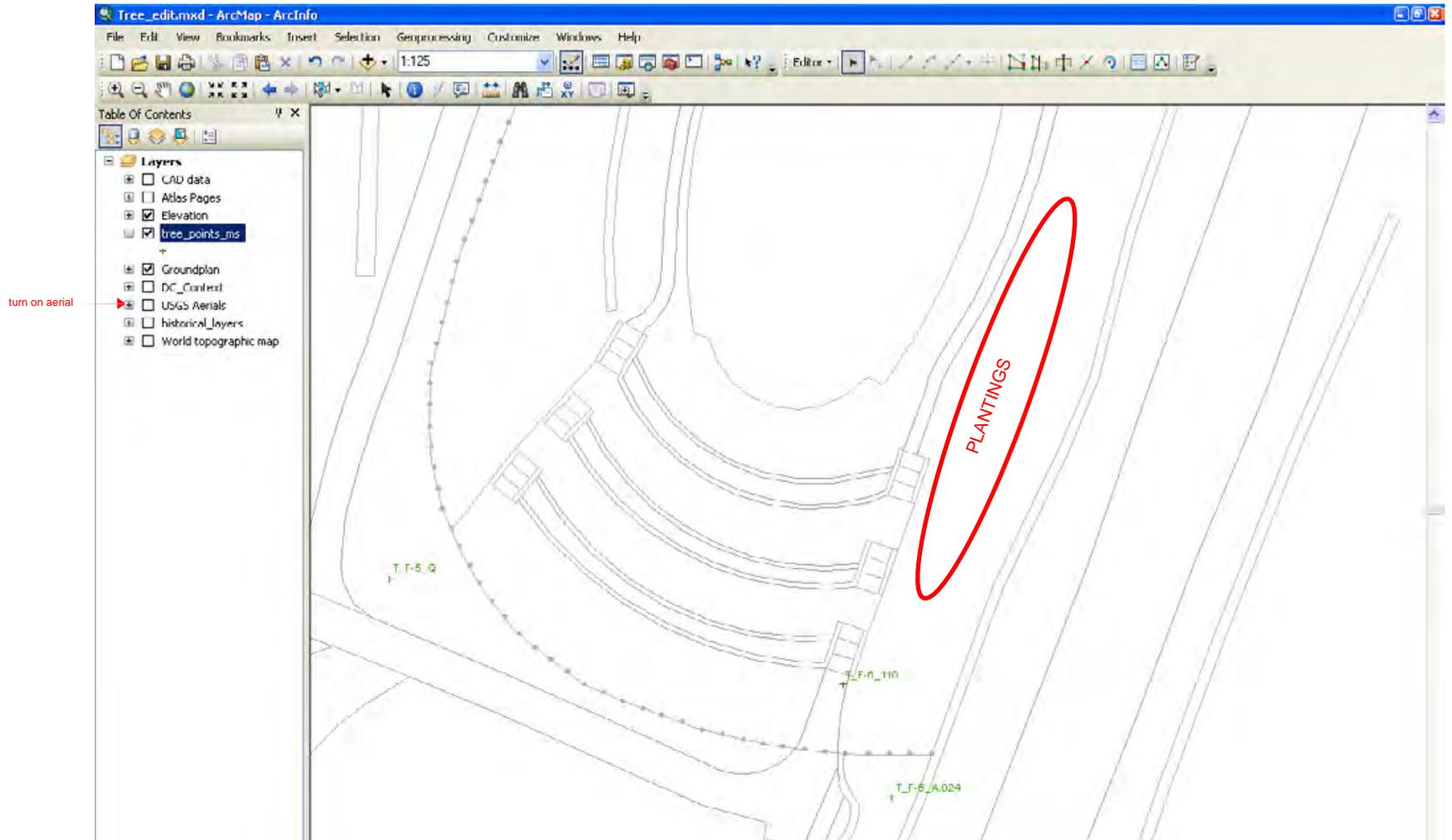


Again click the tree point and the *Identify* window now displays the *tree\_points\_ms* record. To view the associated tables expand the information tree by clicking the plus sign.



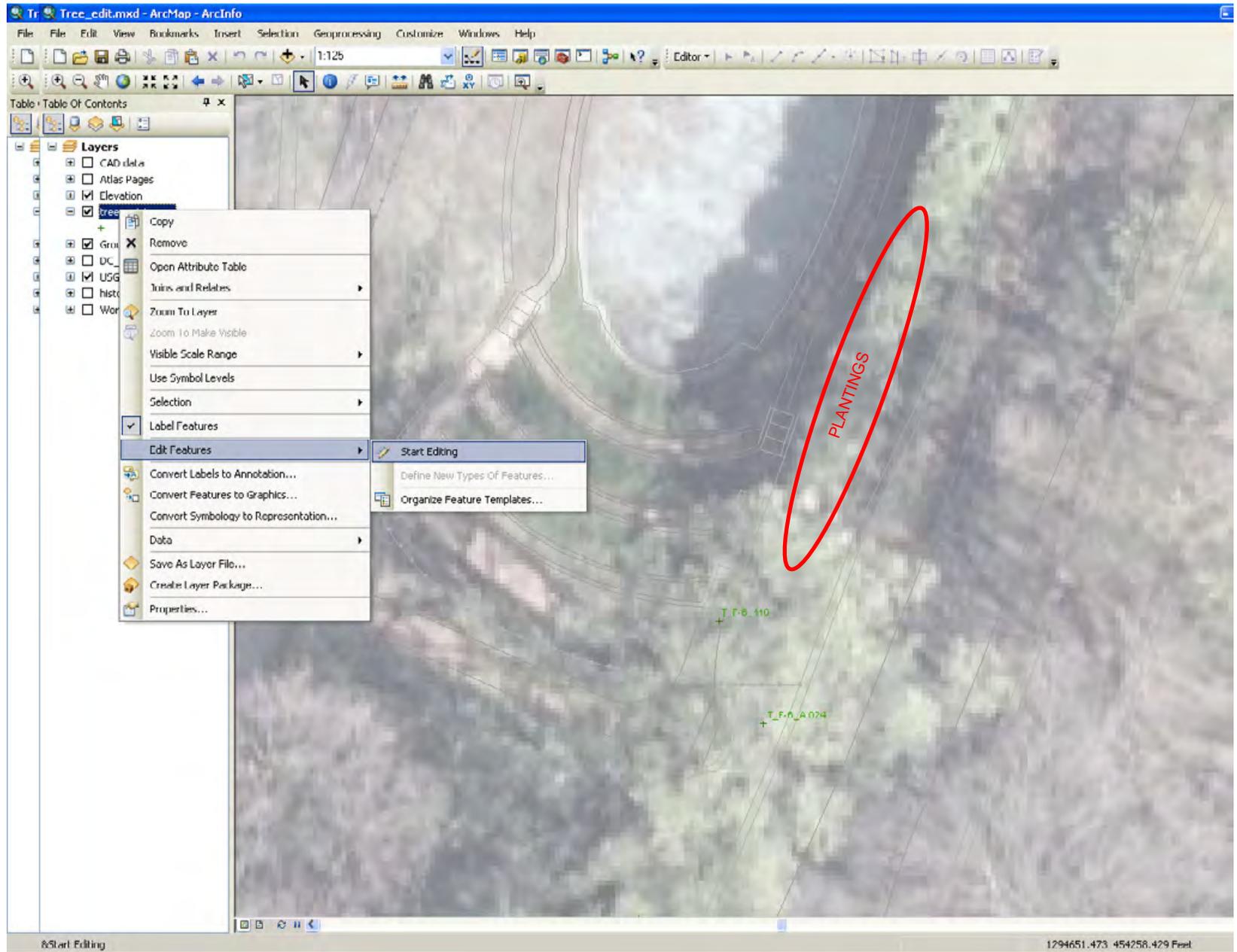
The *Identify* window shows that one *tree\_observation\_ms* record is associated with the tree point and no *tree\_work\_ms* or *tree\_photos\_ms* records are present for this tree. By clicking the record below *tree\_observations\_ms* we see that DAW, measured a DBH of 47 inches on 6/30/2010. \*While this is the most direct method to search for data by tree, it is not possible to edit or print records through the Identify window.

# ADDING TREES AND OBSERVATIONS

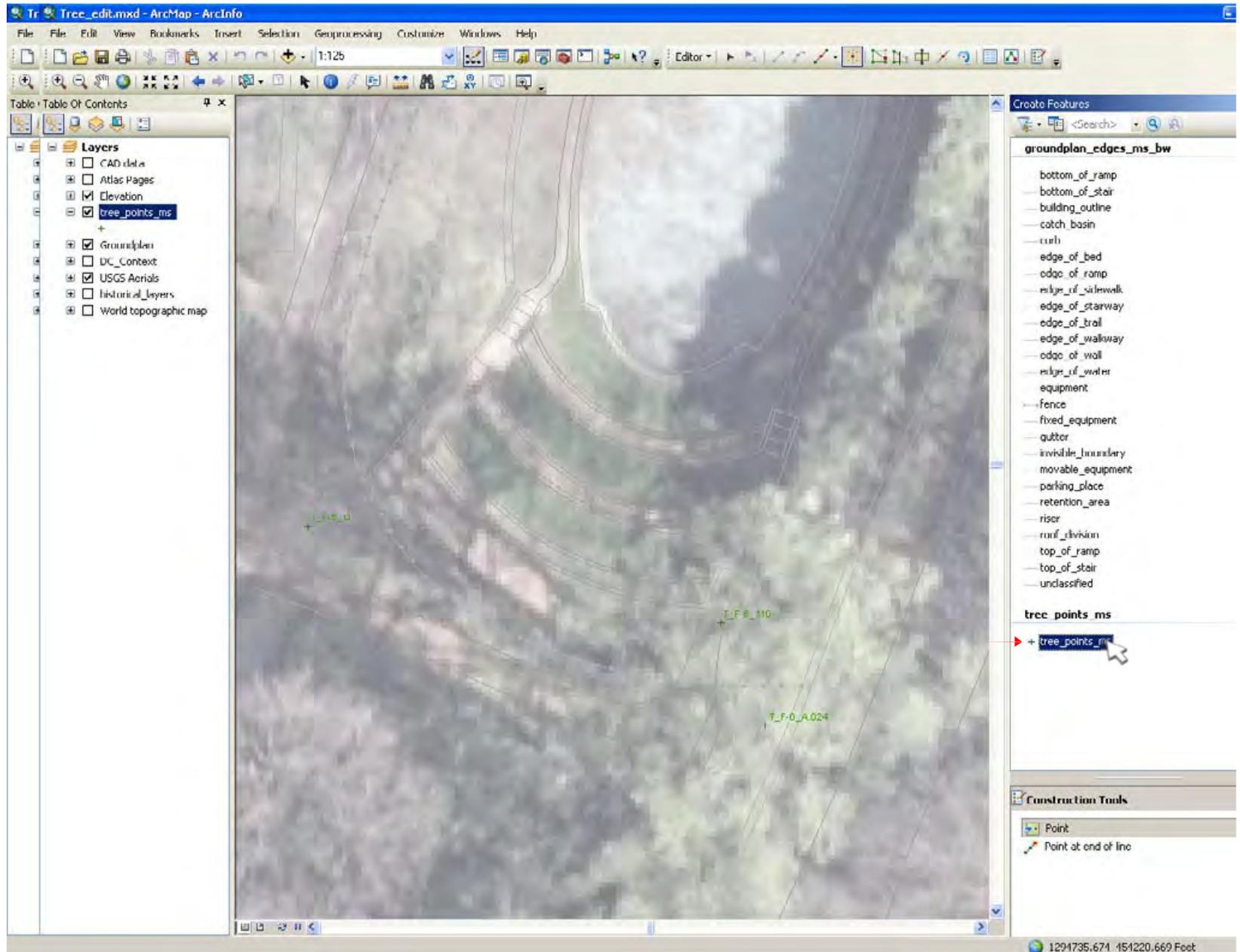


To add new trees to the tree database *tree\_points.ms* we first navigate to the area where the new trees are located. In this case we will add three trees points on the west side of the Lovers' Lane Pool. To help locate the trees it might be helpful to turn on the USGS aerial layer by clicking the check box called USGS aerial, in the *table of contents*. *table of contents* > *USGS aerial*, check mark.

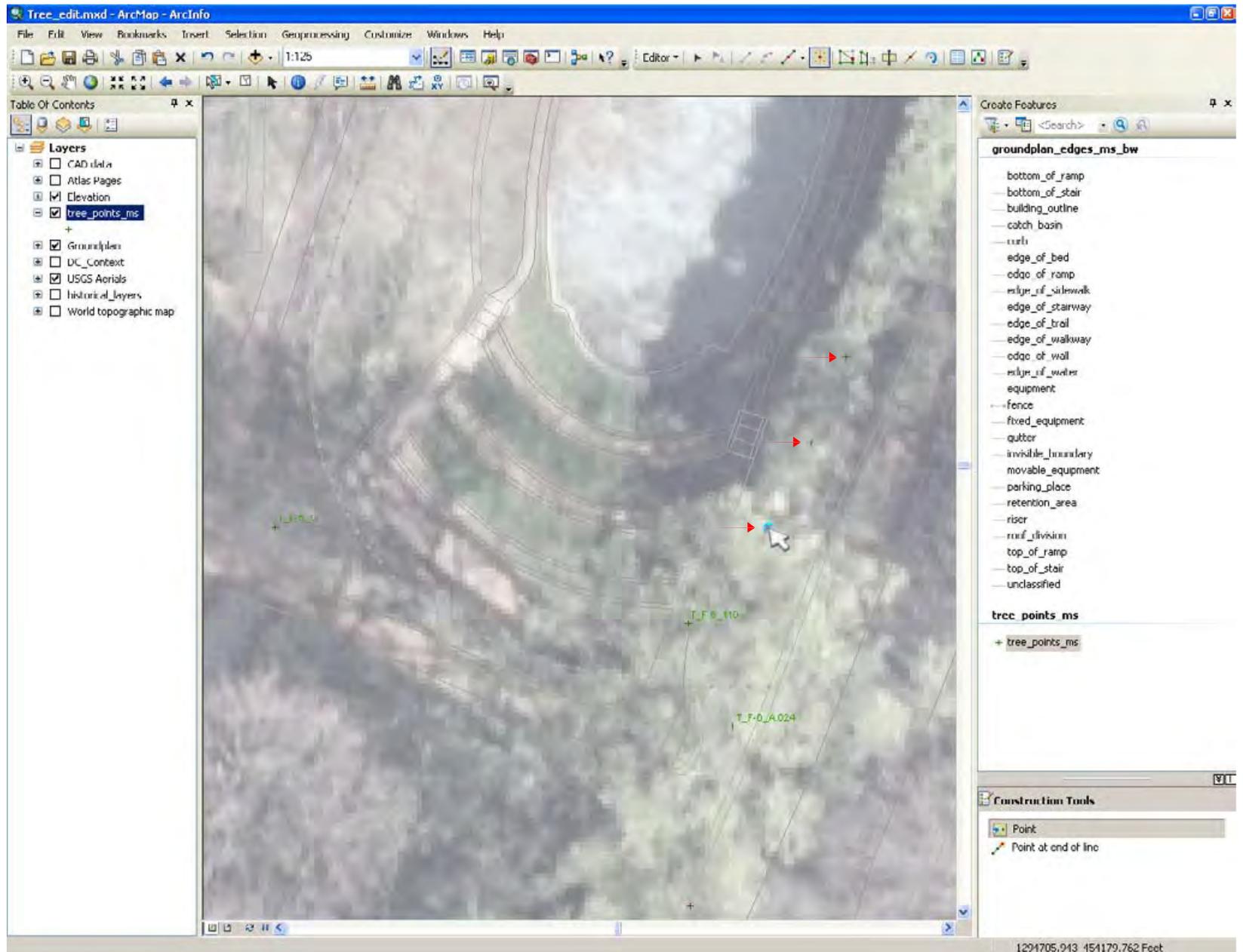
\*If the image is not displayed you may have to open the *USGS aerials* group by clicking the plus sign and then check the box next to the image file.



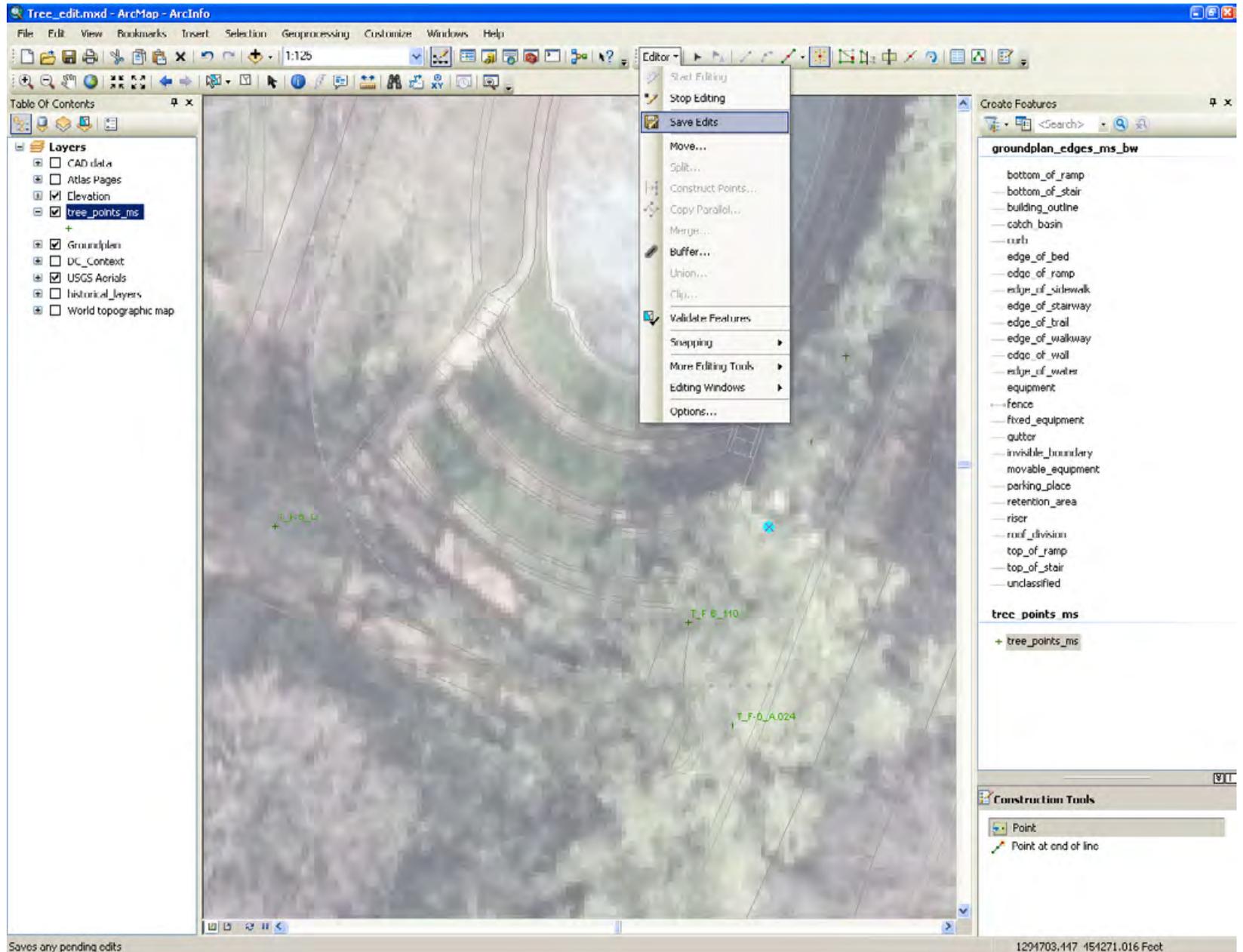
To edit objects or tables you must turn on the editing feature. *Table of Contents* > *tree\_points\_ms*, right click > *Edit Features* > *Start Editing*.  
\*This will allow editing of the entire geodatabase, which includes tree points, image, and observation tables.



