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.

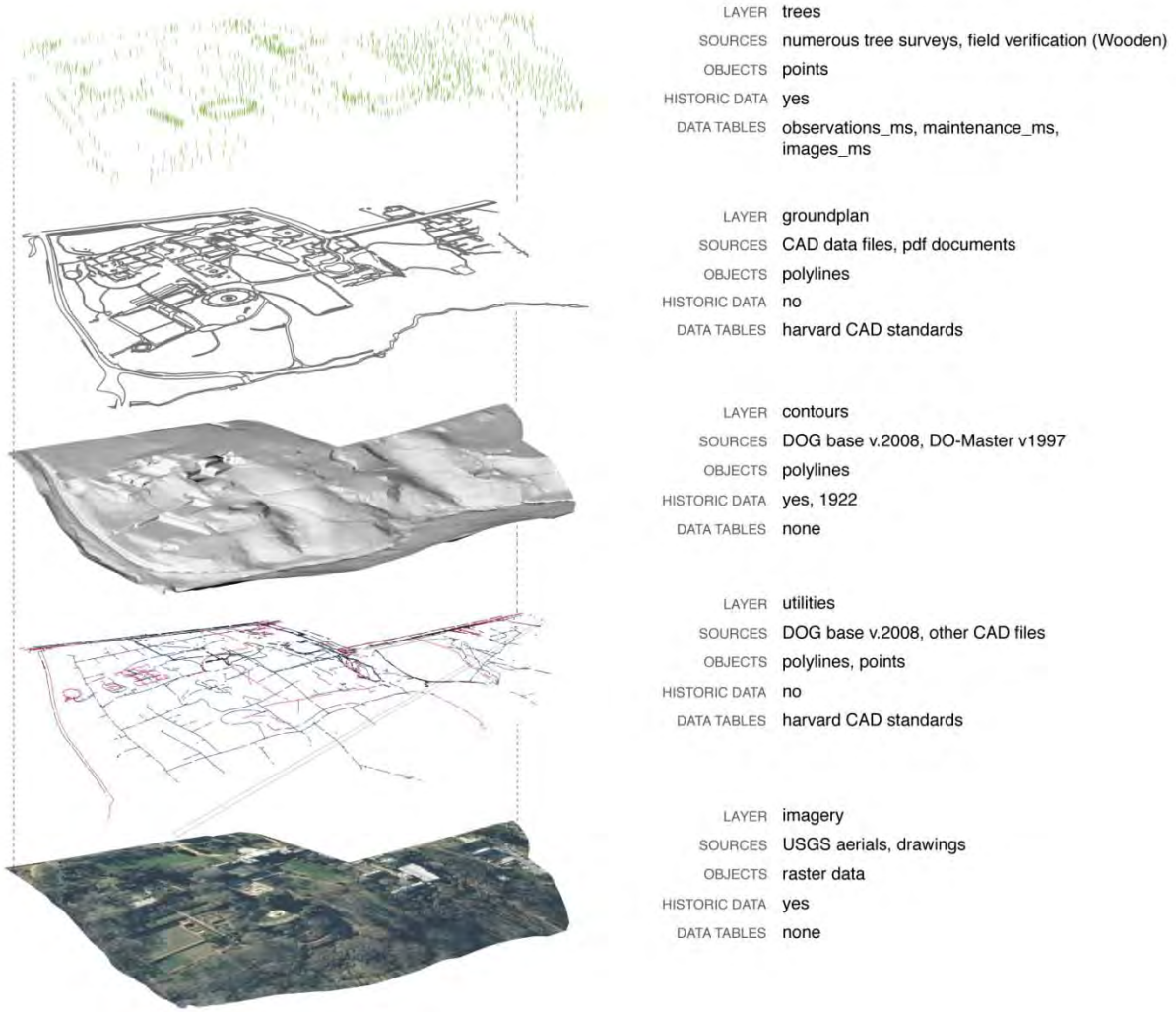
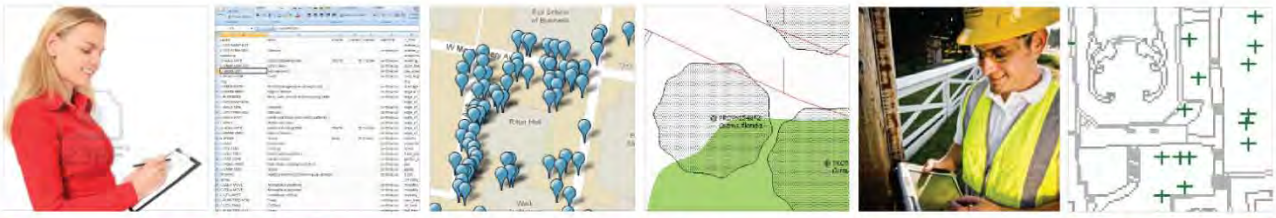


Figure 1. DO GIS Model: conceptual view

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 inteface 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 **Tree**s. 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).