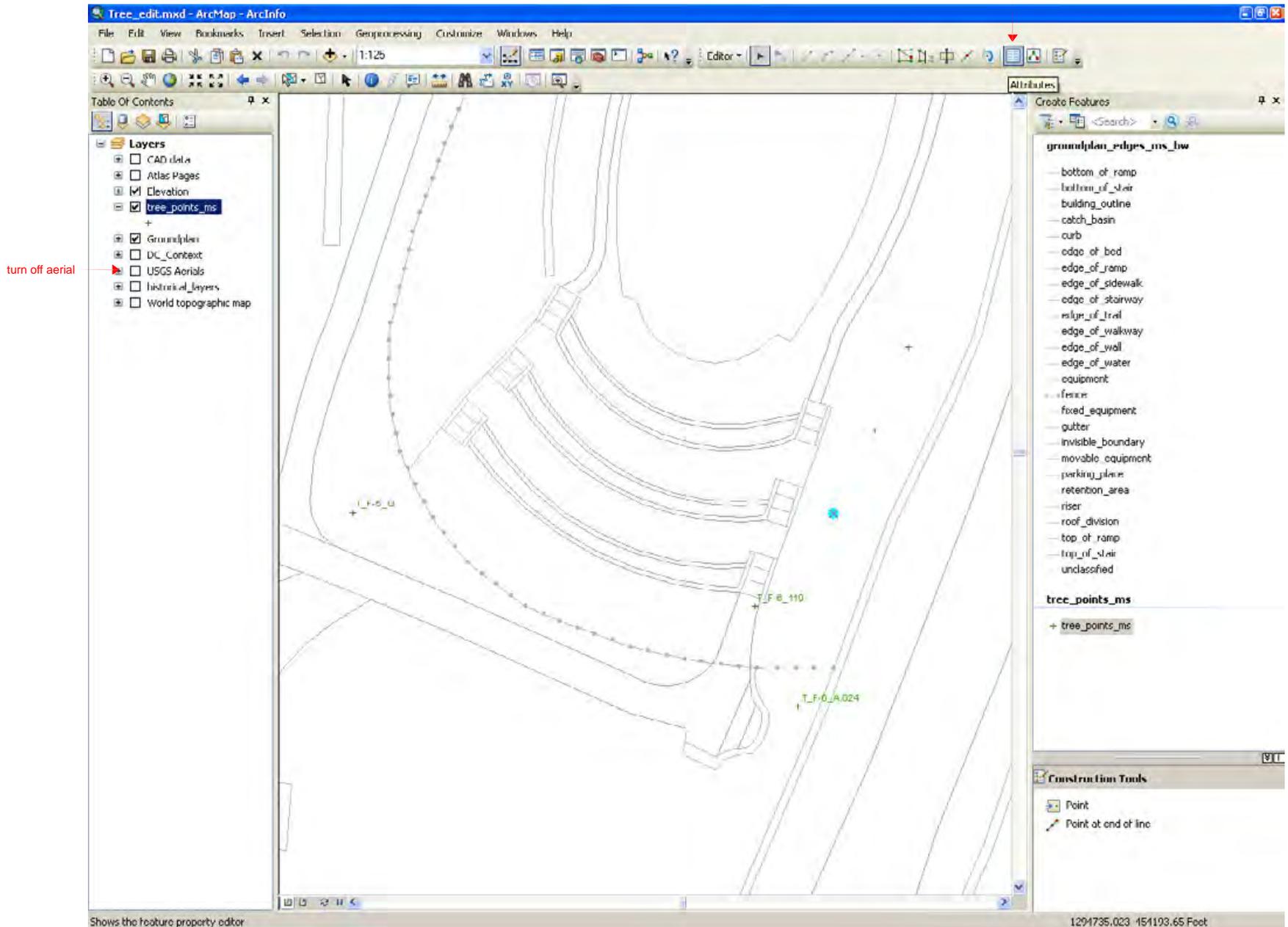
The *Create Feature* dialogue expands. To create a new tree click on the *tree\_points\_ms* layer: *Create Features* > click *tree\_points\_ms* (the cursor is now 'active') > click on the map to add a new tree.



The cursor remains 'active' and each click on the map will result in a new tree point. I add three trees by clicking in the three locations shown above. If you accidentally click in the wrong location, that's fine, you can move and delete points after done adding them.

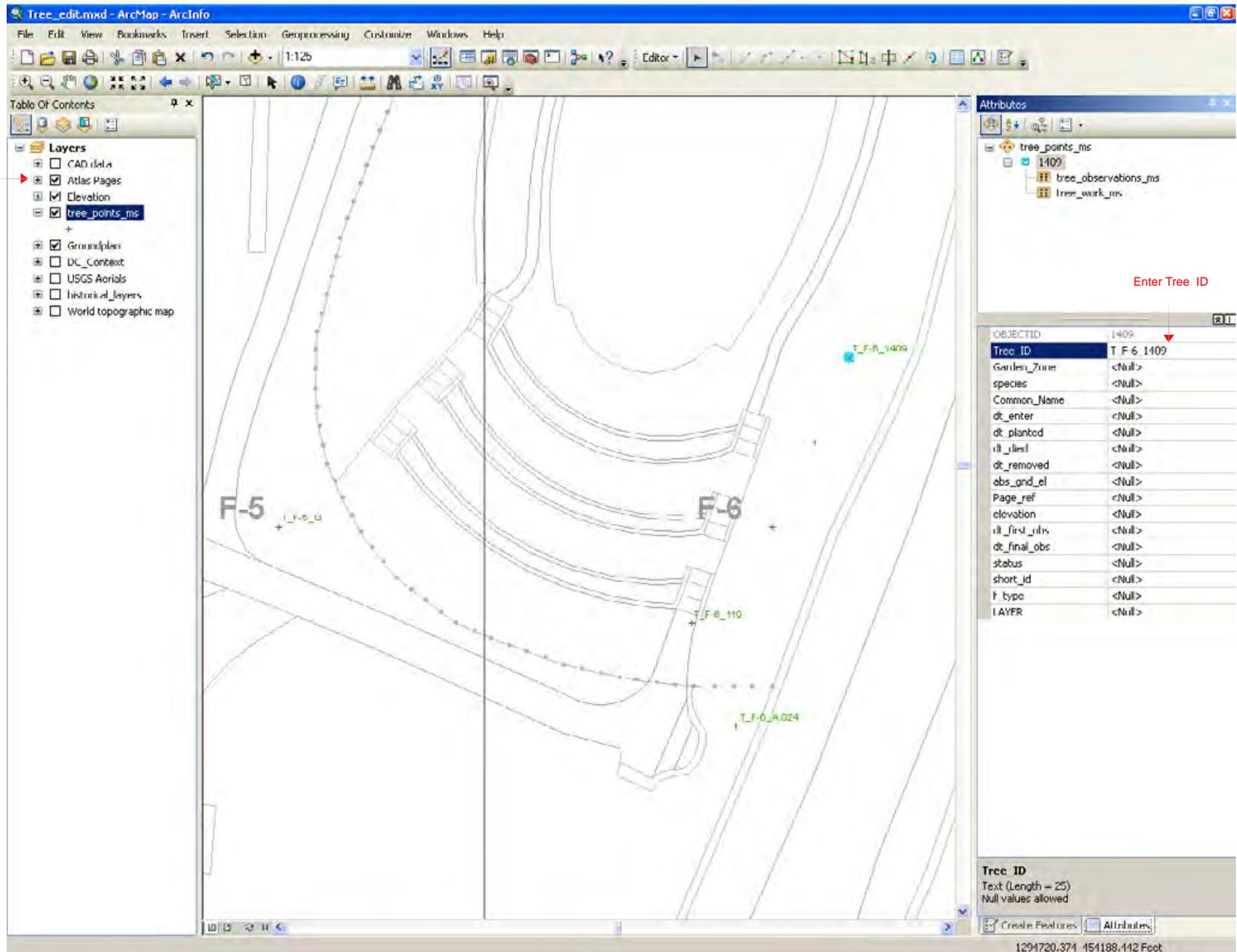


To stop adding trees: click *Editor* > *Save Edits*. The cursor is no longer active.



Now we will add information to the points we created. It may be helpful to turn off the aerial imagery.

Open the *Attributes* dialogue by clicking the icon in the *Editor toolbar*.



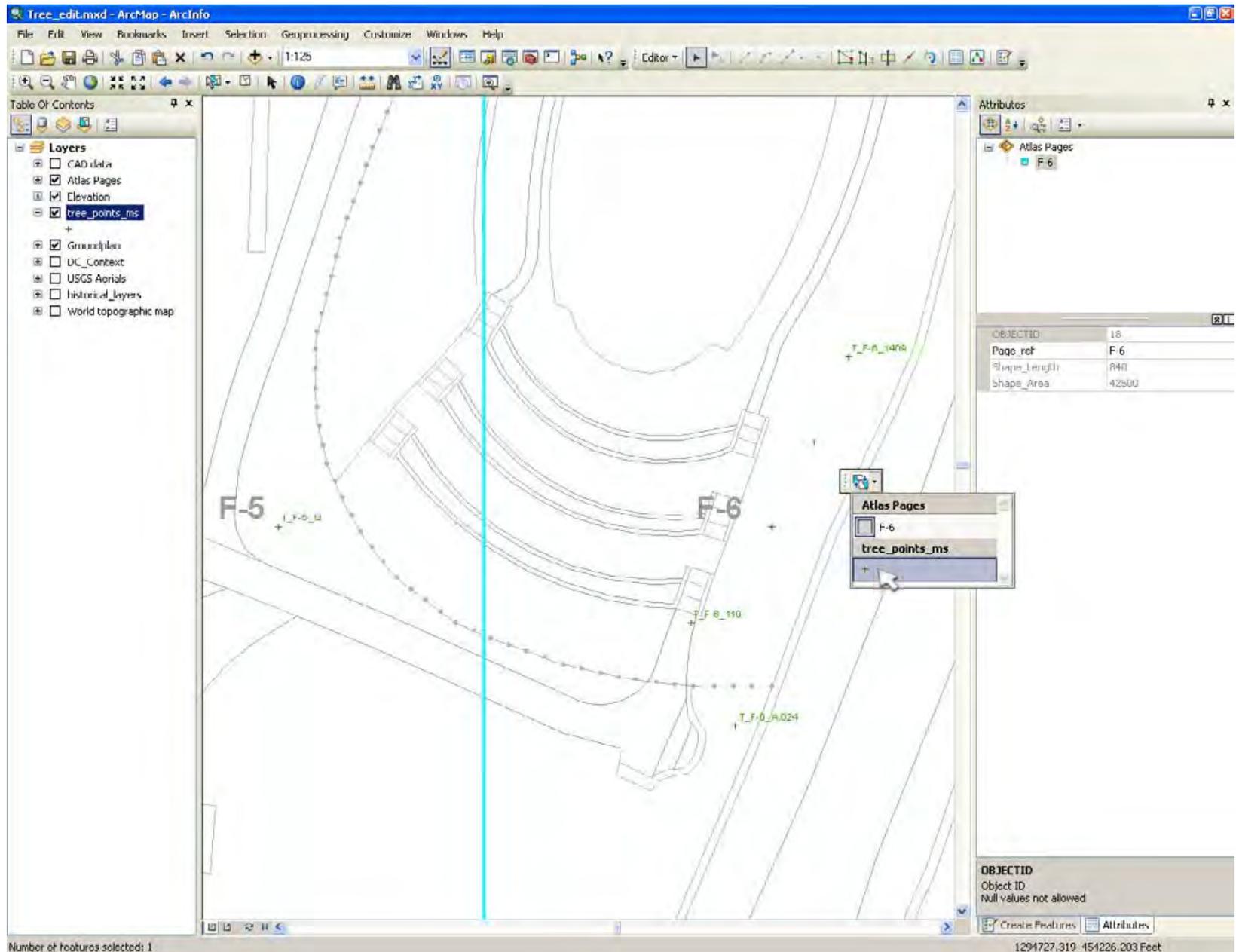
Select one of the new points by clicking on it. The tree record will appear in the *Attributes dialog* on the right side of the screen. We will enter a tree id number by clicking in the cell to the right of the *Tree\_ID* field, but first turn on the *Atlas Pages* layer for reference. Each *Tree\_ID* number is unique and begins with T for 'Tree' followed by the tree atlas quadrant (F-6) where it's located, and finally the *Object ID* number shown in the *Attributes* dialog. In this example I type T\_F-6\_1409.

The screenshot shows the ArcMap interface with a map of a garden area. The map displays several tree points labeled F-5, F-6, T\_F\_B\_1409, T\_F\_B\_110, and T\_F\_D\_A024. The attribute table for the 'tree\_points\_ms' layer is open, showing the following data:

OBJECTID	1409
Tree_ID	T F 6 1409
Garden_Zone	<Null>
species	<Null>
Common_Name	<Null>
dt_enter	July, 2011
dt_planted	July, 2011
dt_removed	Sun Mon Tue Wed Thu Fri Sat
obs_and_el	26 27 28 29 30 1 2
Page_ref	3 4 5 6 7 8 9
elevation	10 11 12 13 14 15 16
dt_first_obs	17 18 19 20 21 22 23
dt_final_obs	24 25 26 27 28 29 30
status	Today: 7/21/2011
short_id	<Null>
f_type	<Null>
LAYER	<Null>

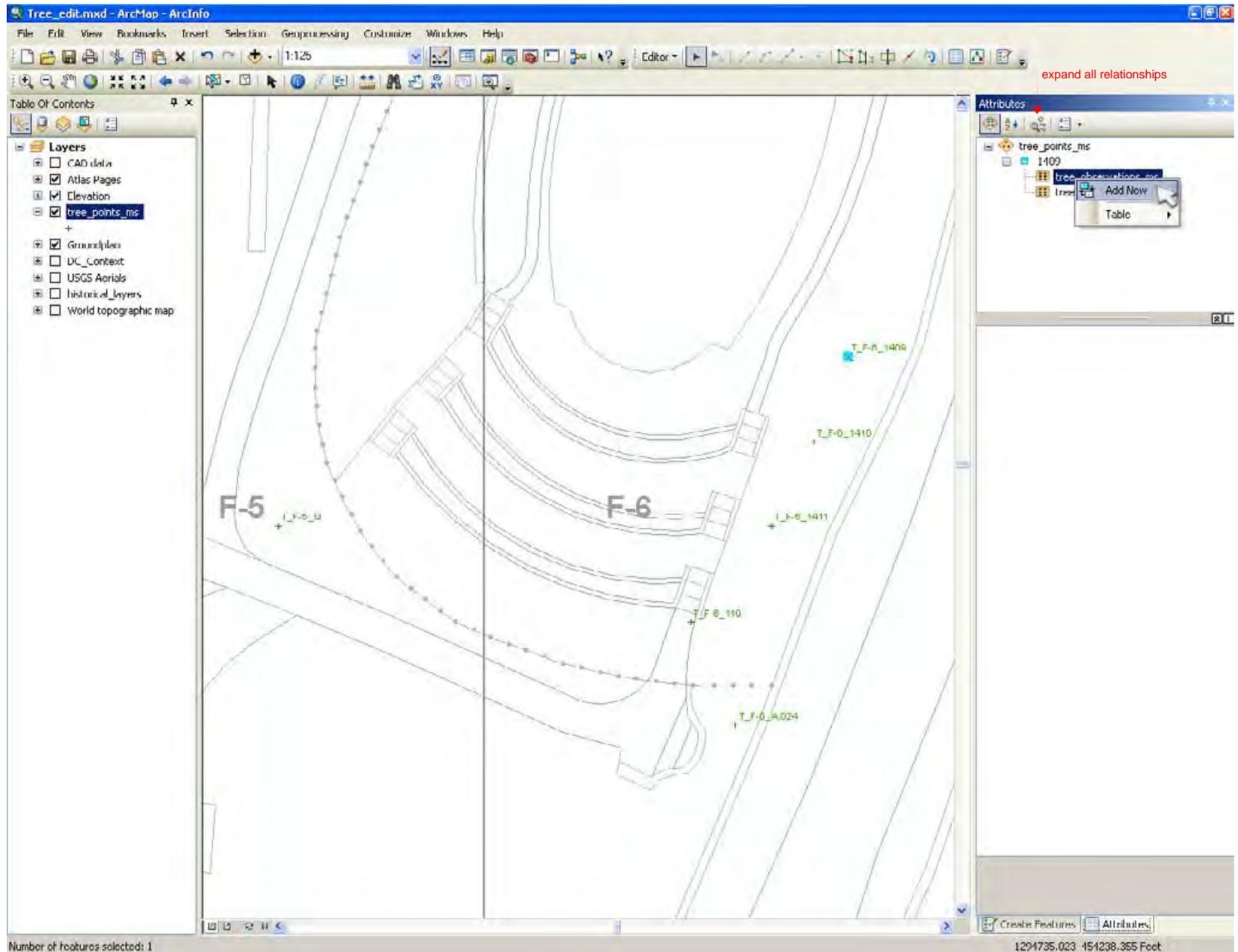
At the bottom right of the interface, the text '1291735.023 451191.016 Feet' is visible.

Enter all of the appropriate data before moving on to the next point.

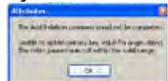


Click on the next tree point - ArcMap recognizes that there are overlapping objects where we clicked (*Atlas Pages* and *tree\_points\_ms*) and allows us to choose between them. Click point > choose *tree\_points\_ms*

Now enter a *Tree\_ID* as before and all additional data. Next we will add an observation.



To view observations, or in this case add a first observation, expand the data tree in the *Attributes dialog*. Click 'Expand All Relationships in Branch' . We see that there are observation and maintenance tables linked to this the tree records (*tree\_points\_ms*). Add a new record by right-clicking on the observation table. Right click *Observation table* > *Add New*. \*The tree point to which you are adding the observation must have a valid *Tree\_ID* number, if you have not yet set the *Tree\_ID* number you will receive an error.



The screenshot shows the ArcMap interface with a map of a site containing several tree observation points. The map displays contour lines and features labeled F-5 and F-6. Tree points are marked with labels like T\_F-6\_1409, T\_F-6\_1410, T\_F-6\_1411, T\_F-6\_110, and T\_F-6\_A024. The 'tree\_points\_ms' layer is active in the Table of Contents.

The 'Attributes' window shows the following data for the selected feature:

OBJECTID	945
tree_id	T_F-6_1409
tree_obs_id	<Null>
Species	<Null>
Common_Name	<Null>
DBH	<Null>
Stem_Count	1
condition	Poor
Obs_date	7/21/2011
observer	July, 2011
Site	
Est_Height	Sun Mon Tue Wed Thu Fri Sat
Fst_Age	26 27 28 29 30 1 2
Health	3 4 5 6 7 8 9
Hazard	10 11 12 13 14 15 16
Arb_Recommend	17 18 19 20 21 22 23
Protection_recom	24 25 26 27 28 29 30
map_ref	31 1 2 3 4 5 6
map_ref	today: 1/21/2011
alt_id	<Null>

The 'Obs\_date' field is highlighted with a calendar icon, and the date 7/21/2011 is displayed. The status bar at the bottom shows coordinates: 1294735.023 454195.278 Foot.

Enter observation data.

The screenshot shows the ArcMap interface with the Editor menu open. The 'Save Edits' option is highlighted. The map displays several tree points with labels like T\_F-6\_1410 and T\_F-6\_A.024. The Attributes dialog is open for tree\_id 1409, showing a table of field values.

OBJECTID	946
tree_id	T_F-6_1409
tree_obs_id	<Null>
species	<Null>
Common_Name	<Null>
DBH	<Null>
Stem_Count	<Null>
condition	<Null>
Obs_date	<Null>
observer	<Null>
Site	<Null>
Est_Height	<Null>
Fu_Age	<Null>
Health	<Null>
Hazard	<Null>
Arb_Recommend	<Null>
Protection_recommond	<Null>
page_ref	<Null>
alt_ID	<Null>

OBJECTID  
Object ID  
Null values not allowed

1294711.151 454270.907 Feet

Save edits when finished. Click *Editor* > *Save Edits*. \*Do not 'stop editing' we will make further changes outside of the *Attributes dialog*.

The screenshot displays the ArcMap interface with the 'tree\_points\_ms' layer selected in the Table of Contents. The 'Select Elements' tool is highlighted in the Standard Toolbar. The attribute table for 'tree\_points\_ms' is open, showing the following data:

OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_entered	dt_planted	dt_died	dt_removal	atlas_page_ref	Page_ref	elevation	dt
1	Point	T_G_4_56	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	181.103683	<Nu
2	Point	T_G-4_60	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-4	178.472	<Nu
3	Point	T_G-4_01	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	170.467194	<Nu
4	Point	T_G-4_65	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	187.948798	<Nu
5	Point	T_G-4_66	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	185.168961	<Nu
6	Point	T_G_4_57	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	188.043503	<Nu
7	Point	T_G-4_68	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-4	187.336777	<Nu
8	Point	T_G-4_08	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	109.092004	<Nu
9	Point	T_G-4_70	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	185.127197	<Nu
10	Point	T_G-4_71	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	166.714615	<Nu
11	Point	T_G_4_72	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-4	190.591003	<Nu
12	Point	T_G-4_73	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	C-4	180.881378	<Nu
18	Point	T_G-5_23	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-5	173.667053	<Nu
19	Point	T_G-5_24	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-5	174.179055	<Nu
20	Point	T_G-5_25	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-5	172.301666	<Nu
21	Point	T_G-5_26	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	G-5	172.480377	<Nu

View the new data entries in the `tree_points_ms` table. *Table of Contents* > Right click `tree_points_ms` > *open attribute table*.

Now select the tree points that we added. Choose the *Select Elements* tool (Standard Toolbar) > Click the first point and hold shift while clicking all of the other points.