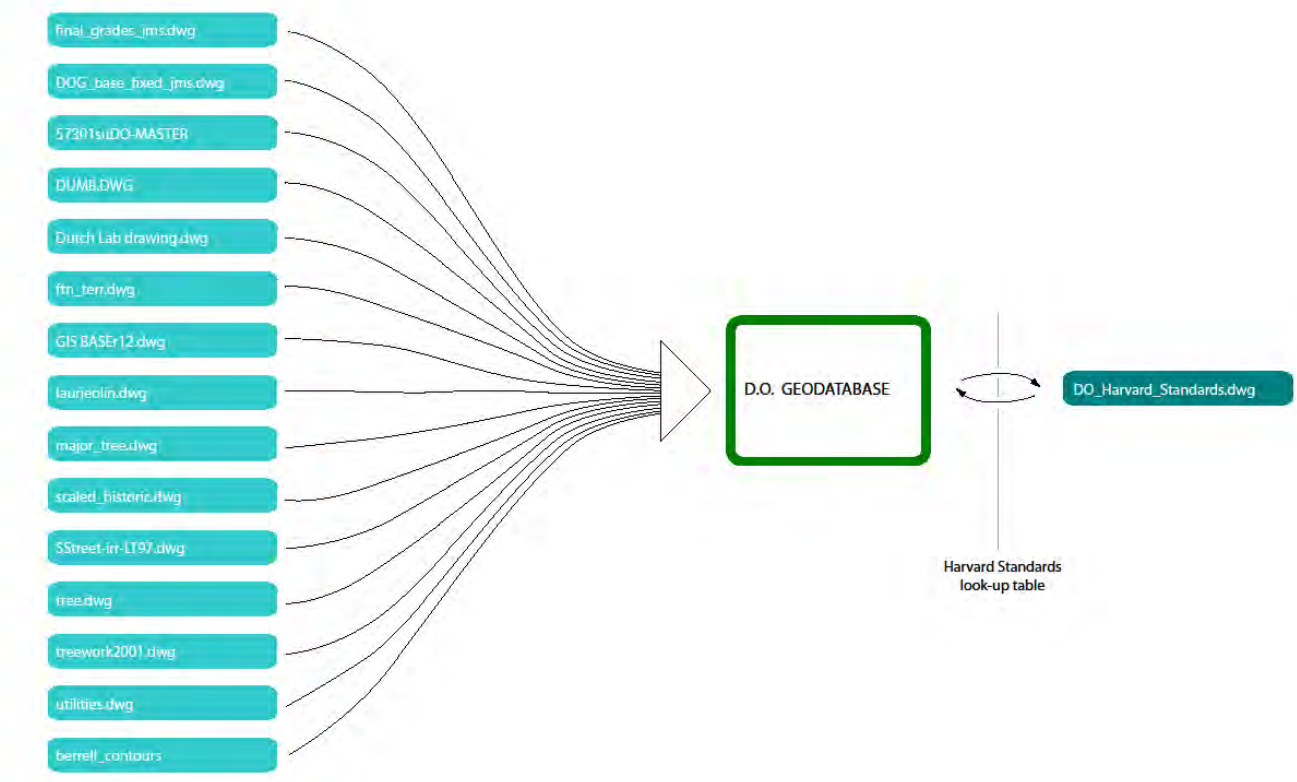


Figure 3. Harvard Standards Look-Up Table: place in data transfer

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 quickley. 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.

Content:

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.**

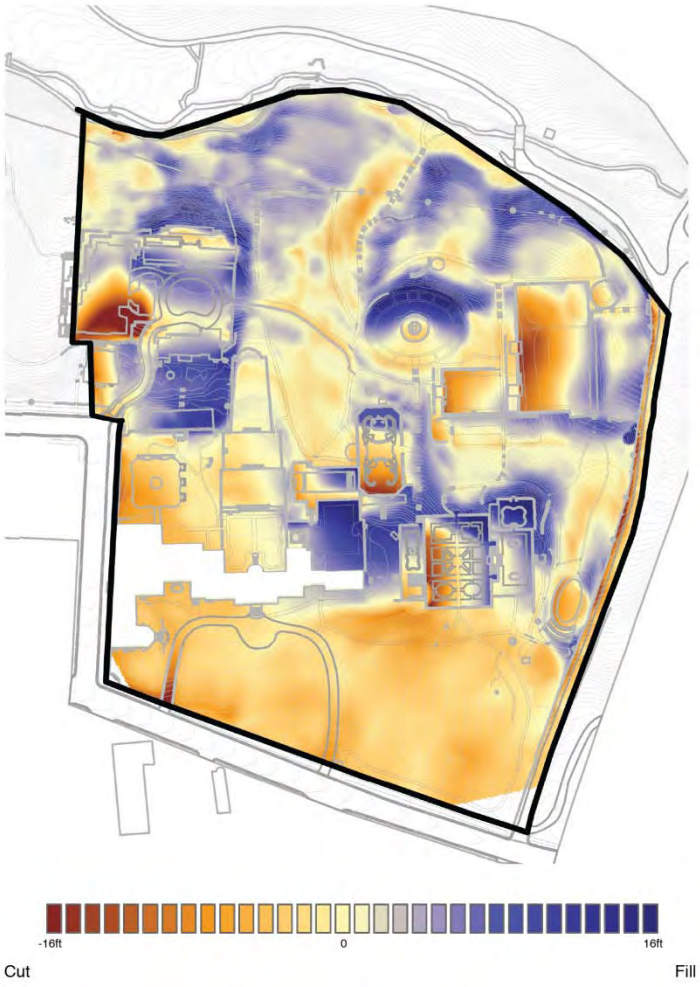


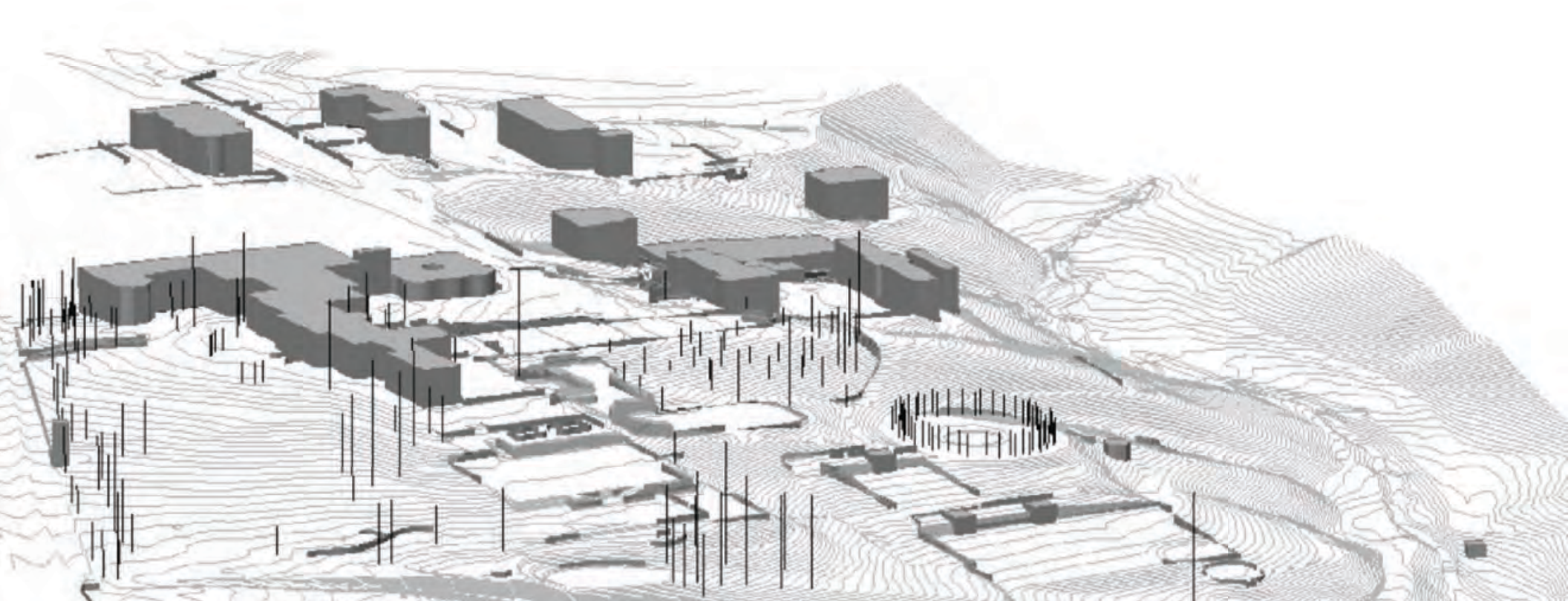
Figure 5. Topographic Change in the DO Garden: a GIS map algebra product

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.

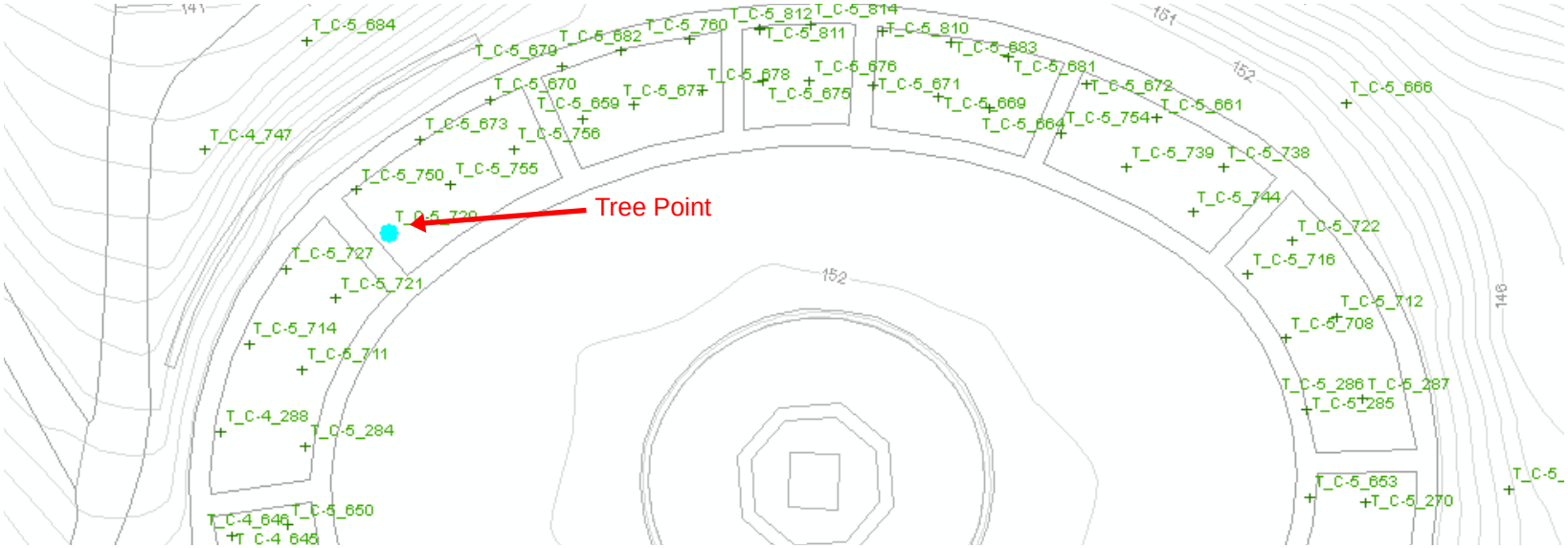
These tasks are extremely relevant as many public and private gardens are searching for an appropriate data management tool like GIS.