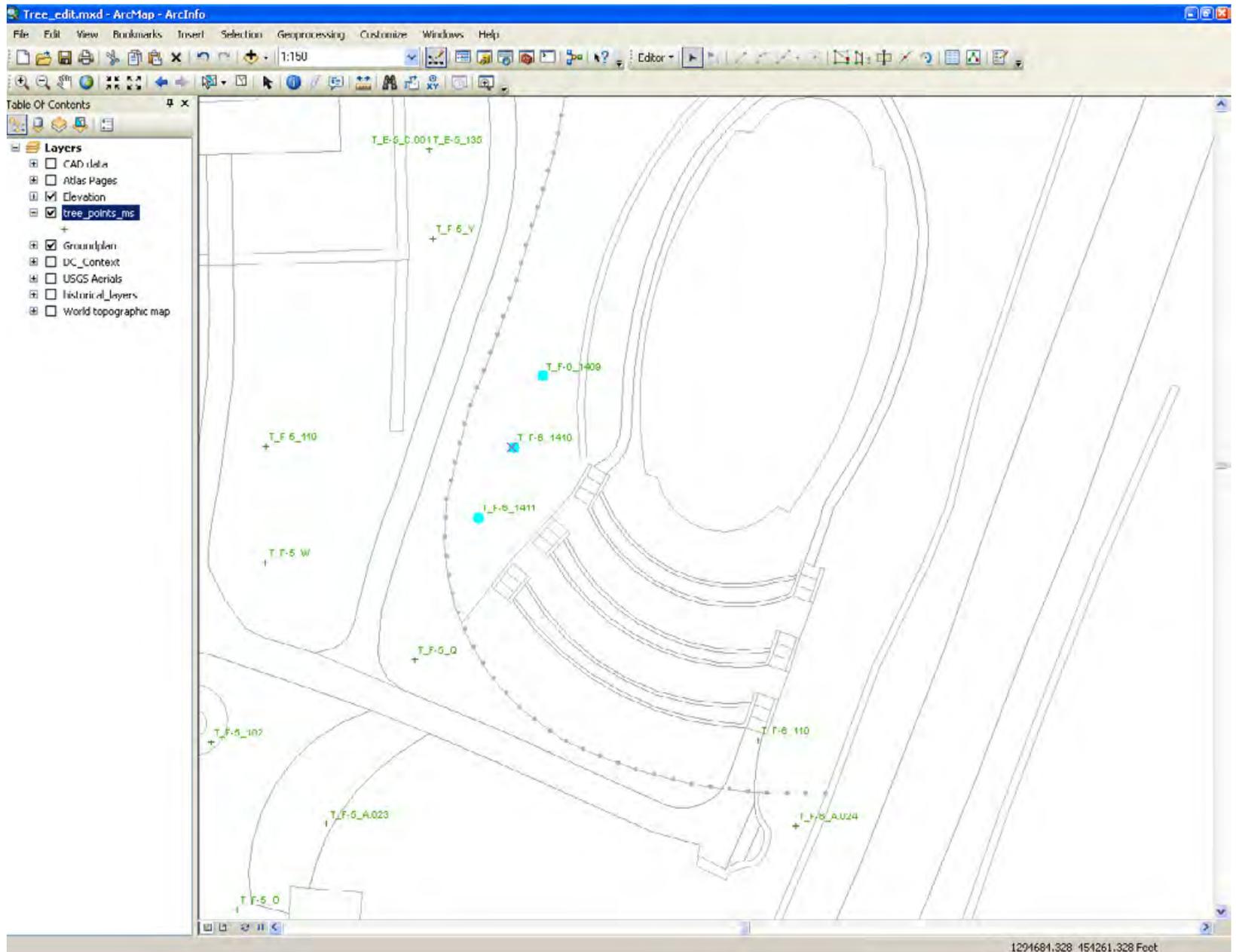
The screenshot shows the ArcMap interface with a map of a garden area. Three tree points are visible on the map, labeled T\_F-6\_1400, T\_F-6\_1410, and T\_F-6\_1411. The 'Table' window is open, displaying the data for the 'tree\_points\_ms' layer. The table has the following columns and data:

OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_enter	dt_planted	dt_died	dt_removed	atlas_page_id	Page_ref	elevation	dt_b
1409	Point	T_F-6_1409	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1410	Point	T_F-6_1410	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1411	Point	T_F-6_1411	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

At the bottom of the table view, there is a status bar showing '(3 out of 1408 Selected)' and a button labeled 'Show selected records'.

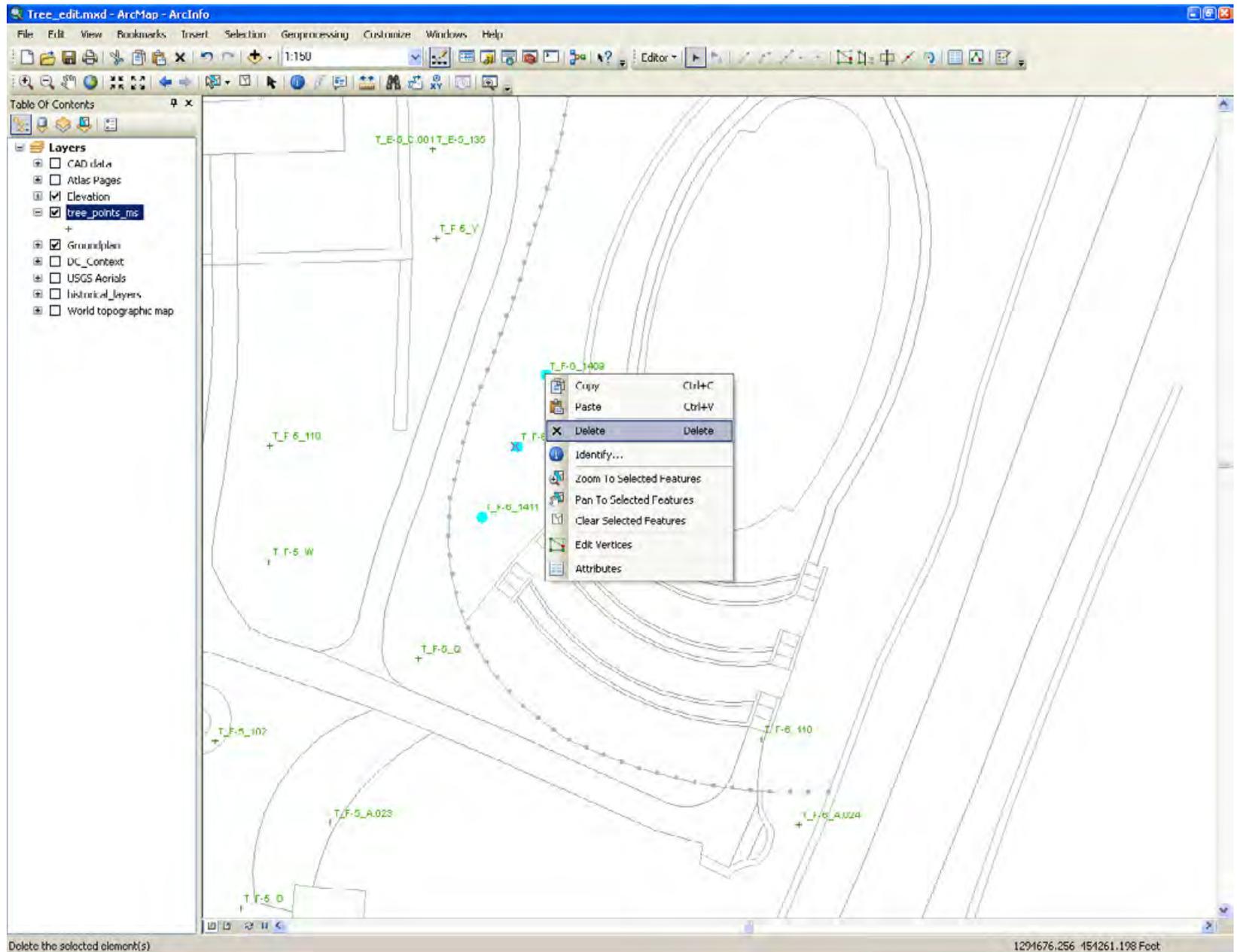
View the selected records within the table view. Click 'Show selected records' at the bottom of the *tree\_points\_ms* table. 

Now close the table by clicking 

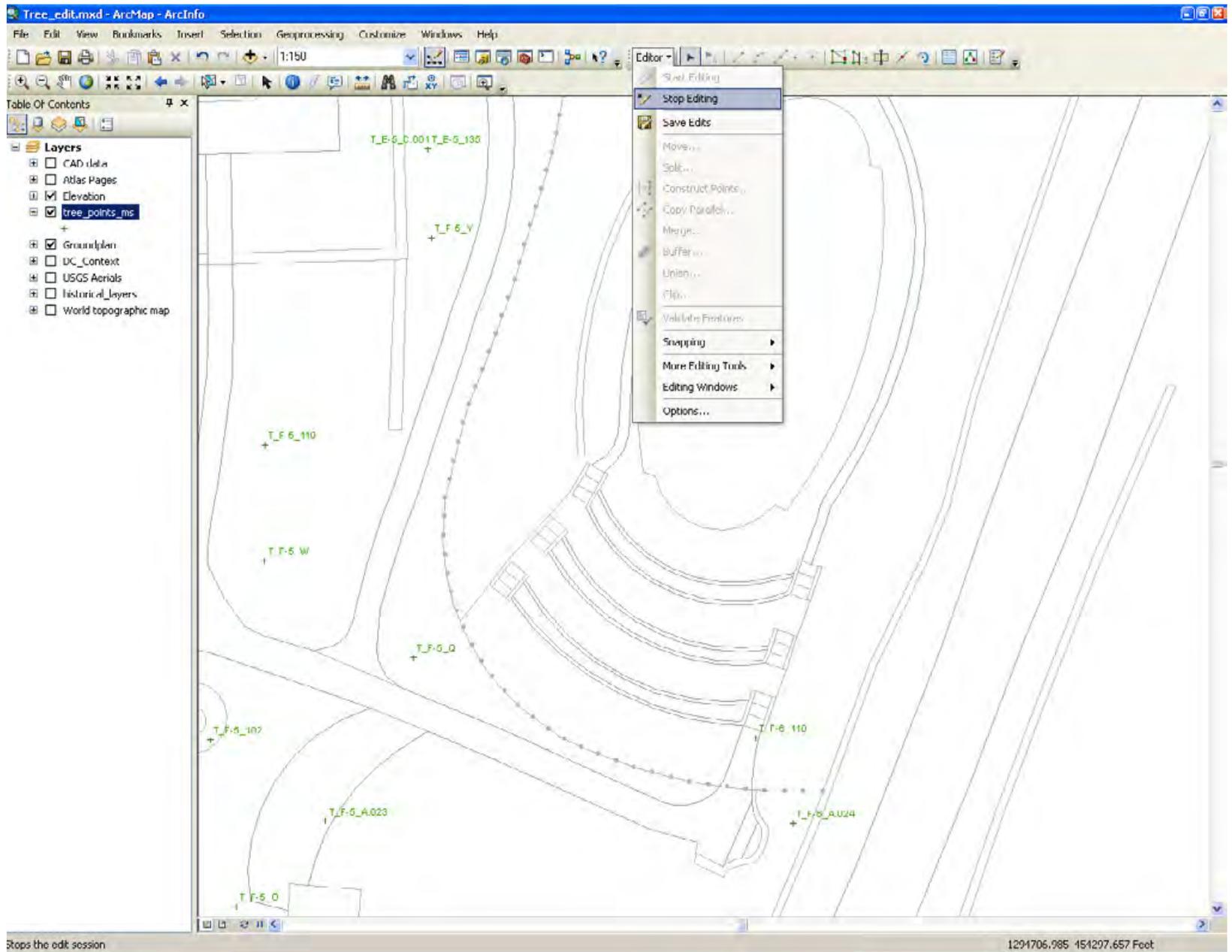


Move selected points to a new location. If you originally misplaced the points or moved a tree, the point can be dragged to a new map position. In this case, we move the three trees from the east of the pool to the west. Highlight all points if they are not still highlighted, then click on one and hold while dragging to the new location. The points retain their record attributes.

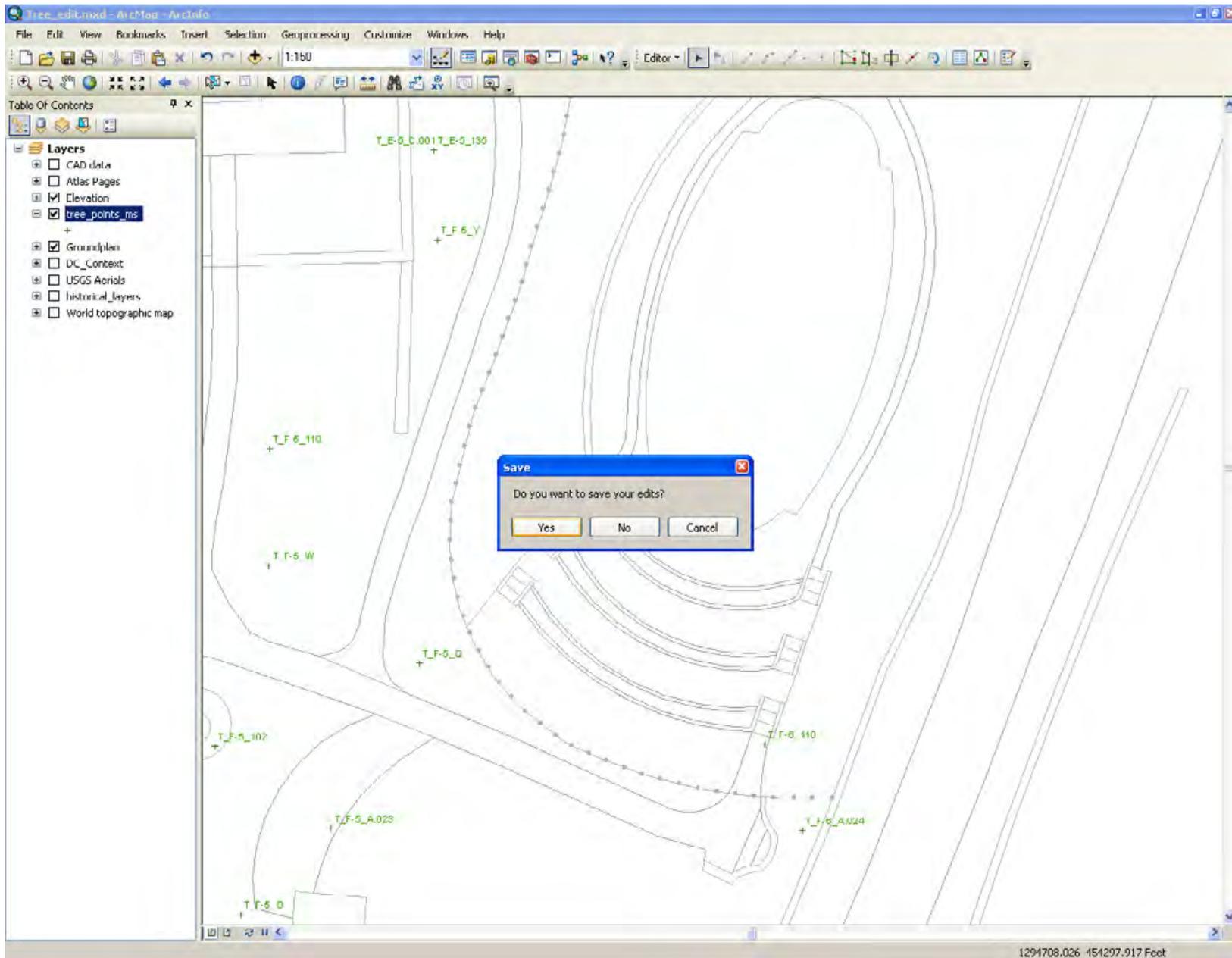
\*Note: you must have editing 'on' to drag objects.



I will now delete these practice points. \*Deleting points from *tree\_points\_ms* will also delete any of the observations or maintenance records that are associated with these points via the *Tree\_ID* number.

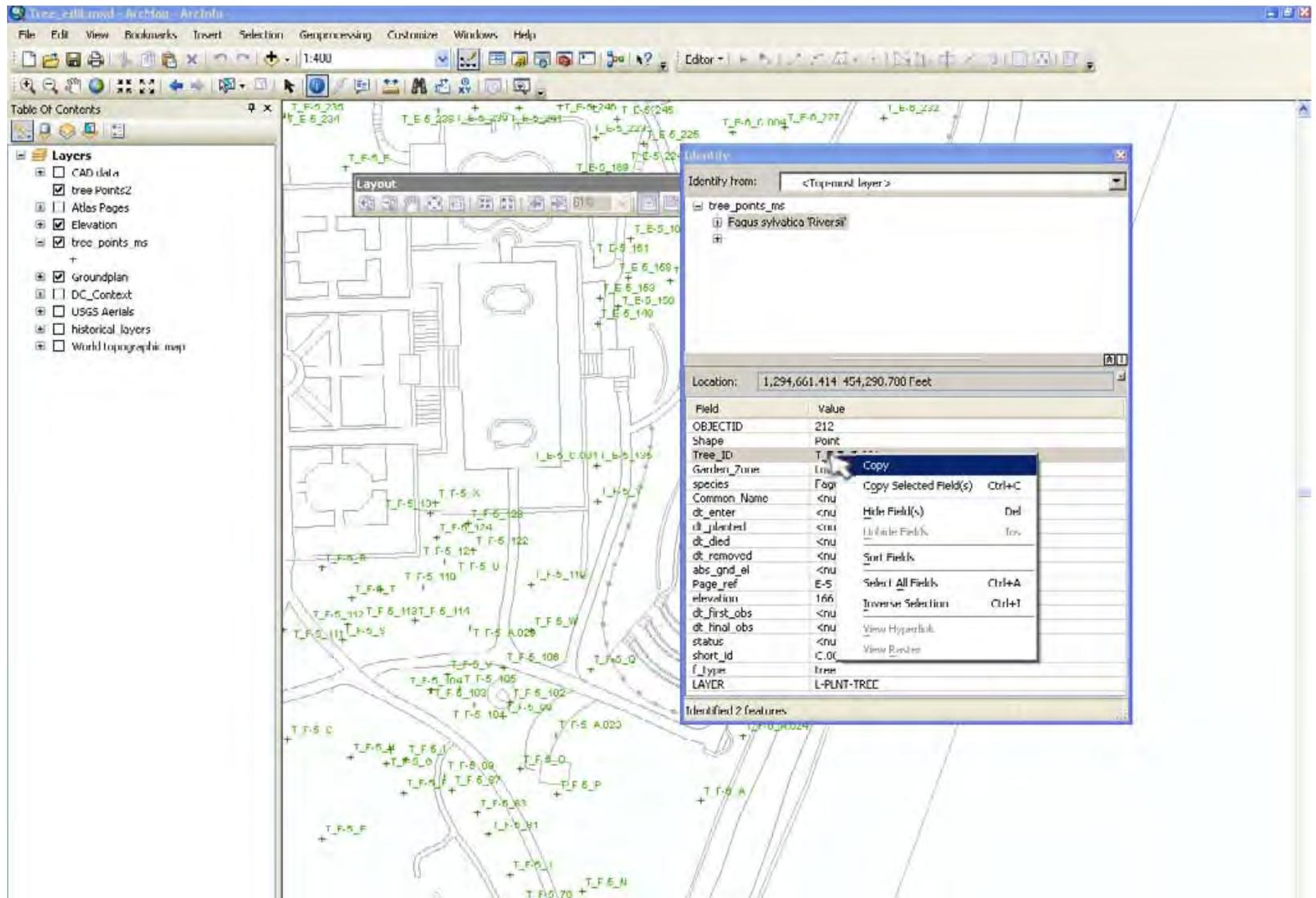


Stop editing after making all of the desired changes. Click *Editor* > *Stop editing*.

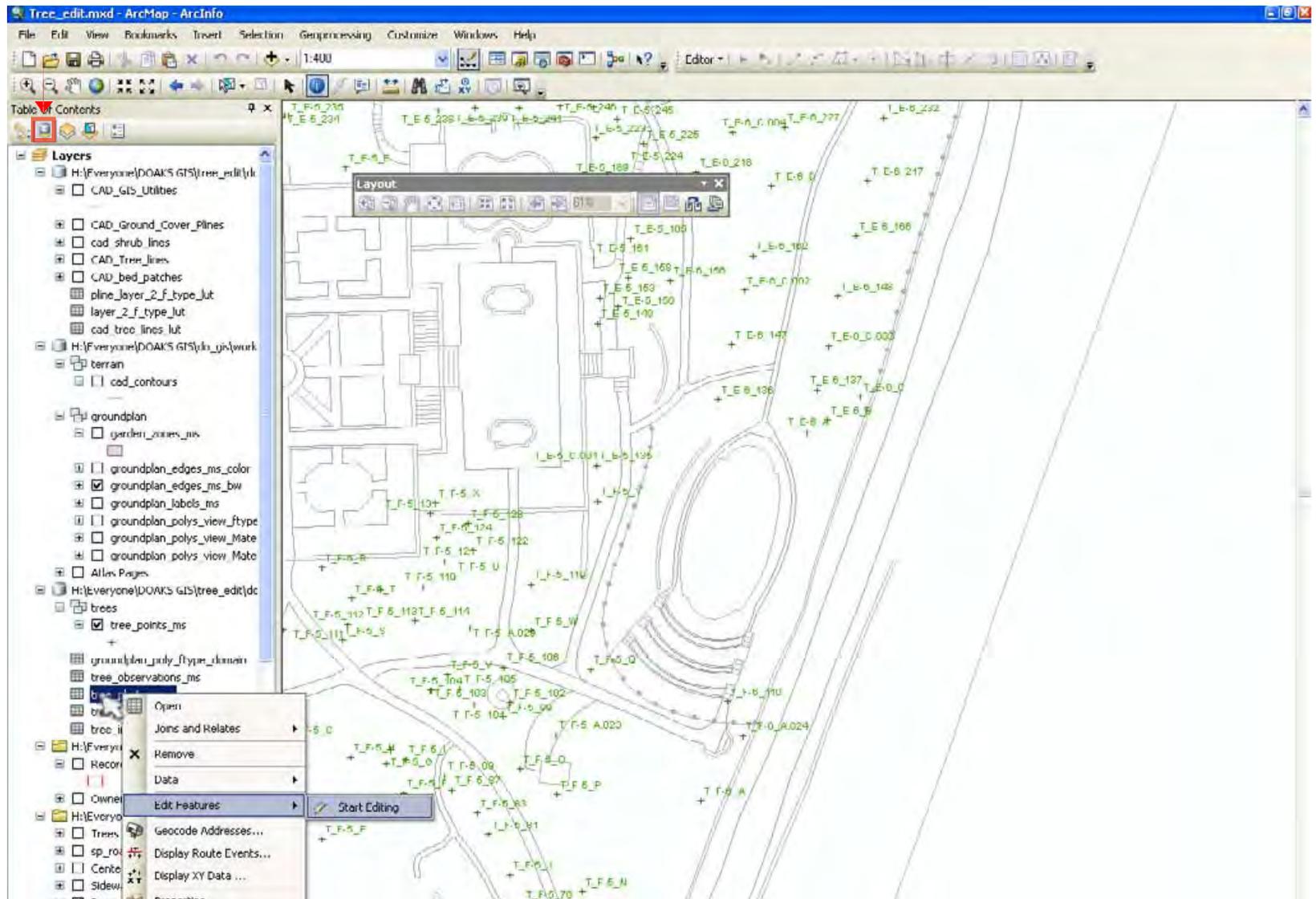


Save edits. Click Yes.