Exploring the Dumbarton Oaks Geographic Database

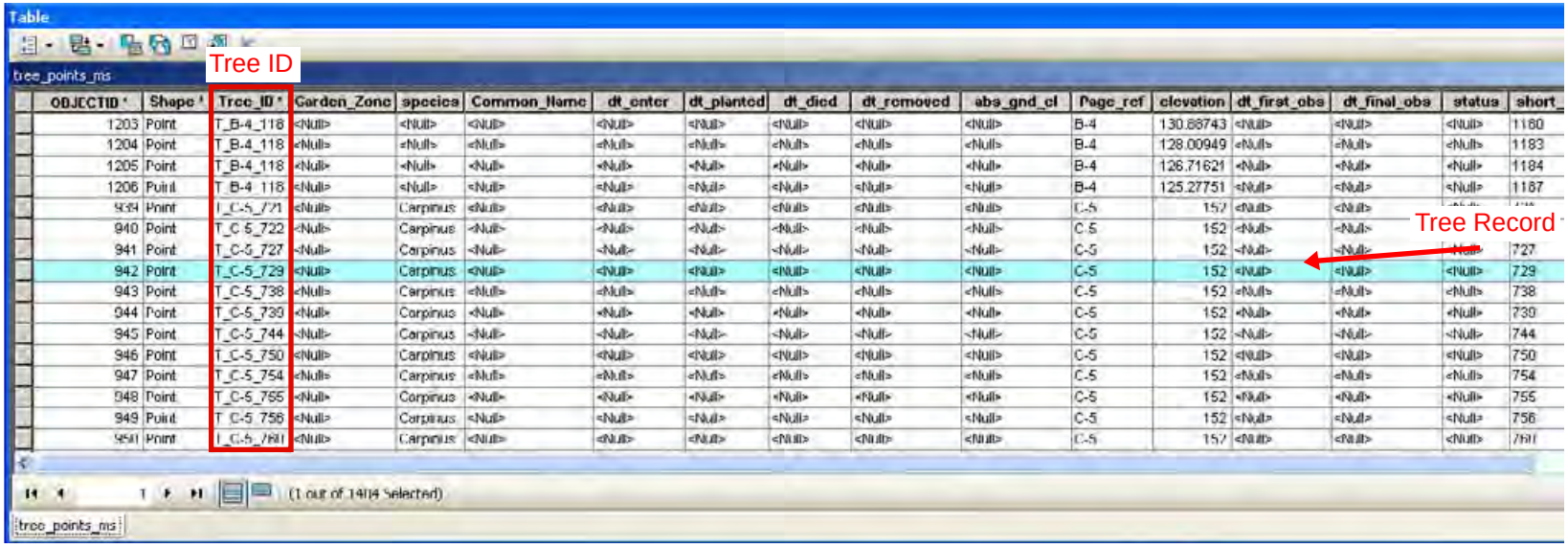


Content:

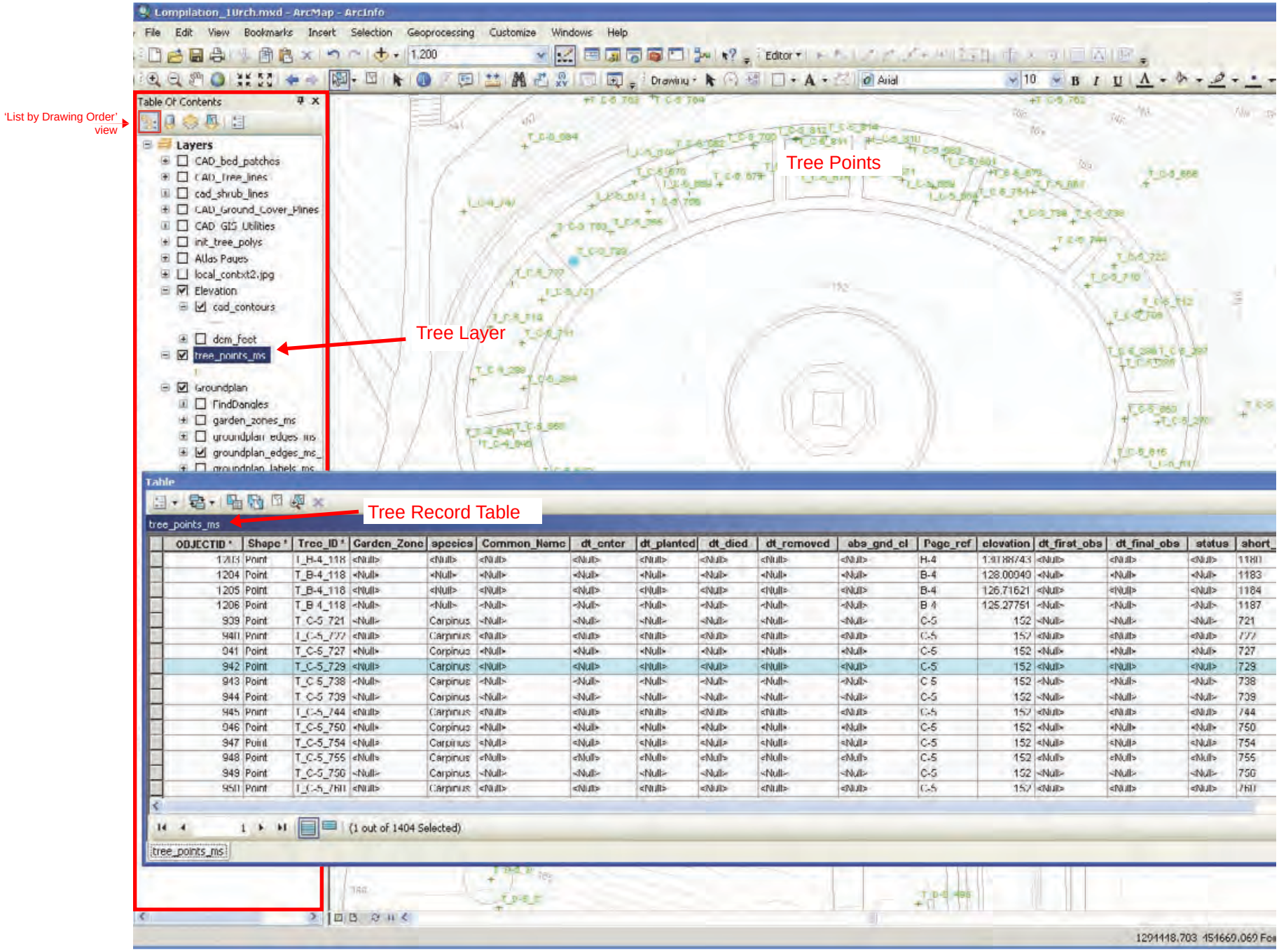
DATABASE ORGANIZATION



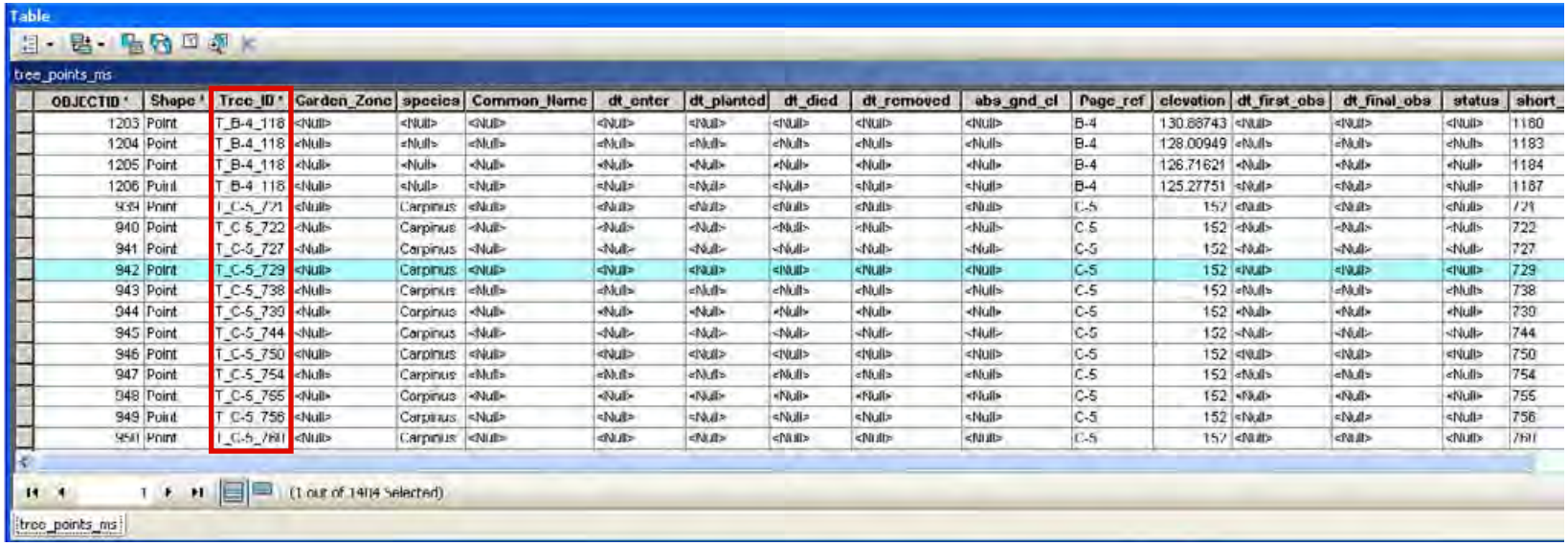
Within ArcMap, every object on the map is linked to a record.



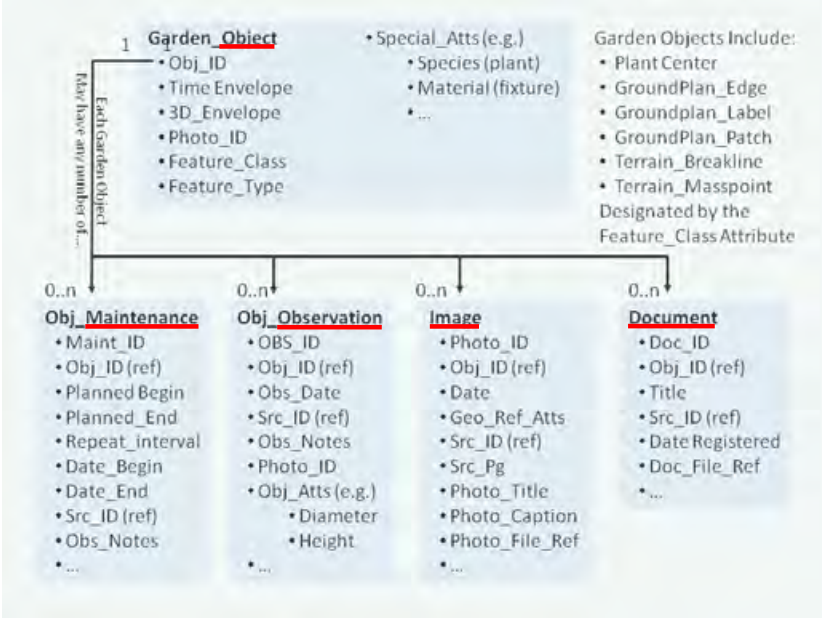
In the Dumbarton Oaks tree database every record has a unique identification code called '*Tree_ID*'.