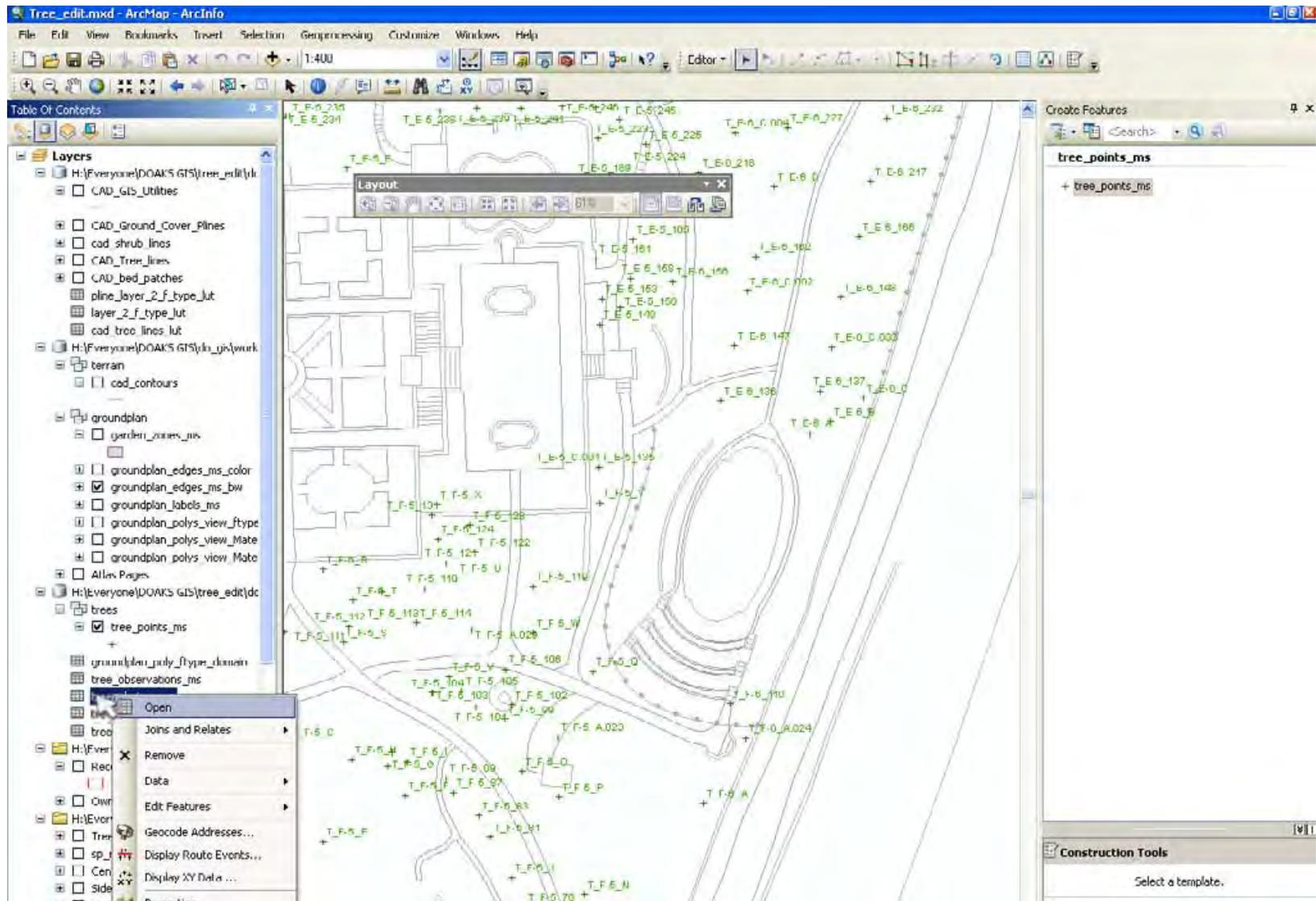




Copy the *Tree\_ID* number for the selected tree point. In the *Identify* dialogue, click in the cell containing the *Tree\_ID* number > Right-click the same cell > Select 'Copy'



Begin editing the *tree\_photo\_ms* database. Right-click *tree\_photo\_ms* (make sure that the table of contents is displaying by 'source') > Edit Features > Start Editing



The create features dialogue opens. We will not create any objects but will add an image entry to the *tree\_photos\_ms* table. Open the table. Right-click *tree\_photos\_ms* (table of contents) > Open.

The screenshot displays the ArcMap interface with a map of a building complex. Numerous tree points are marked on the map with labels such as T\_E-5\_101, T\_E-5\_100, T\_E-5\_107, T\_E-5\_103, T\_E-5\_102, T\_E-5\_104, T\_E-5\_105, T\_E-5\_106, T\_E-5\_108, T\_E-5\_109, T\_E-5\_110, T\_E-5\_111, T\_E-5\_112, T\_E-5\_113, T\_E-5\_114, T\_E-5\_115, T\_E-5\_116, T\_E-5\_117, T\_E-5\_118, T\_E-5\_119, T\_E-5\_120, T\_E-5\_121, T\_E-5\_122, T\_E-5\_123, T\_E-5\_124, T\_E-5\_125, T\_E-5\_126, T\_E-5\_127, T\_E-5\_128, T\_E-5\_129, T\_E-5\_130, T\_E-5\_131, T\_E-5\_132, T\_E-5\_133, T\_E-5\_134, T\_E-5\_135, T\_E-5\_136, T\_E-5\_137, T\_E-5\_138, T\_E-5\_139, T\_E-5\_140, T\_E-5\_141, T\_E-5\_142, T\_E-5\_143, T\_E-5\_144, T\_E-5\_145, T\_E-5\_146, T\_E-5\_147, T\_E-5\_148, T\_E-5\_149, T\_E-5\_150, T\_E-5\_151, T\_E-5\_152, T\_E-5\_153, T\_E-5\_154, T\_E-5\_155, T\_E-5\_156, T\_E-5\_157, T\_E-5\_158, T\_E-5\_159, T\_E-5\_160, T\_E-5\_161, T\_E-5\_162, T\_E-5\_163, T\_E-5\_164, T\_E-5\_165, T\_E-5\_166, T\_E-5\_167, T\_E-5\_168, T\_E-5\_169, T\_E-5\_170, T\_E-5\_171, T\_E-5\_172, T\_E-5\_173, T\_E-5\_174, T\_E-5\_175, T\_E-5\_176, T\_E-5\_177, T\_E-5\_178, T\_E-5\_179, T\_E-5\_180, T\_E-5\_181, T\_E-5\_182, T\_E-5\_183, T\_E-5\_184, T\_E-5\_185, T\_E-5\_186, T\_E-5\_187, T\_E-5\_188, T\_E-5\_189, T\_E-5\_190, T\_E-5\_191, T\_E-5\_192, T\_E-5\_193, T\_E-5\_194, T\_E-5\_195, T\_E-5\_196, T\_E-5\_197, T\_E-5\_198, T\_E-5\_199, T\_E-5\_200.

The 'Layers' panel on the left shows the following layers:

- H:\F\everyone\DOAKS GIS\tree\_edit\wk
- CAD\_GIS\_Utillies
- CAD\_Ground\_Cover\_Plines
- cad\_shrub\_lines
- CAD\_Tree\_lines
- CAD\_bed\_patches
- pline\_layer\_2\_f\_type\_lut
- layer\_2\_f\_type\_lut
- cad\_tree\_lines\_lut
- H:\F\everyone\DOAKS GIS\ykn\_gis\work
- terrain
- cad\_contours
- groundplan
- garden\_names\_mw
- groundplan\_edges\_ms\_color
- groundplan\_edges\_ms\_bw
- groundplan\_labels\_ms
- groundplan\_polys\_view\_f\_type
- groundplan\_polys\_view\_Mate
- groundplan\_color\_view\_Mate

The 'Table' window at the bottom shows the following data:

OBJECTID*	tree_ID*	tree_photo_id*	name	dt_taken	caption	photographer	file_path	Photos
7	T_E-5_B_005	<Null>	Beech Terrace	<Null>	http://3.bp.blogspot.com/_pD04Z_fatwY/S9eGID2VZI/AAAAAAAAAkc/35dc	the Gardener's Ey		<Raster
	T_E-5_CUM1							

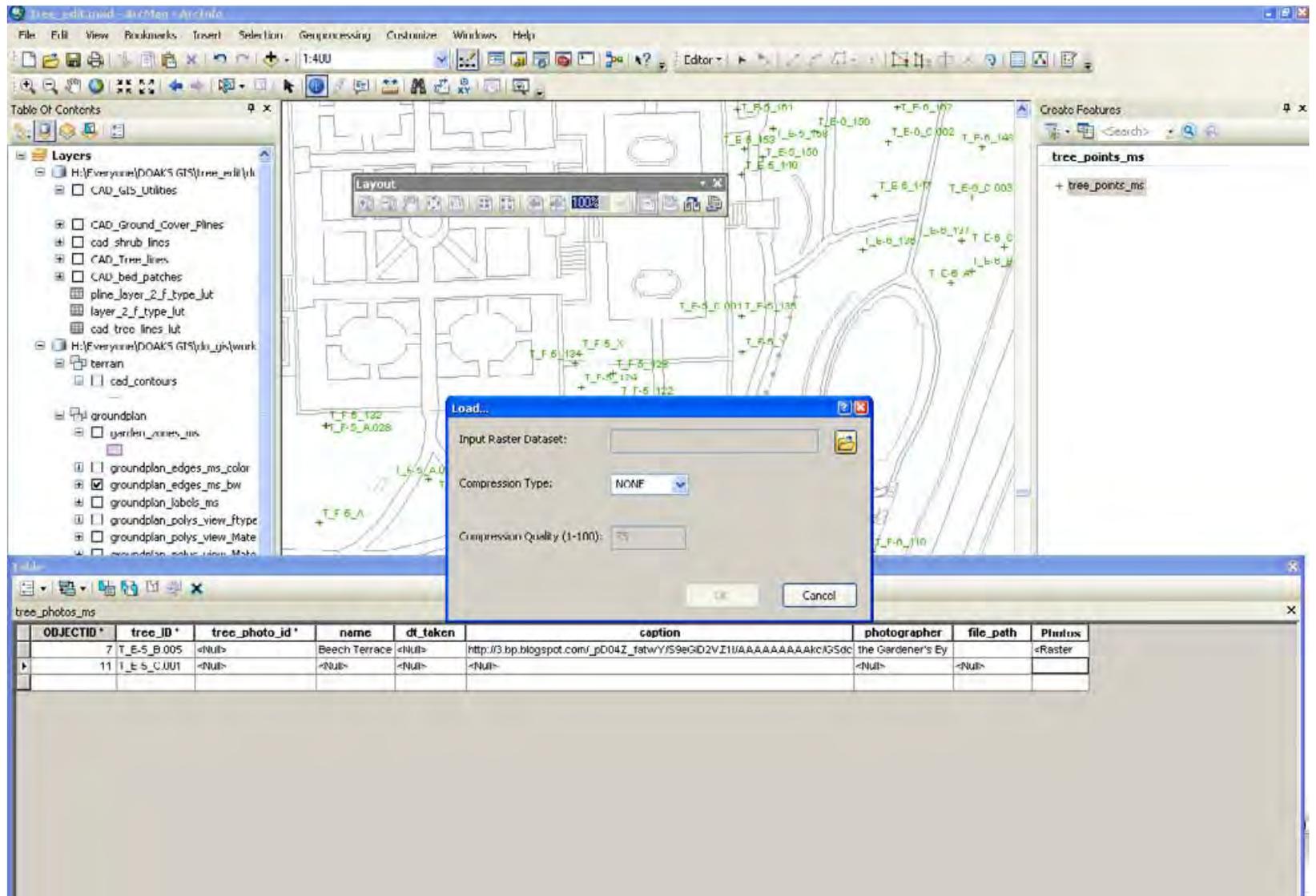
Create a new entry by clicking in the bottom most cell in the *tree\_ID* field. Click to select cell > right-click > Paste (alternatively, you can manually enter the *tree\_ID* of the tree point you would like to reference, but spelling and punctuation must be identical to the *tree\_ID* entry in *tree\_points\_ms*.)

The screenshot shows the ArcMap interface with a map of a building complex. A 'Layout' window is open over the map. On the left, the 'Layers' panel shows a tree layer selected. On the right, the 'Create Features' panel shows a 'tree\_points\_ms' layer. Below the map, a 'Table' window displays a table with the following data:

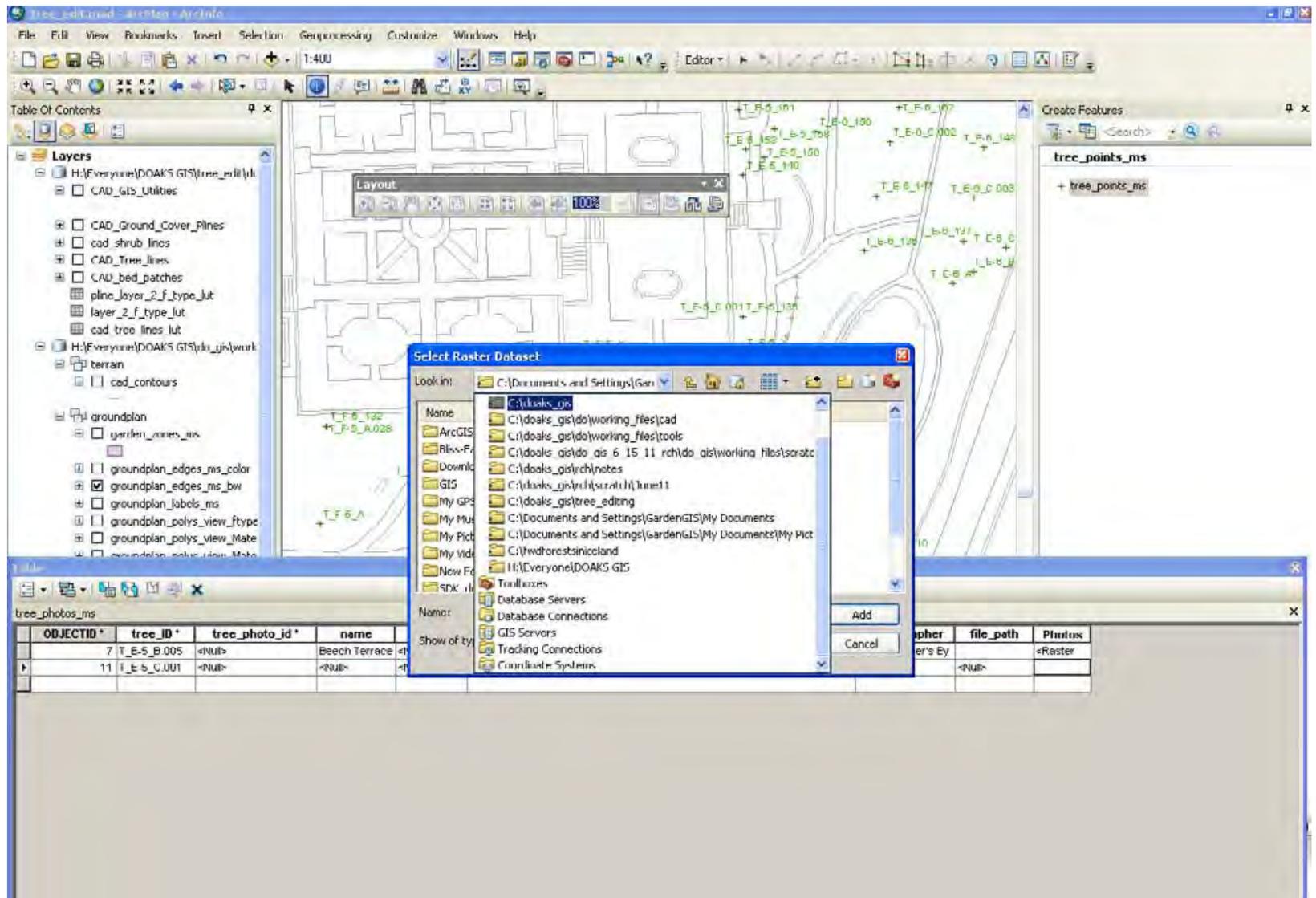
OBJECTID	tree_ID	tree_photo_id	name	dt_taken	caption	photographer	file_path	Photo
7	T_E-5_B_005	<Null>	Beech Terrace	<Null>	http://3.bp.blogspot.com/_pD04Z_1fatwY/S9eGID2VZI/AAAAAAAAAkc/5Sdc	the Gardener's Eye	<Null>	<Raster>
11	T_E-5_C_001	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	

A context menu is open over the 'Photo' field of the second row, with options: Load..., Clear, Save As..., and Properties... The 'Load...' option is highlighted. A text box on the right says 'Right-click raster dataset'.

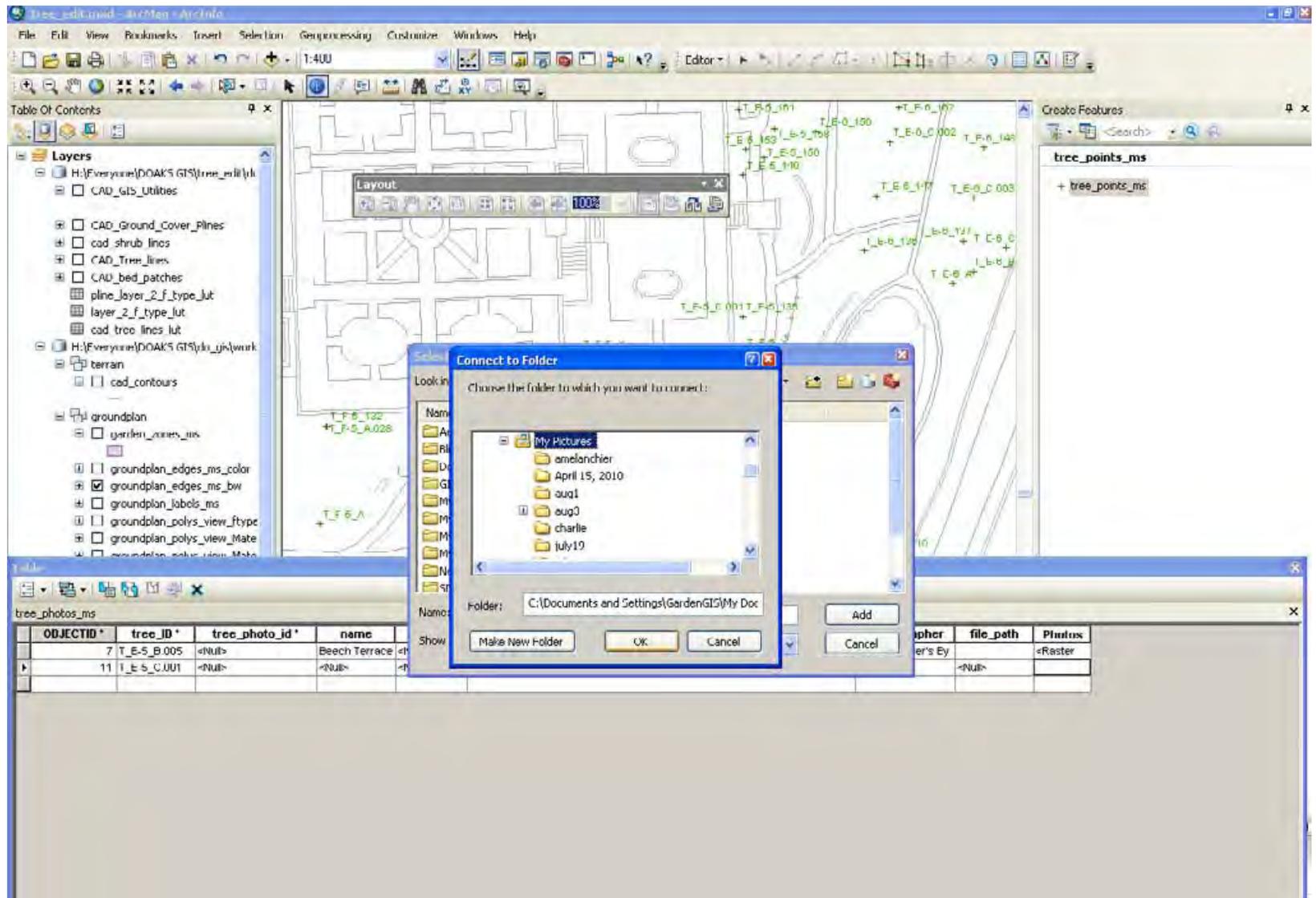
Confirm the entry by clicking in the gray box on the left side of the row. Then enter the image by clicking the cell in the same row under the Photo field > click the arrow > right-click in the image box > select load.