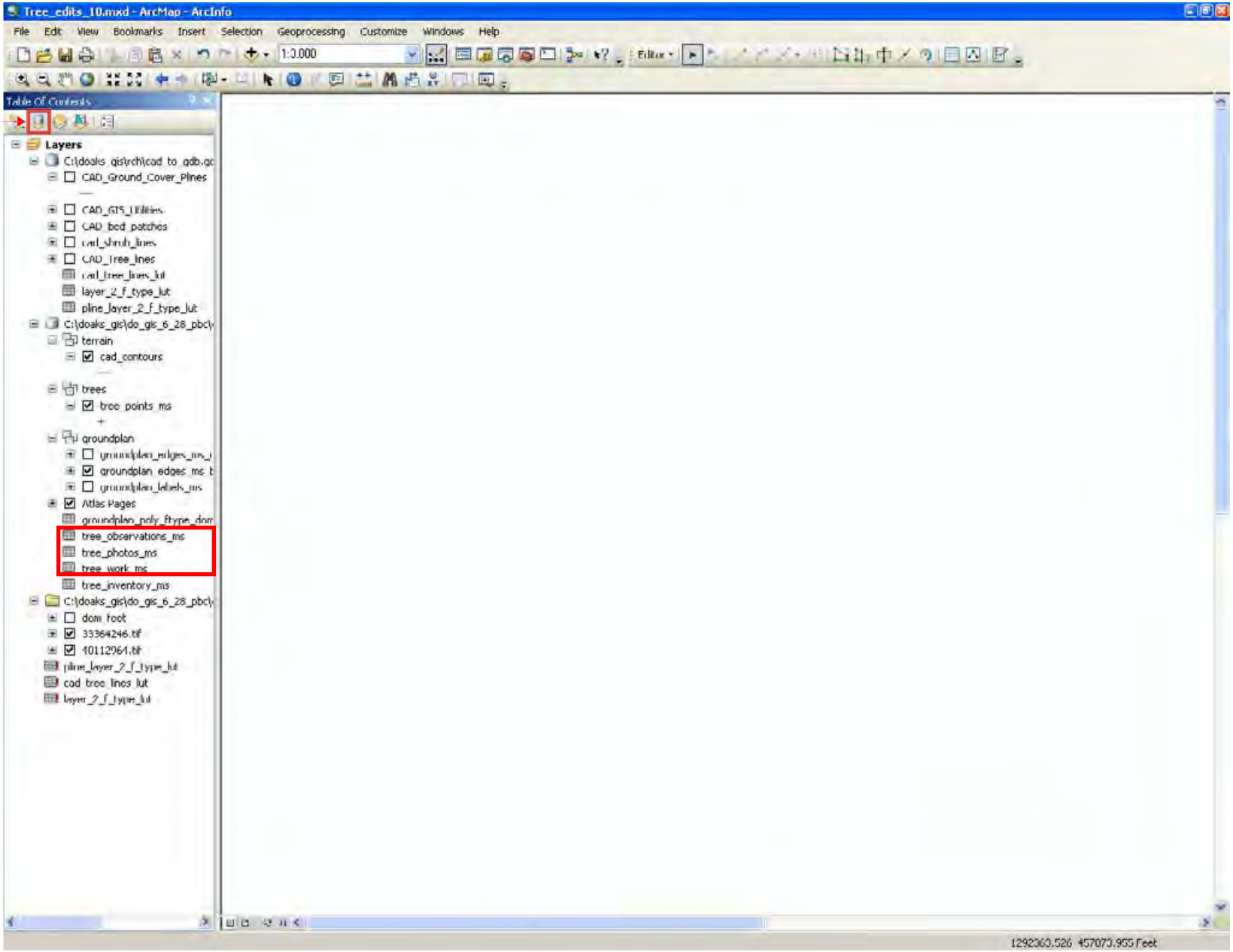
The tree layer, called *tree_points_ms*, can be turned on and off in the *table of contents* at the left side of the screen.
The standard view in the *table of contents* is 'List by Drawing Order' which shows only those layers that are represented by objects on the map.



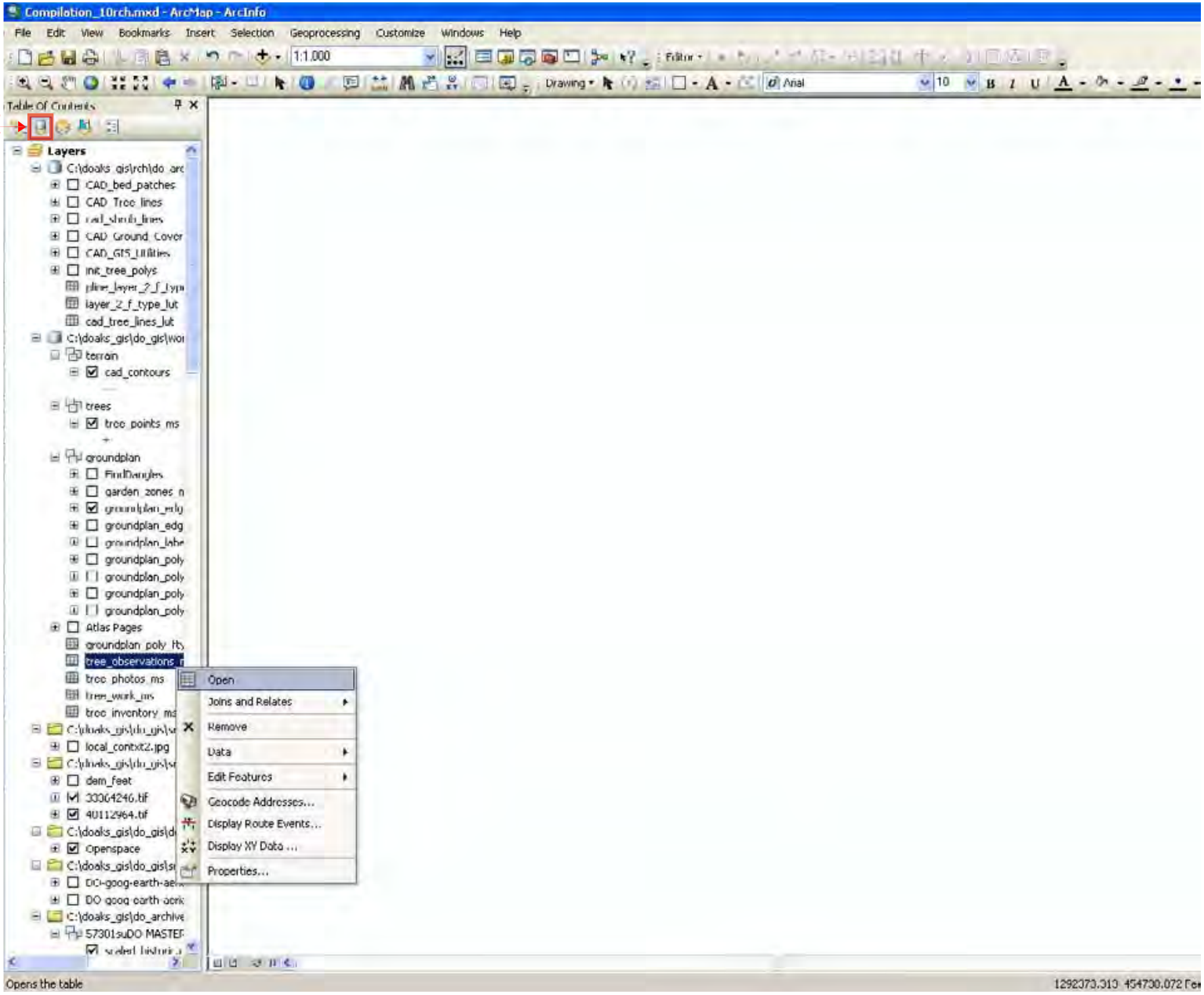
The unique *Tree_ID* number for every tree point allows us to associate additional information tables with each tree point.



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.

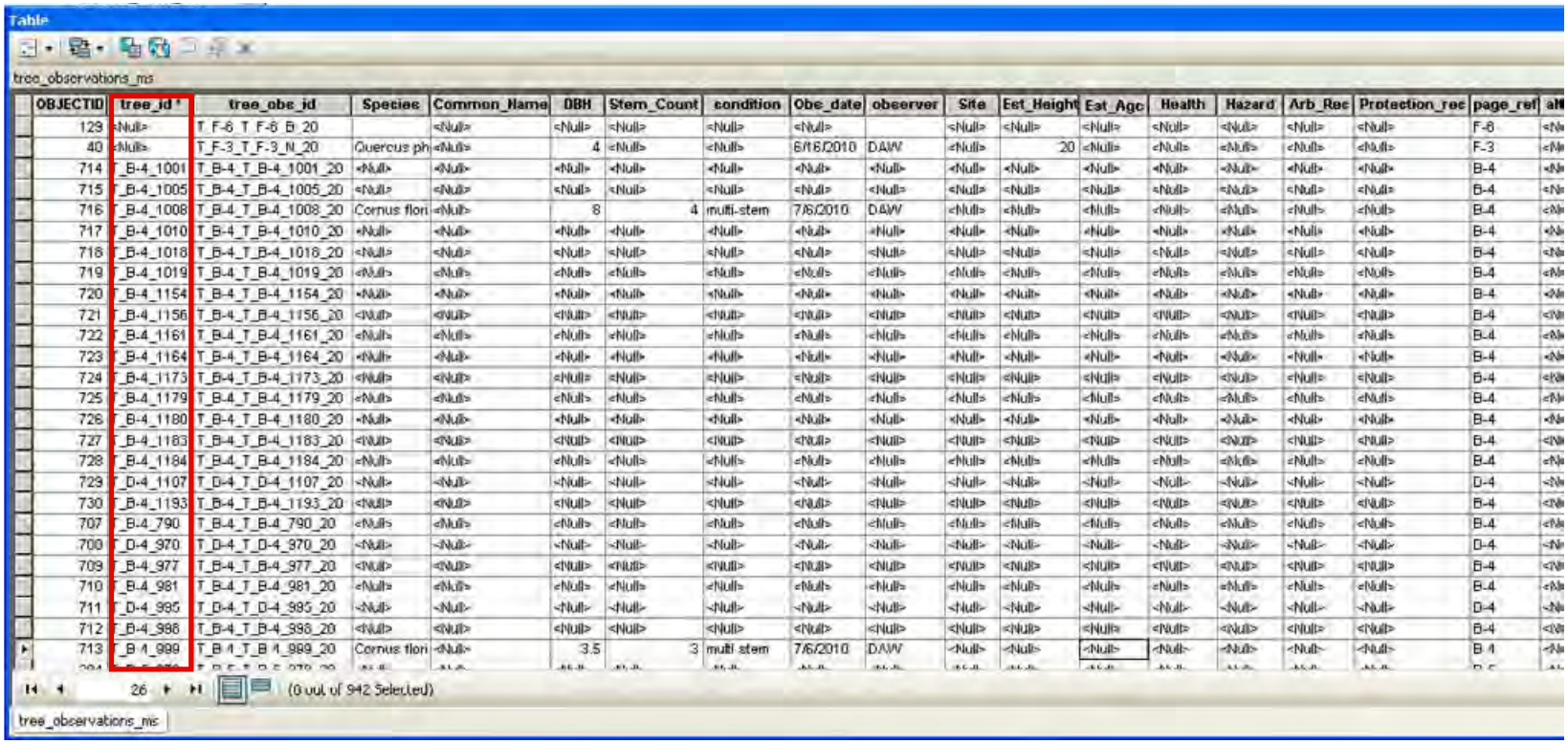


To view these associated information tables, you must switch the *table of contents* to *List by Source* view. Now the associated 'maintenance', 'observation', and 'image' tables are shown within the *table of contents*.