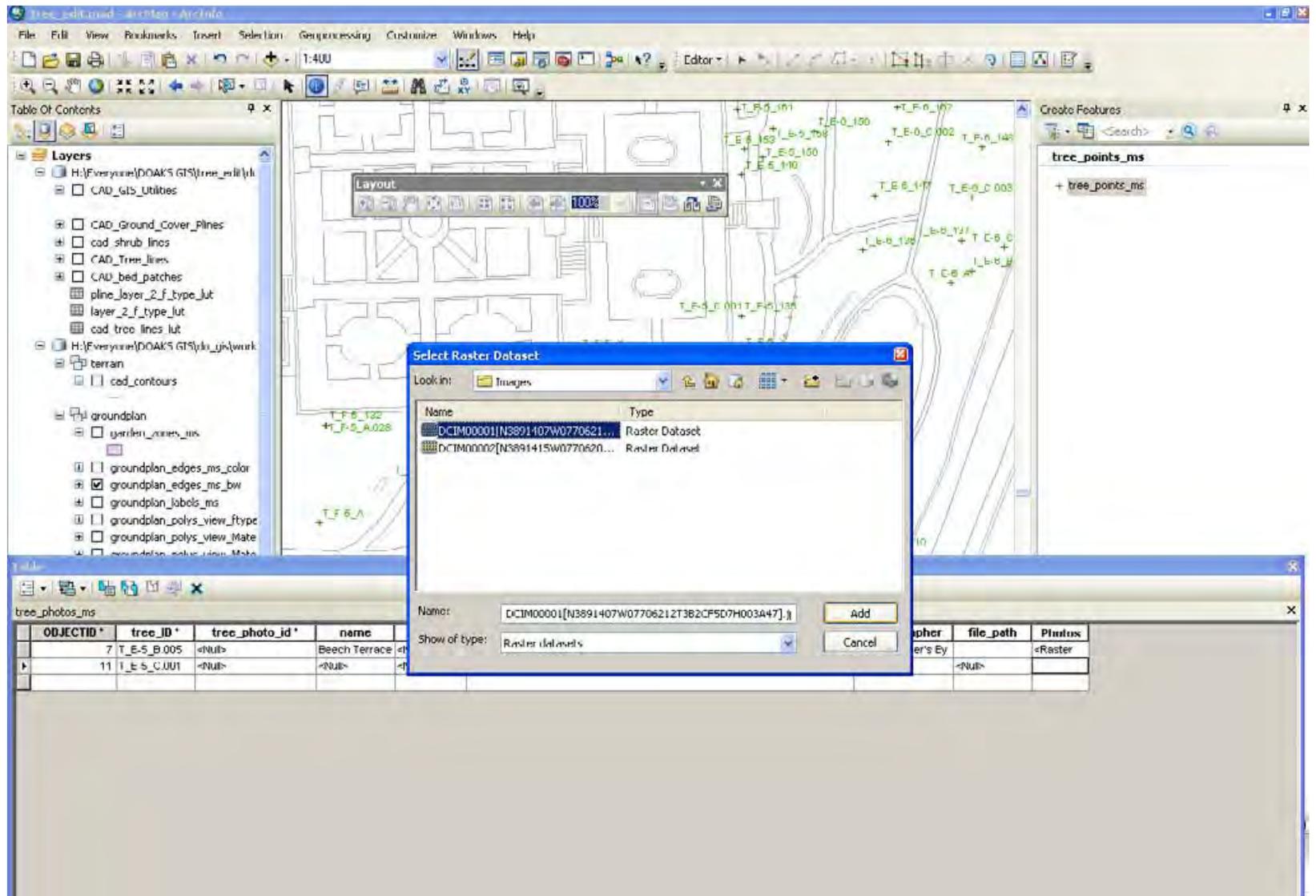
The Load... interface opens. Accept defaults and click the folder button  to locate the desired image.



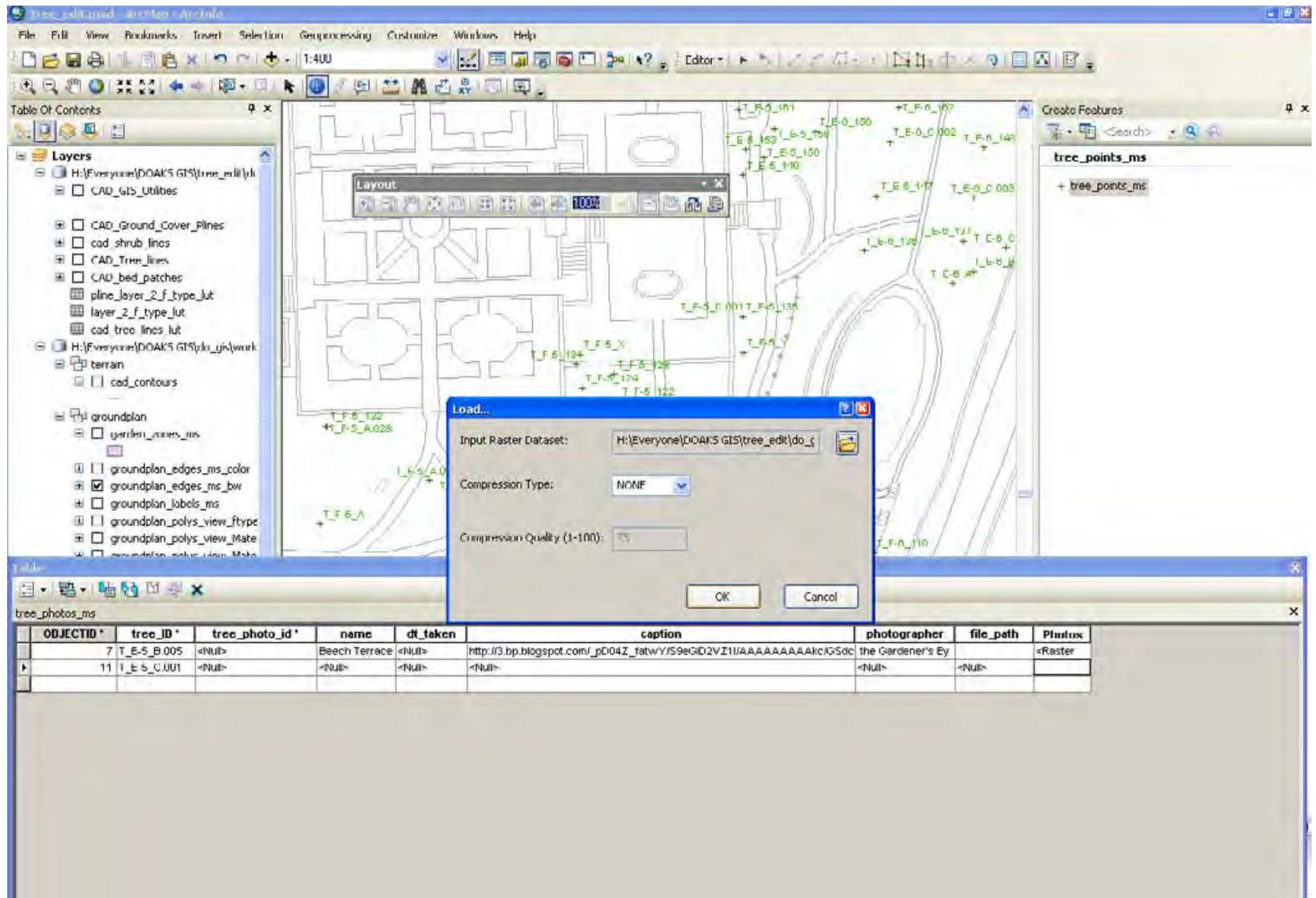
Use the drop-down menu to locate the directory where the image is located. If the directory is not shown you may have to add it using the *Connect to Folder* button.  \*Unlike in windows explorer where all folders are immediately 'browseable', in Arcmap folders must be added to the list of connected directories.



Click the Connect to Folder button  > locate the folder or directory where the image is located > click OK. \* You can not add the image itself only the directory or file, which contains the image.



Locate the folder which contains the image > select the image > click Add.



Accept defaults > click OK.

Tree\_edit.mxd - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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Table Of Contents

Layers

- H:\Everyone\DOAKS\GIS\tree\_edit\trk
  - CAD\_GIS\_Utillies
  - CAD\_Ground\_Cover\_Plines
  - cad\_shrub\_lines
  - CAD\_Tree\_Lines
  - CAD\_bed\_patches
  - pline\_layer\_2\_f\_type\_lut
  - layer\_2\_f\_type\_lut
  - cad\_tree\_lines\_lut
- H:\Everyone\DOAKS\GIS\yko\_jh\work
  - terrain
  - cad\_contours
  - groundplan
    - garden\_names\_msk
    - groundplan\_edges\_ms\_color
    - groundplan\_edges\_ms\_bw
    - groundplan\_labels\_ms
    - groundplan\_polys\_view\_f\_type
    - groundplan\_polys\_view\_Mate

Layout

100%

Create Features

tree\_points\_ms

- tree\_points\_ms

Table

tree\_photos\_ms

OBJECTID*	tree_ID*	tree_photo_id*	name	dt_token	caption	photographer	file_path	Plinfix
7	T_E-5_B_005	<Null>	Beech Terrace	<Null>	http://3.bp.blogspot.com/_pD04Z_fatwY/S9eGD2VZI1U/AAAAAAAAAkcAG5dc	the Gardener's Ey	<Null>	<Raster>
11	T_E-5_C_001	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Raster!>

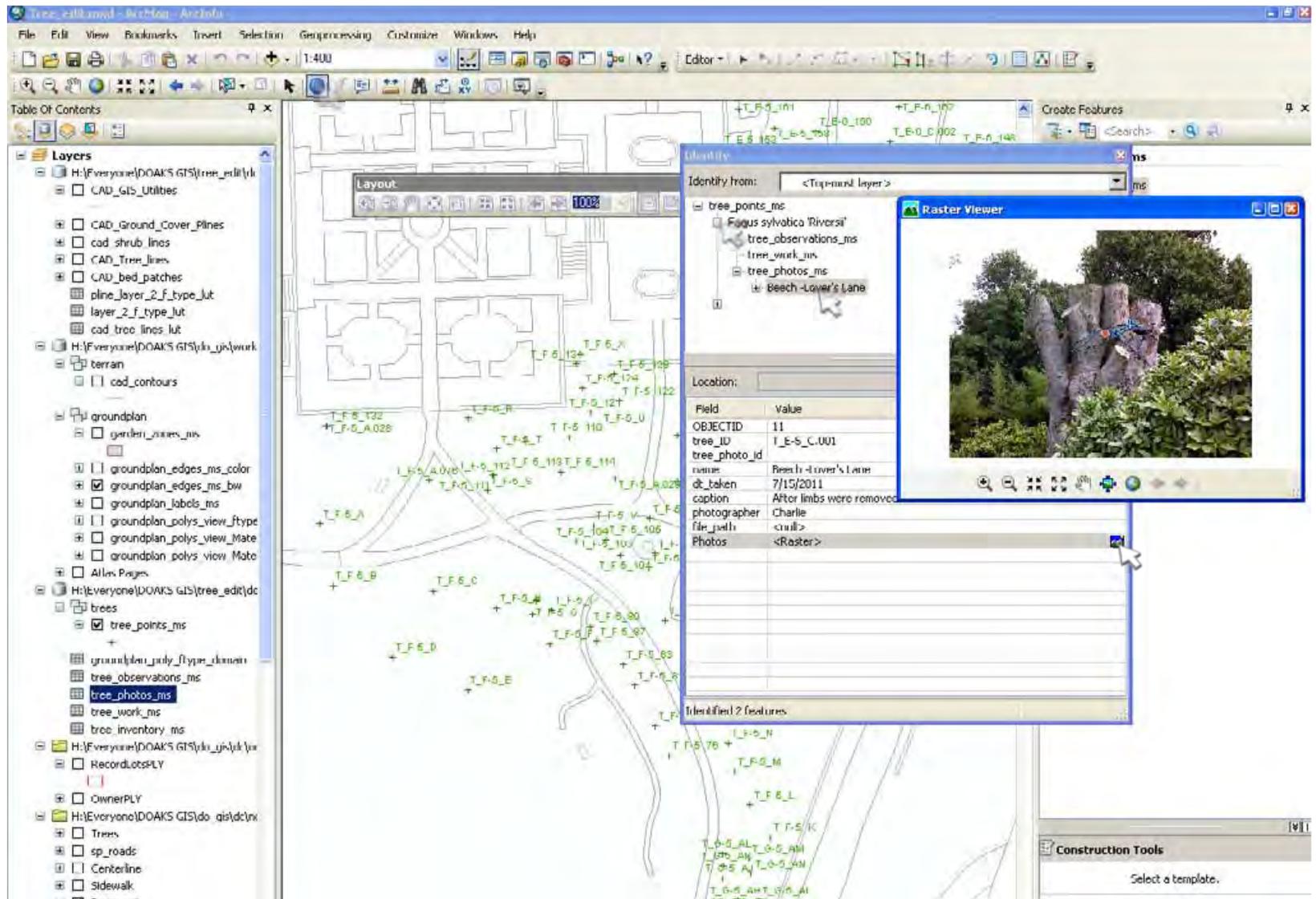
View...  
Load...  
Clear  
Save As...

The image is now shown in the raster window.

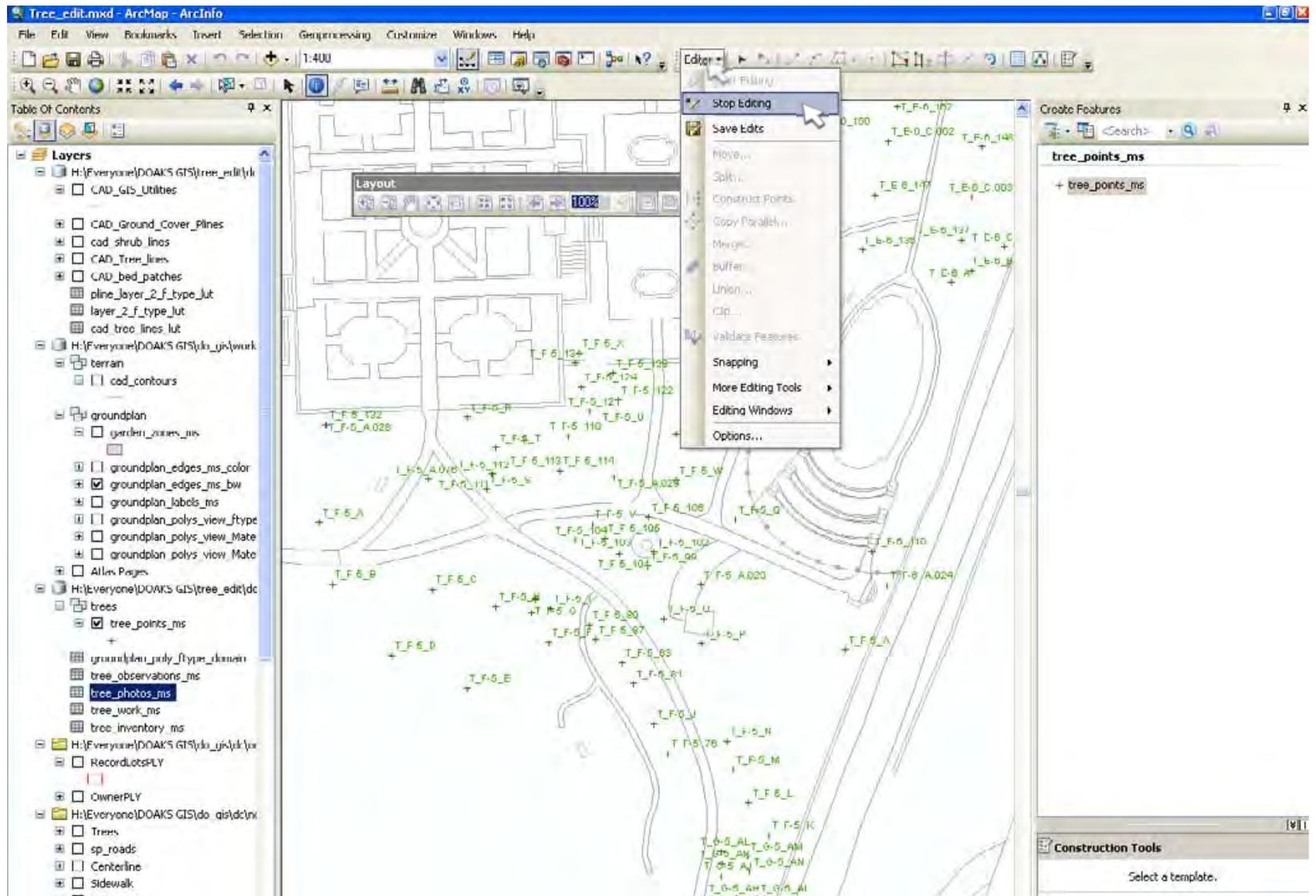
The screenshot shows the ArcMap interface with the Editor toolbar open. The 'Save Edits' option is highlighted. The map displays a ground plan with various tree points labeled with IDs like T\_E-5\_B-005 and T\_E-5\_C-001. Below the map, a table window titled 'tree\_photos\_ms' is visible, containing the following data:

OBJECTID	tree_ID	tree_photo_id	name	dt_taken	caption	photographer	file_path	Photos
7	T_E-5_B-005	<Null>	Beech Terrace	<Null>	<a href="http://3.bp.blogspot.com/_pD04Z_1atwY/S9eGID2VZI/AAAAAAAAAkc/5Sdc">http://3.bp.blogspot.com/_pD04Z_1atwY/S9eGID2VZI/AAAAAAAAAkc/5Sdc</a>	the Gardener's Eye	<Null>	<Raster
11	T_E-5_C-001	<Null>	Beech Lover's	07/15/2011	After limbs were removed	Charlie	<Null>	<Raster

Complete the entry by adding descriptive information in other fields. Then save edits. Click Editor > Save Edits.



Use the Identify tool to confirm that the image has been added to *tree\_photos\_ms* table. Click the *Identify* tool > click the tree point on the map > open the tree of associated tables - click **+** > click the Raster icon  to open the image.

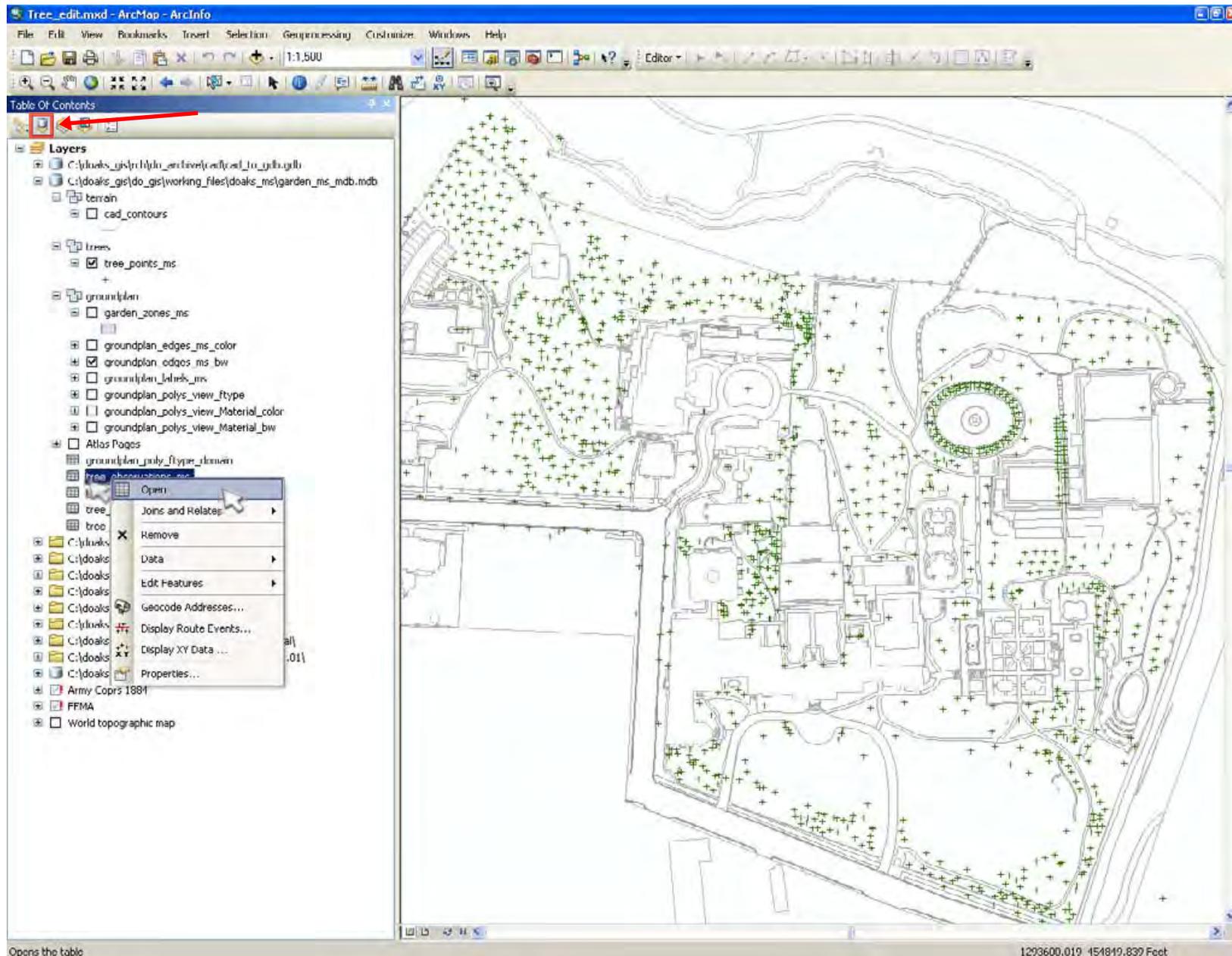


Turn off editing. Click Editor > Stop Editing.

# SORTING AND PRINTING DATA

Tree Observations 2010											
page_ref	tree_id	Species	DBH	Ster	condition	Obs_date	observer	Est_Height	Health	Hazard	Arb_Recomm
<b>B-4</b>											
	T_B-4_999	Cornus florida	3.5	3	multi-stem	7/6/2010	DAW	<null>	<null>	<null>	<null>
	T_B-4_1008	Cornus florida	8	4	multi-stem	7/6/2010	DAW	<null>	<null>	<null>	<null>
<b>C-4</b>											
	T_C-4_266	Liriodendron tulipifera	28	< null >	<null>	7/6/2010	DAW	0	<null>	<null>	<null>
	T_C-4_275	Magnolia grandiflora	18	3	multi-stem	7/6/2010	DAW	0	<null>	<null>	<null>
	T_C-4_288	Carpinus caroliniana	5.5	2	multi-stem	7/6/2010	DAW	16	<null>	<null>	<null>
	T_C-4_610	Magnolia kobus	7	< null >	<null>	7/6/2010	DAW	18	<null>	<null>	<null>

Sort data tables as you would in Excel and print the selected records or entire tables.



Opens the table

Open a table. Display all related tables in the table of contents by clicking List by Source view.



Open *tree\_observations\_ms* table: right click *tree\_observations\_ms* > Open.

The screenshot shows the ArcMap interface with a map of a garden area. The map displays various layers including terrain, groundplan, and tree points. A data table window is open, showing a table of tree observations. The table has the following columns: OBJECTID, tree\_id, Species, URN, Stem\_Count, condition, Obs\_date, Health, Hazard, and Arb\_Recommend. The Obs\_date column is highlighted, and a context menu is open over it, with 'Sort Descending' selected. The table contains 20 rows of data, with the most recent observations (from 2010) at the bottom.

OBJECTID	tree_id	Species	URN	Stem_Count	condition	Obs_date	Health	Hazard	Arb_Recommend
597	T_E-5_225	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
586	T_D-4_1143	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
587	T_D-4_1145	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
588	T_D-4_1146	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
576	T_E-5_135	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
502	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
584	T_F-5_185	Pyrus sp.	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
588	T_E-5_174	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
590	T_E-5_183	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
294	T_B-5_978	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
590	T_E-5_185	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
735	T_C-4_A_033	Fagus sylvatica	0	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
49	T_F-4_78	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
72	T_F-5_81	<Null>	0	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
588	T_E-5_239	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
599	T_E-5_233	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
600	T_E-5_234	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>

Sort the values in this field in descending order (Z - A) (0 - 1)

1293831.79 -1540411.245 Feet

To select only the most recent tree observations, we will use the *Sort Descending* command in the *Obs\_date* field: Right-click *Obs\_date* > *Sort Descending*. We can now select all of the newest records, those from 2010.

Table

tree\_observations\_ms

OBJECTID*	tree_id*	Species	DBH	Stem_Count	condition	Obs_date	observer	Est_Height	Health	Hazard	Arb_Recommend
780	T_C-4_869	Tsuga canadensis	9.5	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
139	T_G-4_71	Magnolia grandiflora	19.75	<Null>	<Null>	8/10/2010	DAW	<Null>	<Null>	<Null>	<Null>
801	T_C-4_931	Tsuga canadensis	12	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
799	T_C-4_929	Ilex opaca	8.75	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
798	T_C-4_927	Tsuga canadensis	8	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
797	T_C-4_917	Tsuga canadensis	9	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
793	T_C-4_908	Tsuga canadensis	4.5	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
792	T_C-4_907	Tsuga canadensis	5.5	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
138	T_G-4_70	Magnolia grandiflora	19.5	<Null>	<Null>	8/10/2010	DAW	<Null>	<Null>	<Null>	<Null>
788	T_C-4_887	Tsuga canadensis	4.75	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
771	T_C-4_841	Tsuga canadensis	8	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
779	T_C-4_864	Tsuga canadensis	4	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
777	T_C-4_861	Tsuga canadensis	9	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
776	T_C-4_858	Tsuga canadensis	12	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
773	T_C-4_847	Tsuga canadensis	8	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
770	T_C-4_838	Tsuga canadensis	9	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>
768	T_C-4_827	Tsuga canadensis	4.25	<Null>	<Null>	8/10/2010	DAW		0	<Null>	<Null>

(1 out of 943 Selected)

tree\_observations\_ms

Table

tree\_observations\_ms

OBJECTID*	tree_id*	Species	DBH	Stem_Count	condition	Obs_date	observer	Est_Height	Health	Hazard	Arb_Recommend
211	T_G-5_G	Ilex opaca	2.75	<Null>	<Null>	6/11/2010	DAW		<Null>	<Null>	<Null>
199	T_G-5_C	Magnolia grandiflora	4.825	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
200	T_G-5_D	Ilex opaca	14	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
201	T_G-5_E	Ilex opaca	12	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
202	T_G-5_F	Tsuga canadensis	11.75	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
203	T_G-5_G	Magnolia kobus	10	<Null>	multi-stem	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
205	T_G-5_I	Pseudotsuga sinensis	3.75	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
207	T_G-5_J	Quercus coccinea	27	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
208	T_G-5_M	Ilex opaca	9.375	<Null>	multi-stem	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
209	T_G-5_O	Ilex opaca	11.125	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
210	T_G-5_P	Tsuga canadensis	12	<Null>	multi-stem	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
196	T_G-5_AP	Ulmus parvifolia 'Athena'	2.75	<Null>	<Null>	6/11/2010	DAW		18	<Null>	<Null>
230	T_G-5_AJ	Ilex opaca	<Null>	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
838	T_C-3_560	Tsuga canadensis	11.5	<Null>	good-fair	10/27/2000	JJ	<Null>	<Null>	<Null>	<Null>
883	T_C-3_268	Tsuga canadensis	12	<Null>	fair	10/27/2000	JJ	<Null>	<Null>	<Null>	<Null>
926	T_C-2_780	Quercus velutina	14	<Null>	fair-poor	10/17/2000	JJ	<Null>	<Null>	<Null>	<Null>
906	T_C-3_694	Tsuga canadensis	8	<Null>	fair-good	10/17/2000	JJ	<Null>	<Null>	<Null>	<Null>

(538 out of 943 Selected)

tree\_observations\_ms

Select the records. Scroll to the top of the table and select the top row by clicking in the cell at the far left. Then scroll down to the last record with a date in 2010; hold shift and click the cell to the left of this record. This will highlight all of the records from 2010.

Tree\_edit.mxd - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

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Layers

- C:\doaks\_gis\rd\do\_ardtree\edit\do\_ardtree.gdb
  - C:\doaks\_gis\do\_gis\working\_files\doaks\_ms\garden\_ms\_mdb.mdb
    - terrain
      - cad\_contours
    - trees
      - tree\_points\_ms
    - groundplan
      - garden\_zones\_ms
      - groundplan\_edges\_ms\_color
      - groundplan\_edges\_ms\_bw
      - groundplan\_labels\_ms
      - groundplan\_polys\_view\_ftype
      - groundplan\_polys\_view\_material\_color
      - groundplan\_polys\_view\_material\_bw
    - Atlas Pages
      - groundplan\_poly\_ftype\_tilename
      - tree\_observations\_ms
      - tree\_photos\_ms
      - tree\_work\_ms

Table

tree\_obs... Tree to Tree Observations : tree\_points\_ms

OBJECTID	tree_id	Species	DBH	Stem_Count	condition	Obs_date	observer	Fsci_Height	Health	Hazard	Arb_Recommend
204	T_G-S_J	Torreya nucifera	5.75	<Null>	<Null>	6/11/2010	DAW	24	<Null>	<Null>	<Null>
205	T_G-S_J	Pseudotsugia sinensis	3.75	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
206	T_G-S_K	Tsuga canadensis	13	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
207	T_G-S_L	Quercus coccinea	27	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
208	T_G-S_M	Ilex opaca	9.375	<Null>	multi-stem	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
209	T_G-S_O	Ilex opaca	11.125	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
210	T_G-S_P	Tsuga canadensis	12	2	multi-stem	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
211	T_G-S_Q	Ilex opaca	2.75	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
212	T_G-S_R	Ilex opaca	3	<Null>	<Null>	6/11/2010	DAW	18	<Null>	<Null>	<Null>
213	T_G-S_S	Ilex opaca	10	<Null>	multi-stem	6/11/2010	DAW	18	<Null>	<Null>	<Null>
214	T_G-S_T	Ilex opaca	14.25	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
215	T_G-S_U	Ilex opaca	13	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
216	T_G-S_V	Magnolia grandiflora	7.25	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
217	T_G-S_W	Magnolia grandiflora	10.75	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
218	T_G-S_X	Ilex opaca	10.75	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
219	T_G-S_Y	Ilex opaca	6	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>
220	T_G-S_Z	Ilex opaca	9	<Null>	<Null>	6/11/2010	DAW	<Null>	<Null>	<Null>	<Null>

14 538 (538 out of 943 Selected)

tree\_observat... tree\_points\_ms

1293138.648 453880.221 Feet

Displays the relationship classes that the current table participates in

To view the tree points that are associated with these observation records use the related tables button. Click *related tables* > choose *Tree to Tree Observations : tree\_points\_ms*. The related tree points are now selected and the *tree\_points\_ms* table is open. Switch back to *tree\_observations\_ms* by clicking the tab at the bottom of the table.

The screenshot shows a GIS application window with a 'Select By Attributes' menu open. The menu options include: Find & Replace..., Select By Attributes..., Clear Selection, Switch Selection, Select All, Add Field..., Turn All Fields On, Show Field Aliases, Arrange Tables, Restore Default Column Widths, Restore Default Field Order, Joins and Relates, Related Tables, Create Graph..., Add Table to Layout, Reload Cache, Print..., Reports, Export..., and Appearance....

The main window displays a data table titled 'tree\_points\_ms' with the following columns: OBJECTID, Shape, Tree\_ID, Garden\_Zone, species, Common\_Name, dt\_enter, dt\_planted, dt\_died, dt\_removed, abs\_gnd\_el, Page\_ref, elevation, and d. The table contains 21 rows of data, with the first row selected. The status bar at the bottom indicates '(21 out of 1405 Selected)'.

OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_enter	dt_planted	dt_died	dt_removed	abs_gnd_el	Page_ref	elevation	d
1413	Point	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1407	Point	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1302	Point	<Null>	<Null>	Prunus x bircana	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1390	Point	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1209	Point	T_A-2_1076	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	129.701492	<Null>
1210	Point	T_A-2_1077	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	130.091492	<Null>
1211	Point	T_A-2_1078	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	130.091492	<Null>
1212	Point	T_A-2_1079	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	148.352142	<Null>
1213	Point	T_A-2_1080	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	129.701447	<Null>
1214	Point	T_A-2_1081	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	137.810825	<Null>
1215	Point	T_A-2_1082	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	124.399689	<Null>
1216	Point	T_A-2_1083	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	131.917465	<Null>
1217	Point	T_A-2_1084	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	130.40653	<Null>
1210	Point	T_A-2_1005	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	131.712205	<Null>
1218	Point	T_A-2_1086	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	124.558159	<Null>
1220	Point	T_A-2_1087	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	115.505501	<Null>

Select records by composing a query

To make a more complicated selection, one that selects multiple types of records, use the *Select By Attributes Tool*.

Click *Table Options*       > *Select By Attributes*.

Tree\_edit.mxd - ArcMap - ArcInfo

Method: Create a new selection

[OBJECTID]  
[Tree\_ID]  
[Garden\_Zone]  
[species]  
[Common\_Name]  
[dt\_enter]

Like  
> >= And  
< <= Or  
? " {} Not

Get Unique Values Go To:

SELECT \* FROM tree\_points\_ms WHERE:  
[species] = 'Acer palmatum' UH [species] = 'Acer rubrum' UH [species]  
= 'Acer saccharinum' OR [species] = 'Acer saccharum'

Apply

tree\_work.ms  
tree\_inventory.ms

Table

tree\_points\_ms

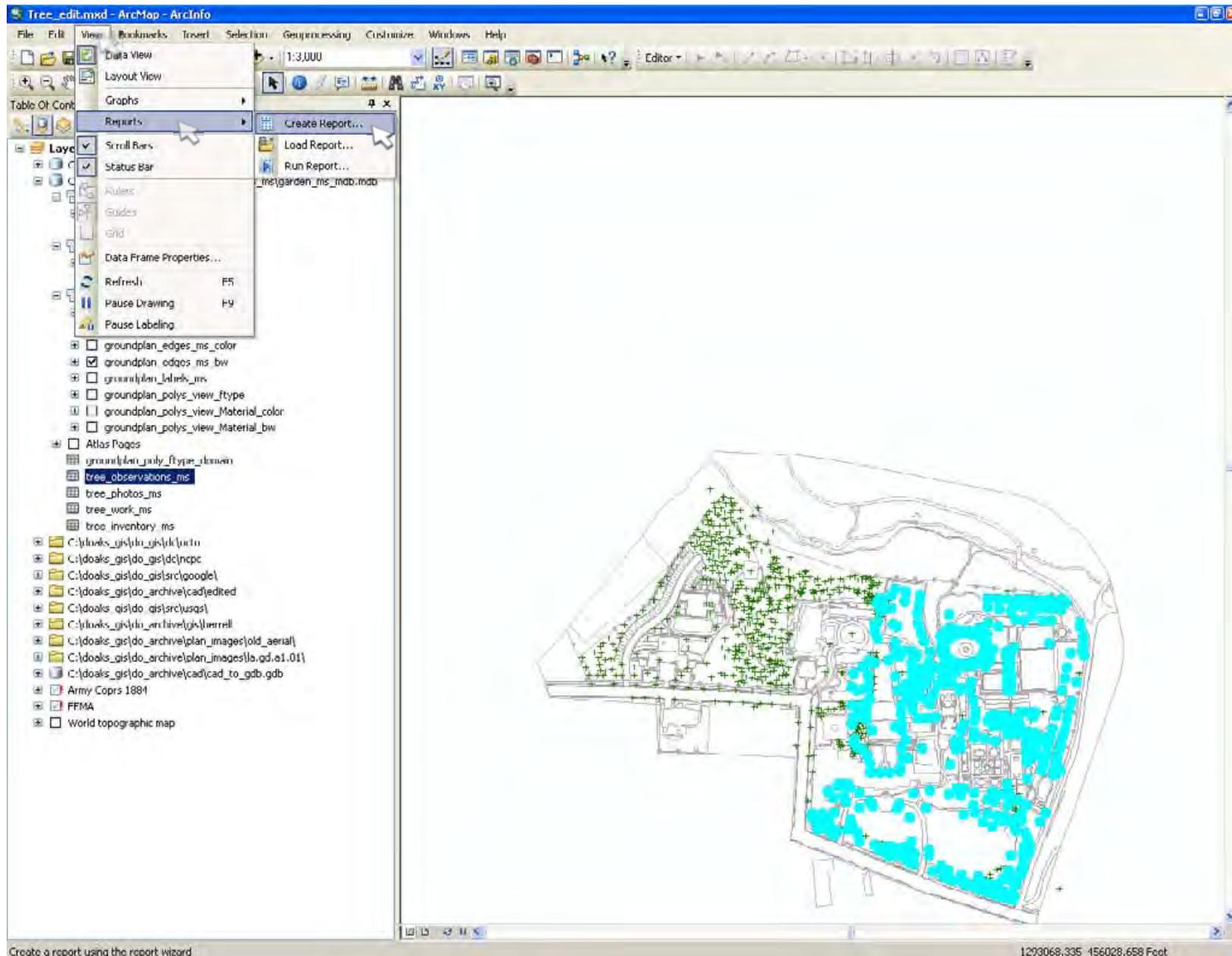
OBJECTID	Shape	Tree_ID	Garden_Zone	species	Common_Name	dt_enter	dt_planted	dt_died	dt_removed	abs_gul_et	Page_ref	elevation	d
1413	Point	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1407	Point	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1092	Point	<Null>	<Null>	Prunus x bireana	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1398	Point	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
1209	Point	T_A-2_1076	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	129.701492	<Null>
1210	Point	T_A-2_1077	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	130.091492	<Null>
1211	Point	T_A-2_1078	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	130.001492	<Null>
1212	Point	T_A-2_1079	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	140.352142	<Null>
1213	Point	T_A-2_1080	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	129.701447	<Null>
1214	Point	T_A-2_1081	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-7	137.610825	<Null>
1215	Point	T_A-2_1082	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	124.399689	<Null>
1216	Point	T_A-2_1083	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	134.917455	<Null>
1217	Point	T_A-2_1084	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	130.43553	<Null>
1210	Point	T_A-2_1005	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	131.712265	<Null>
1218	Point	T_A-2_1088	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-7	124.558159	<Null>
1220	Point	T_A-2_1087	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	A-2	115.505501	<Null>

(65 out of 1405 Selected)

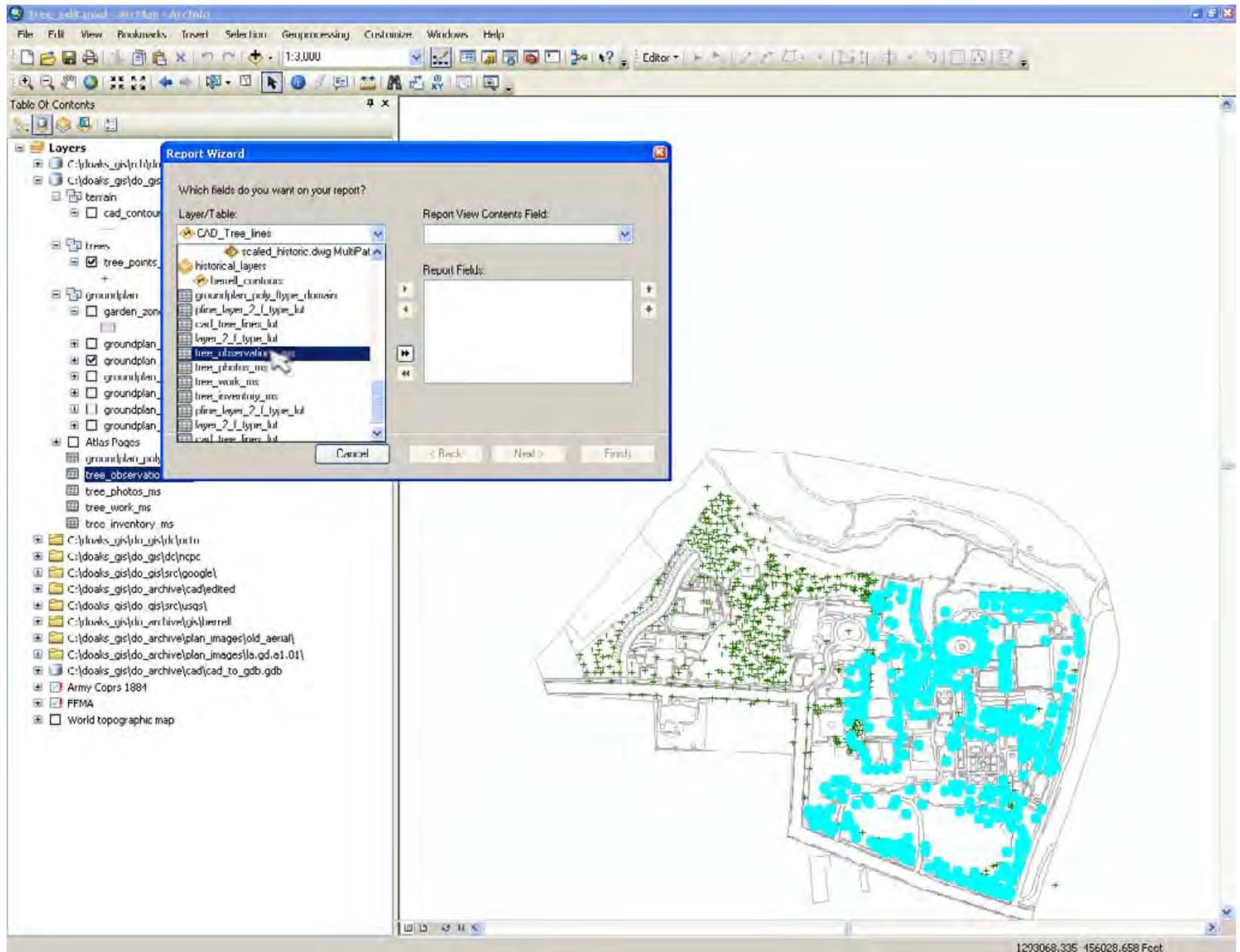
tree\_observations.ms | tree\_points.ms

Number of features selected: 65

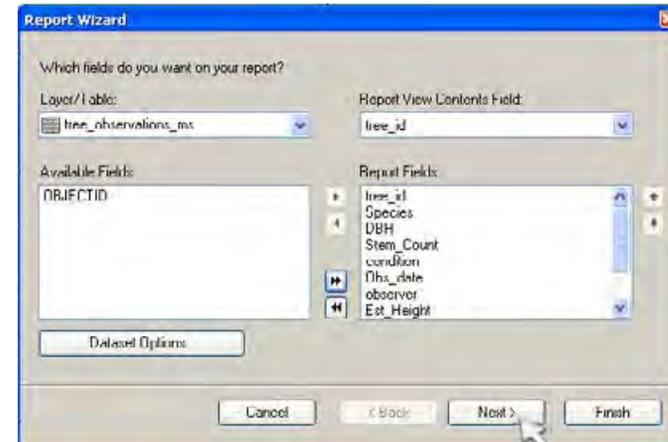
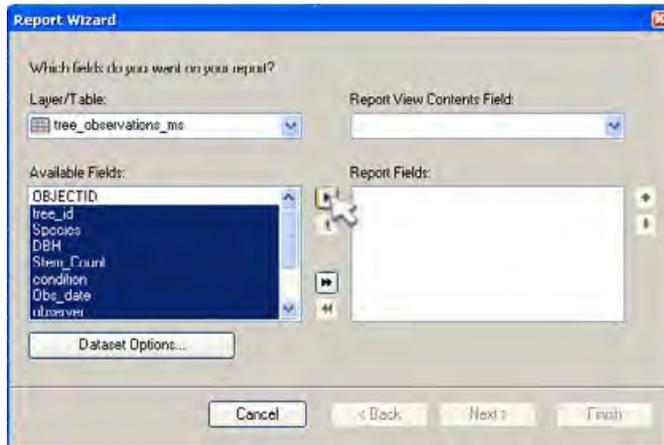
Structured query language commands within the *Select by Attributes* dialogue makes it possible to create complex selections. In this example, we will combine selections for individual maple species to see all maples. Using the buttons in the dialogue box, create the query: [species] = 'Acer palmatum' OR [species] = 'Acer rubrum' OR [species] = 'Acer saccharinum' OR [species] = 'Acer saccharum' > click *Apply*. All of the maple trees are selected.



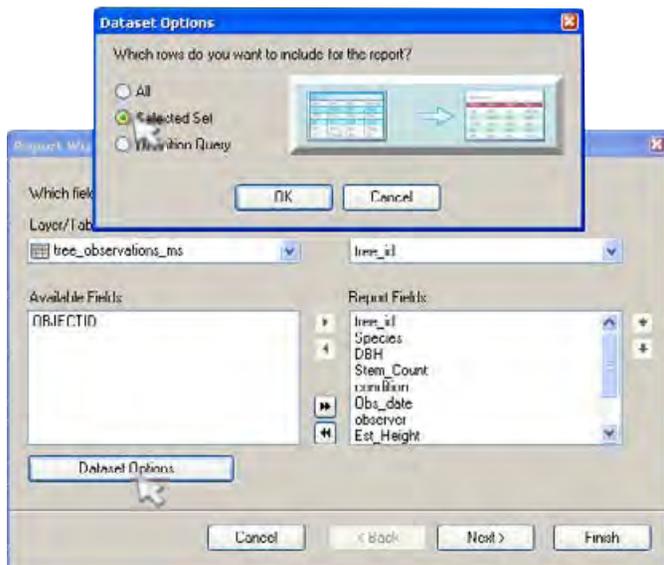
Printing. Using the *Create Report* feature, we can format a table to print selected records with some or all of the information fields. We'll start with 2010 observations selected. Open the Create report dialogue: click *View > Reports > Create Report*.



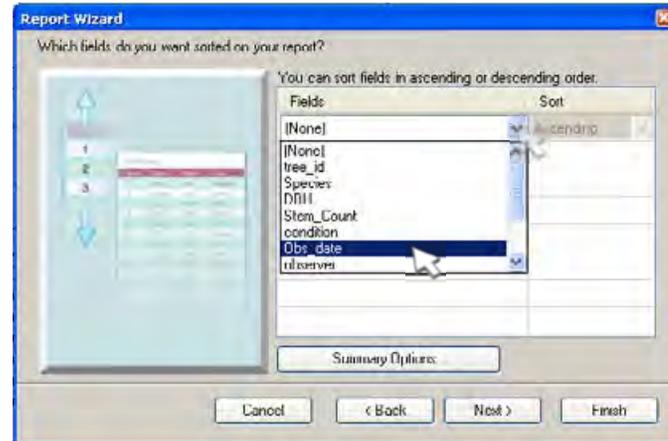
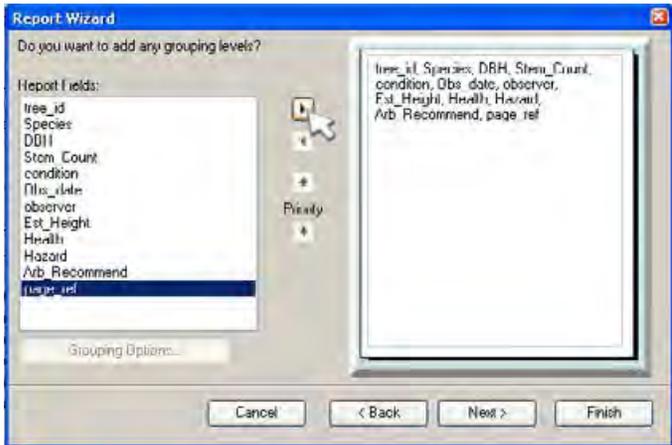
Choose *tree\_observations\_ms* in the Layer/Table drop down menu. \*Unfortunately the *Report* feature only allows us to print one table or layer at a time.



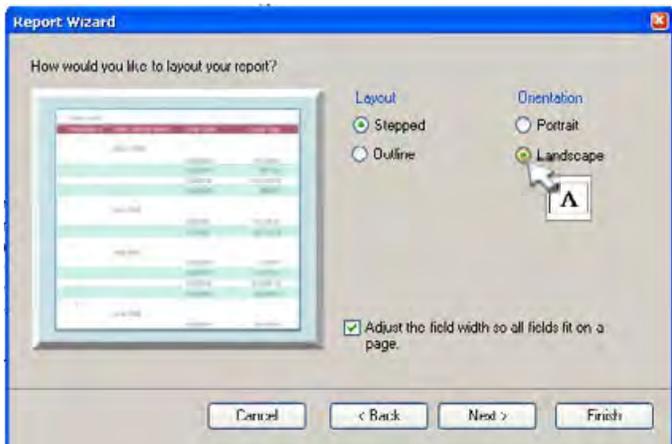
Choose all of the information fields that you would like to include in the report. In this example, I choose to include all fields except the *Object ID*, which is a record identification number generated automatically by the table. Click the right arrow to move the fields to the *Report Fields* column.



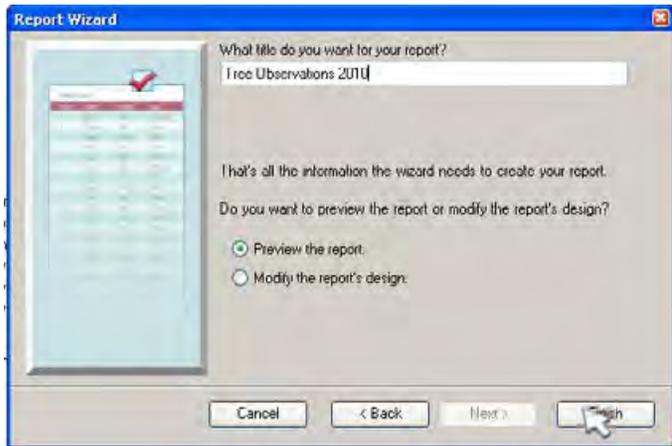
We will print only the year 2010 records that we have preselected. Click *Dataset Options* > *Selected Set*.



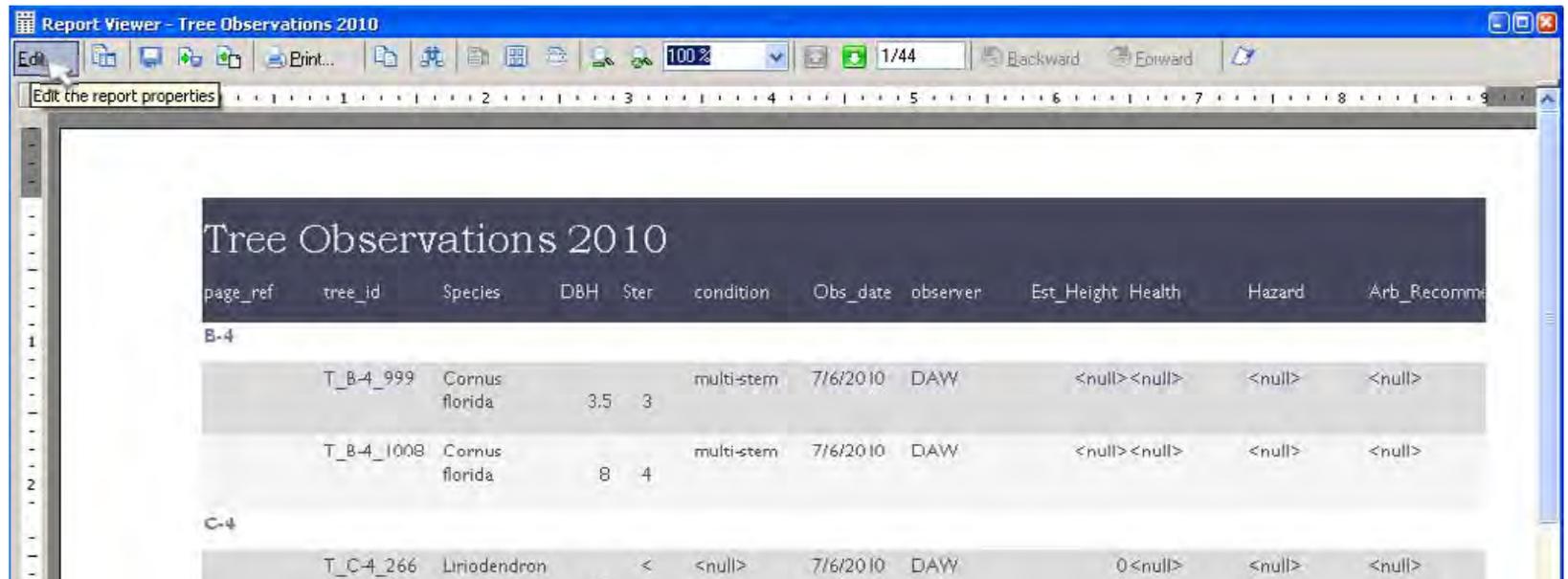
Group the records by the quadrant (page ref) each tree falls in on the map. Highlight *page\_ref* > click the right arrow. Click *Next*. Within each group of records sort the records by date, in ascending order. Click *Next*.



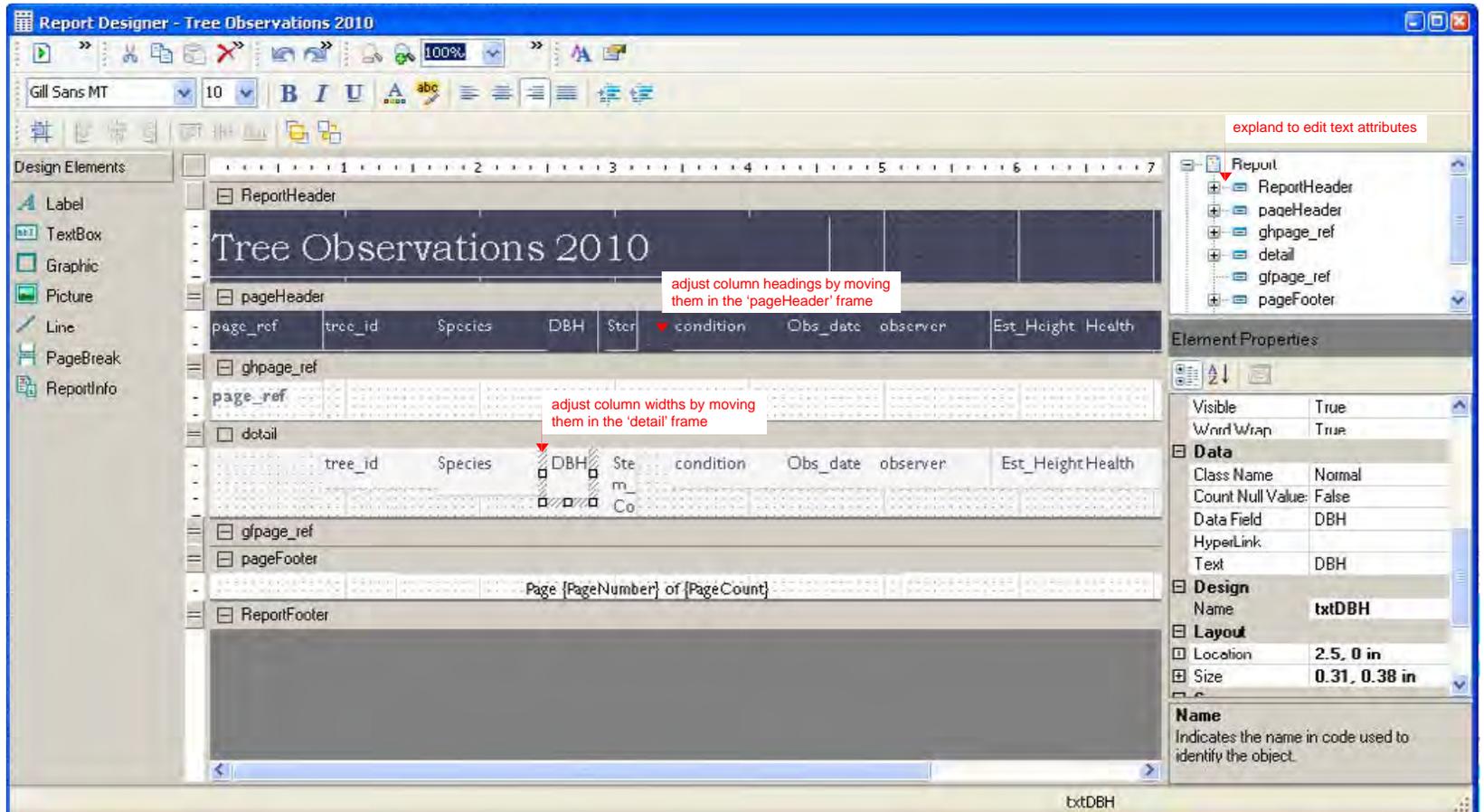
Since we have decided to include nearly all of the information fields we will choose a Landscape orientation to fit the entries. Click *Next*. Choose a report style, I pick Chicago.



Enter a title. Click *Finish*.



Click Edit to view the *Design Report* dialogue.



This complicated looking *Report Designer* interface provides customization of column widths, font, etc. Adjusting the width of the labels under *header* will only adjust the header bar and adjusting the labels under *detail* will adjust the column widths where the data is displayed. Click on the expandable tree to the right side of the dialogue to change text size. To return to the table click *Run Report* 

# Tree Observations 2010

page_ref	tree_id	Species	DBH	Stem condition	Obs_date	observer	Est_Height	Health	Hazard	Arb_Recommen
----------	---------	---------	-----	----------------	----------	----------	------------	--------	--------	--------------

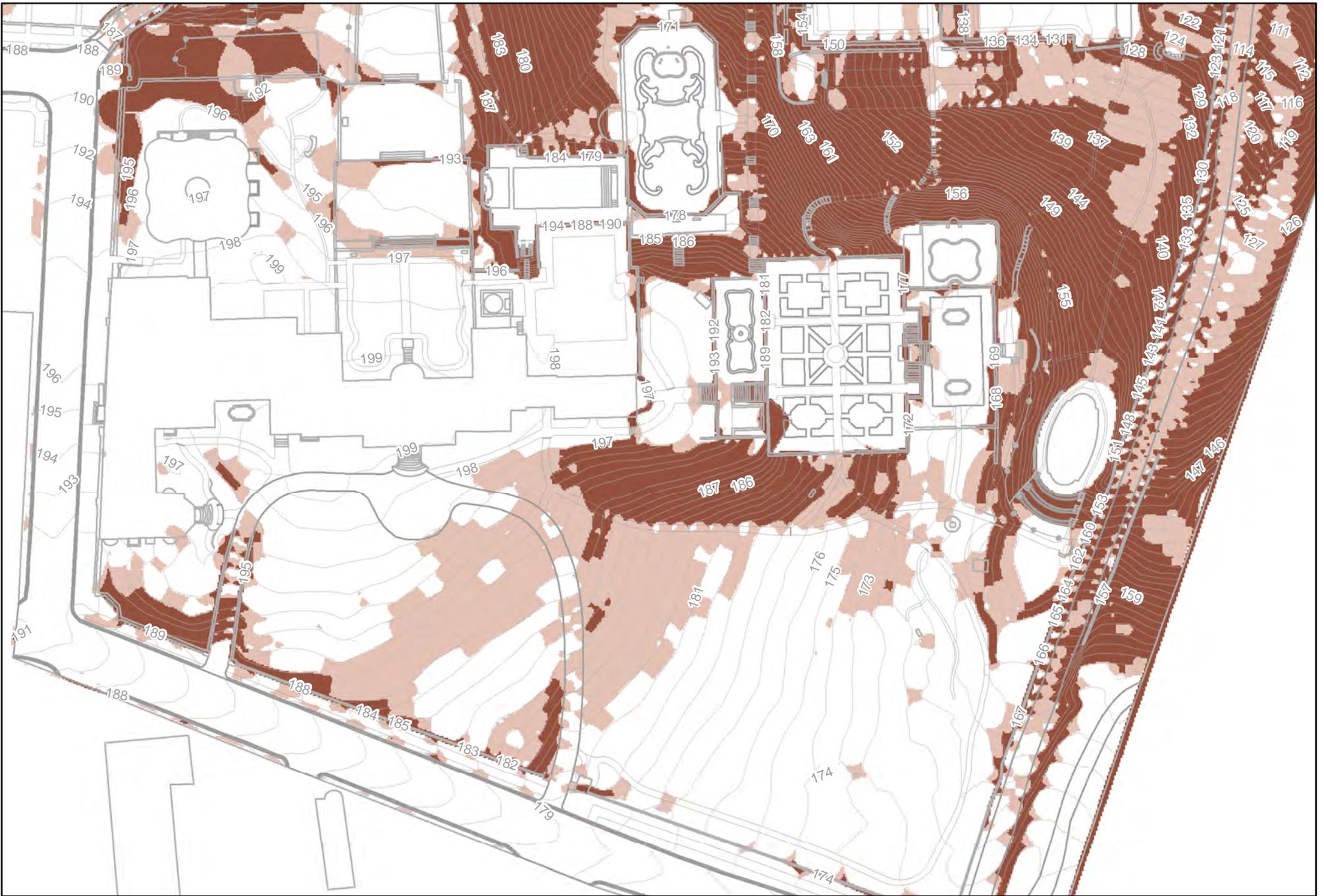
## B-4

	T_B-4_999	Cornus florida	3.5	3 multi-stem	7/6/2010	DAW	<null><null>	<null>	<null>	<null>
	T_B-4_1008	Cornus florida	8	4 multi-stem	7/6/2010	DAW	<null><null>	<null>	<null>	<null>

## C-4

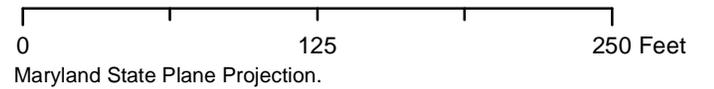
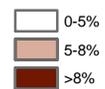
	T_C-4_266	Liriodendron tulipifera	28	<null> <null>	7/6/2010	DAW	0<null>	<null>	<null>	<null>
	T_C-4_275	Magnolia grandiflora	18	3 multi-stem	7/6/2010	DAW	0<null>	<null>	<null>	<null>
	T_C-4_288	Carpinus caroliniana	5.5	2 multi-stem	7/6/2010	DAW	16<null>	<null>	<null>	<null>
	T_C-4_610	Magnolia kobus	7	<null> <null>	7/6/2010	DAW	18<null>	<null>	<null>	<null>
	T_C-4_637	Syringa pekinensis	6.75	<null> multi-stem	7/6/2010	DAW	40<null>	<null>	<null>	<null>
	T_C-4_645	Carpinus caroliniana	3.75	<null> multi-stem	7/6/2010	DAW	16<null>	<null>	<null>	<null>
	T_C-4_647	Syringa pekinensis	13.5	<null> <null>	7/6/2010	DAW	25<null>	<null>	<null>	<null>

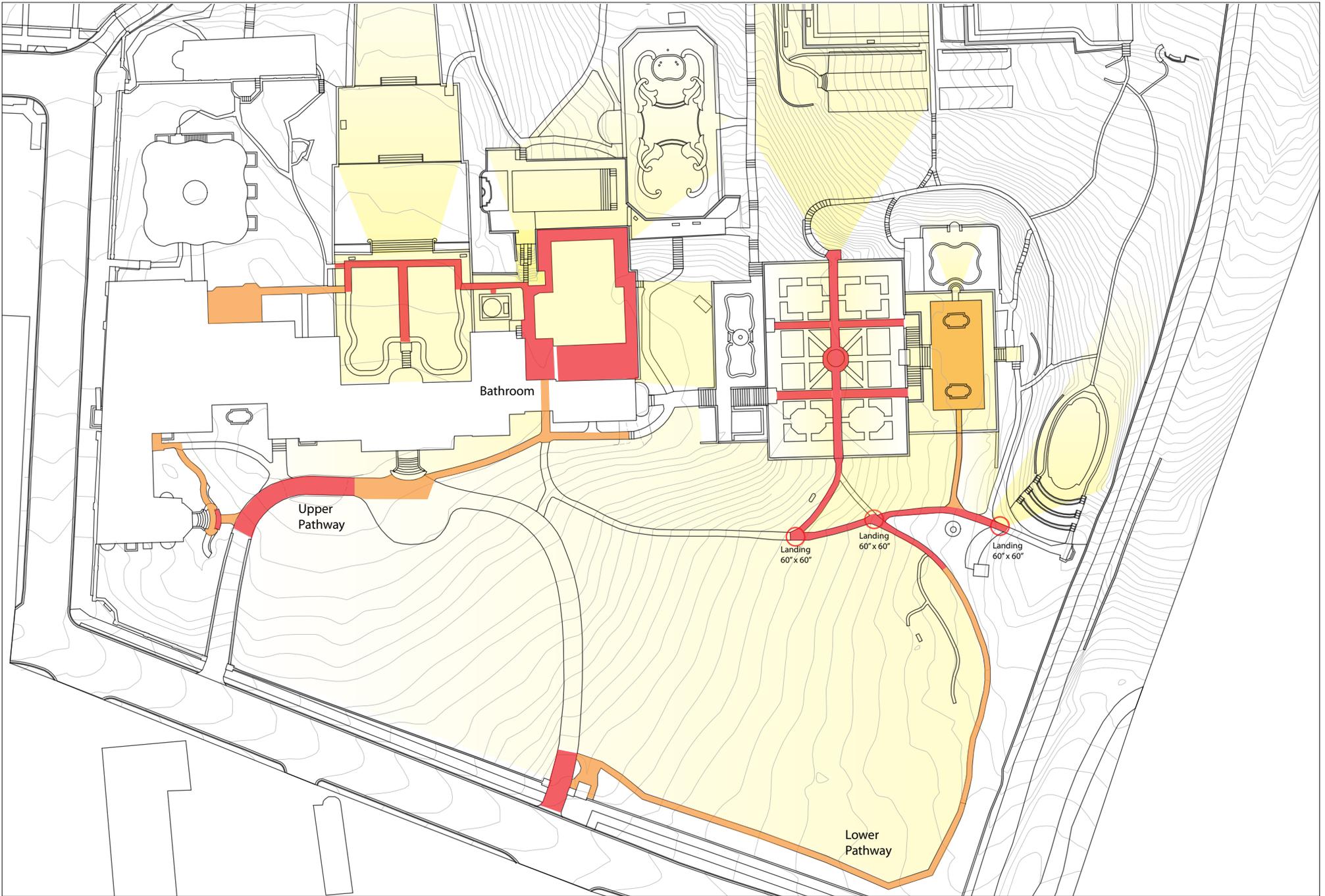
From the *Report Viewer* interface export the information as a pdf or text file, save the report as a *Report Document File*, or print the report. \*More information on the *Report* feature at [http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/What\\_are\\_reports\\_in\\_ArcGIS/004v00000001000000/](http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/What_are_reports_in_ArcGIS/004v00000001000000/)



**Dumbarton Oaks Garden  
Accessibility**

**Slope**



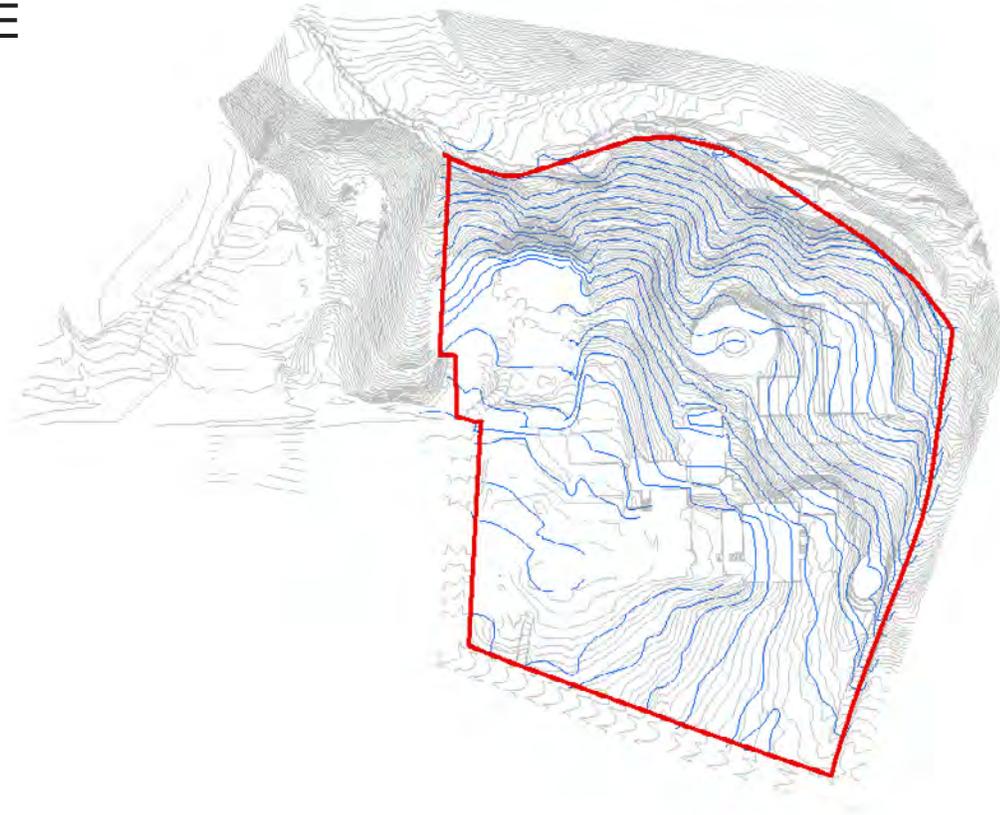


**Dumbarton Oaks Garden  
Accessibility**

- Modification Required
- No Modification Necessary
- Viewshed

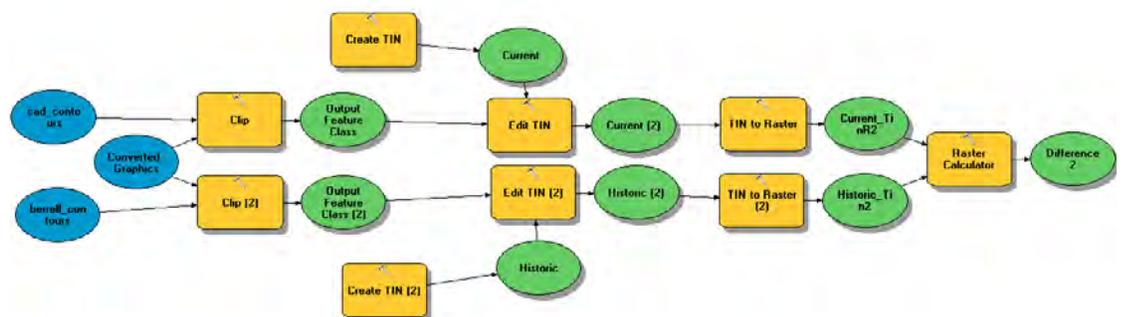
0 125 250 Feet  
Maryland State Plane Projection.

# VISUALIZING TOPOGRAPHIC CHANGE

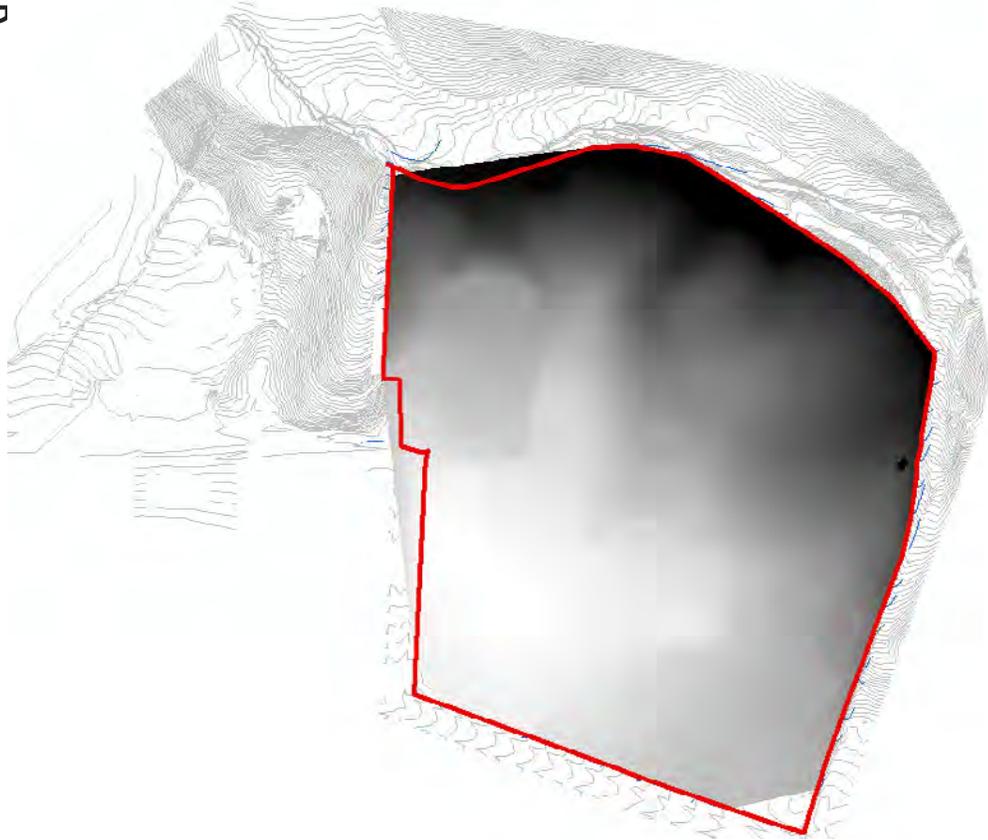


This exercise utilizes arcmap map algebra to compare contour data sets representing a portion of the Dumbarton Oaks grounds in 1922 and during a recent survey. The model (see below) extracts contours from both data sets using the geographic extent of the smaller. From these, equal area, data sets the model creates two digital elevation models (DEM) and uses map algebra capabilities of arcmap to subtract the historic elevation data from recent values.

Dumbarton Oaks Garden  
Charlie Howe, Intern



# VISUALIZING TOPOGRAPHIC CHANG

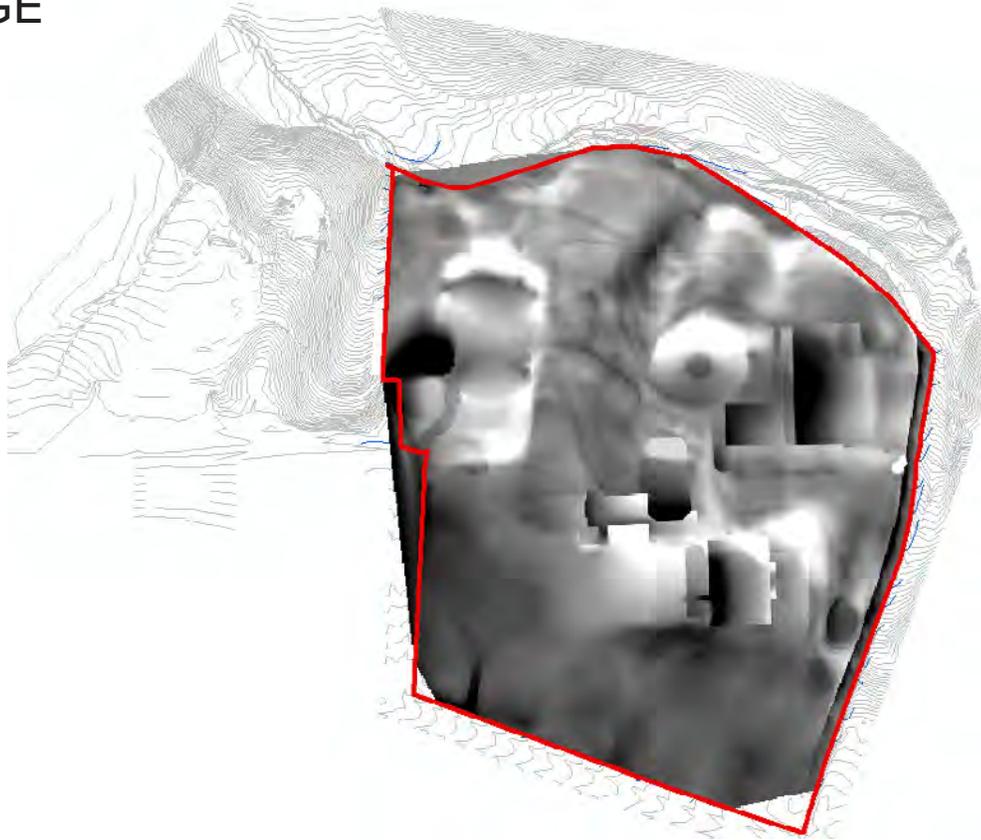


Historic Contour (5ft) DEM

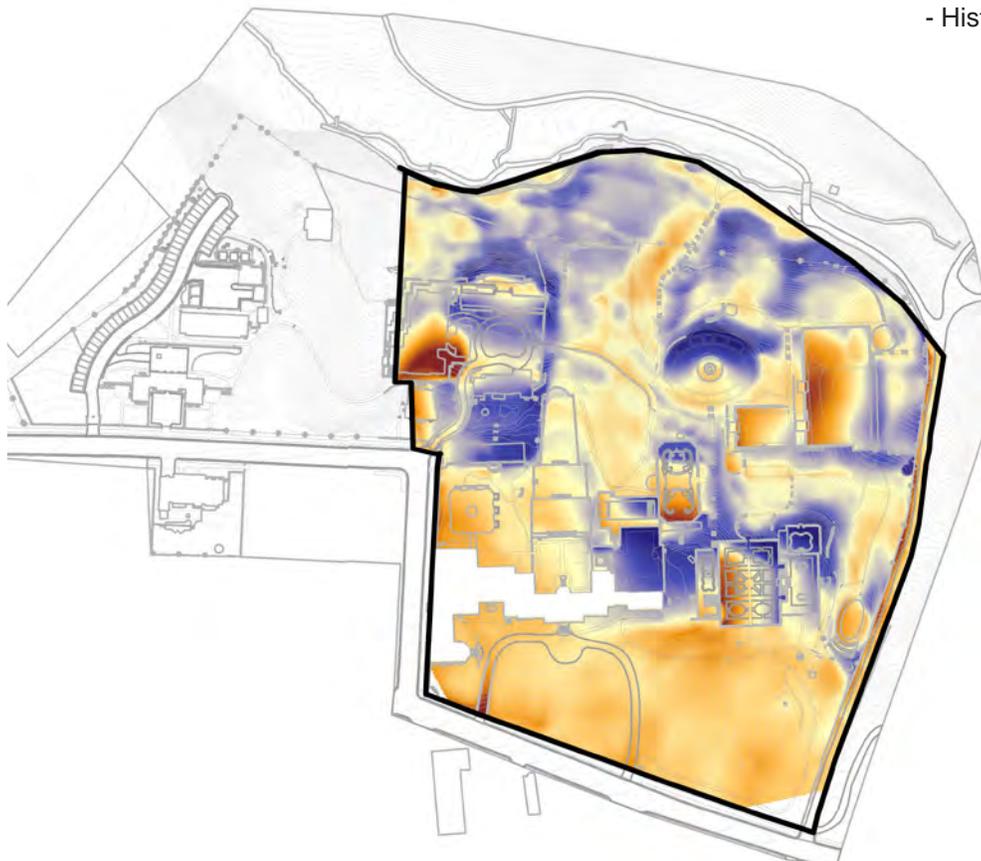


Recent Contour (1ft) DEM

# VISUALIZING TOPOGRAPHIC CHANGE

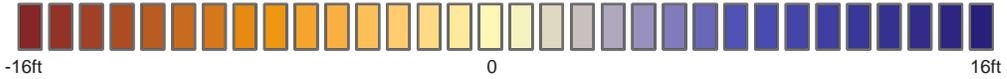
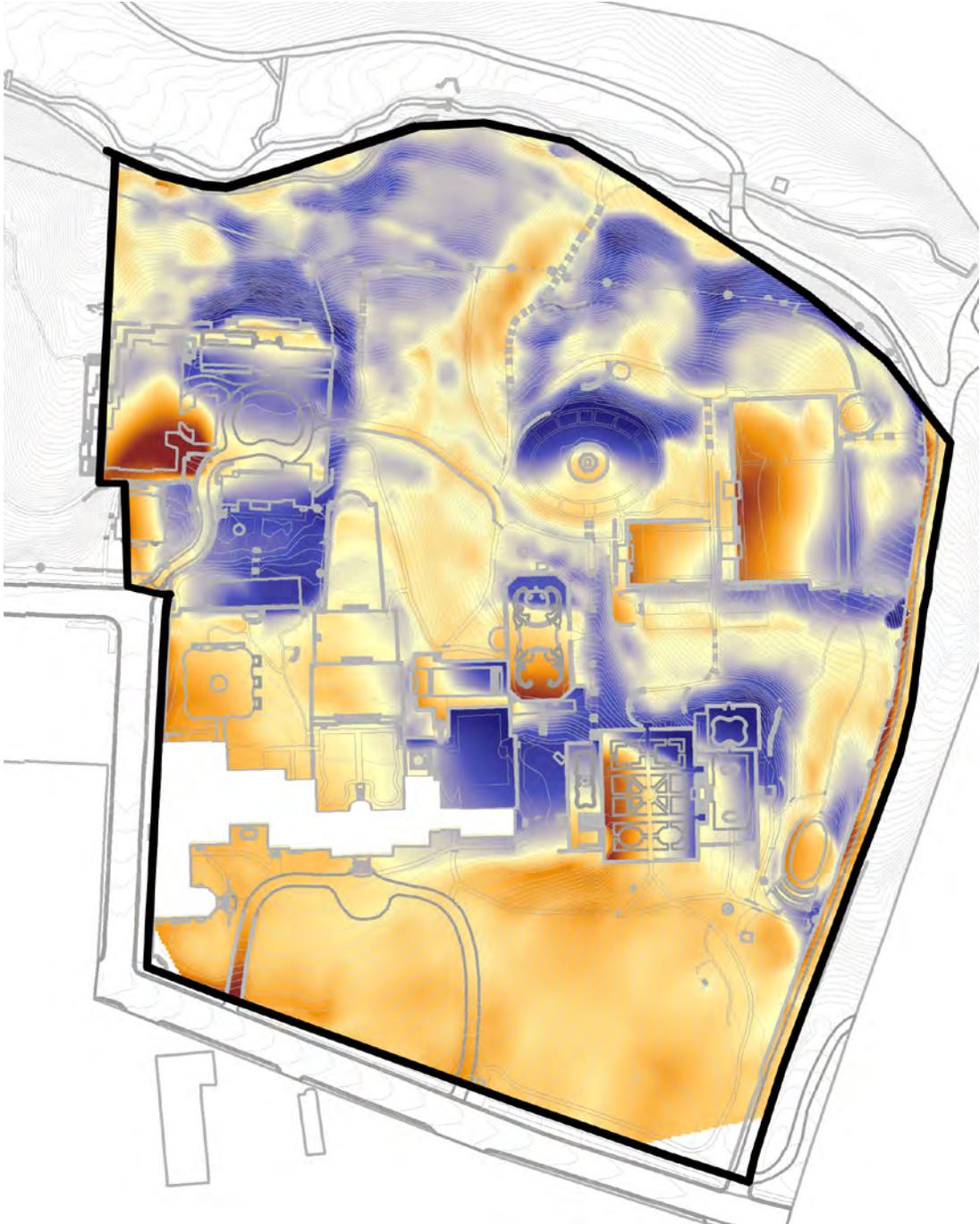
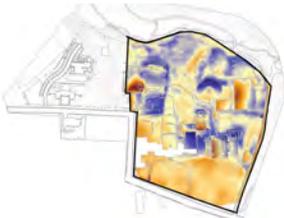


Recent Elevations  
- Historic Elevations



Color Symbology

# VISUALIZING TOPOGRAPHIC CHANGE



Cut

Fill