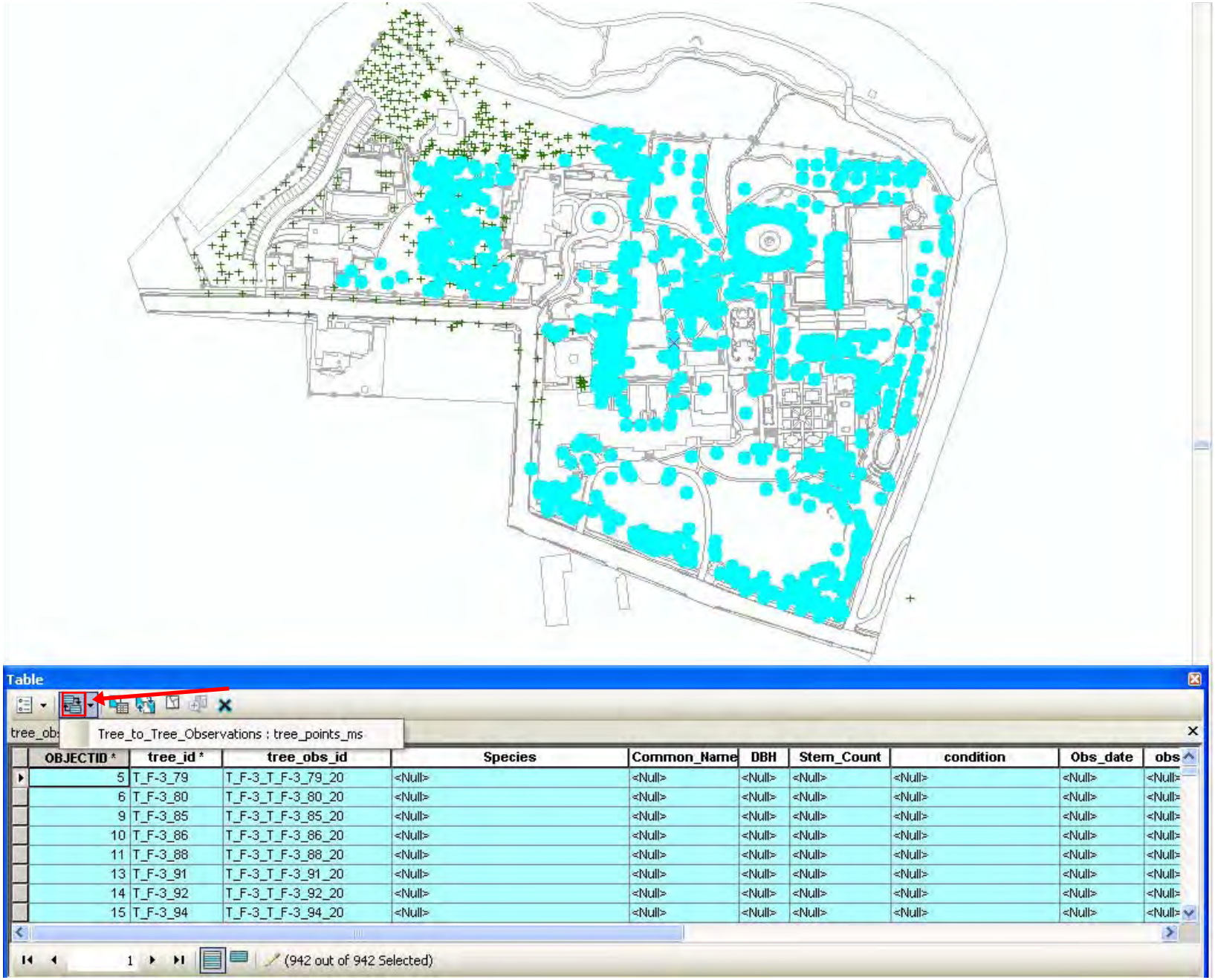


You can view the tables themselves by right-clicking on the table listing. *Table of Contents* > *tree_observations_ms,* right click > *open*.

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.

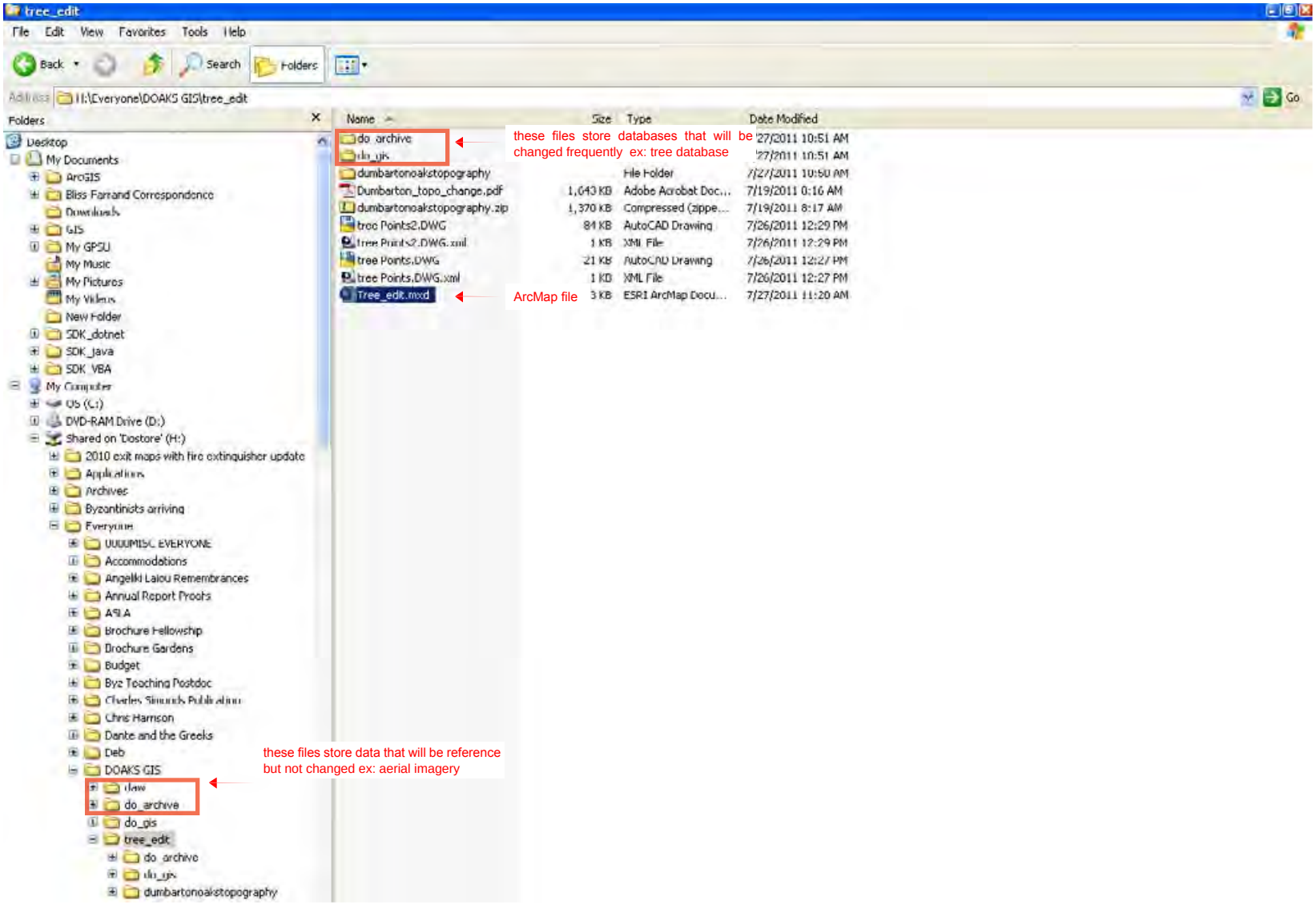


This is a view of the observation database called *tree_observations_ms*. Each entry is linked to a particular tree by the *Tree_ID field*. There may be multiple entries for each tree. The database can be sorted like an excel database and copied into excel.



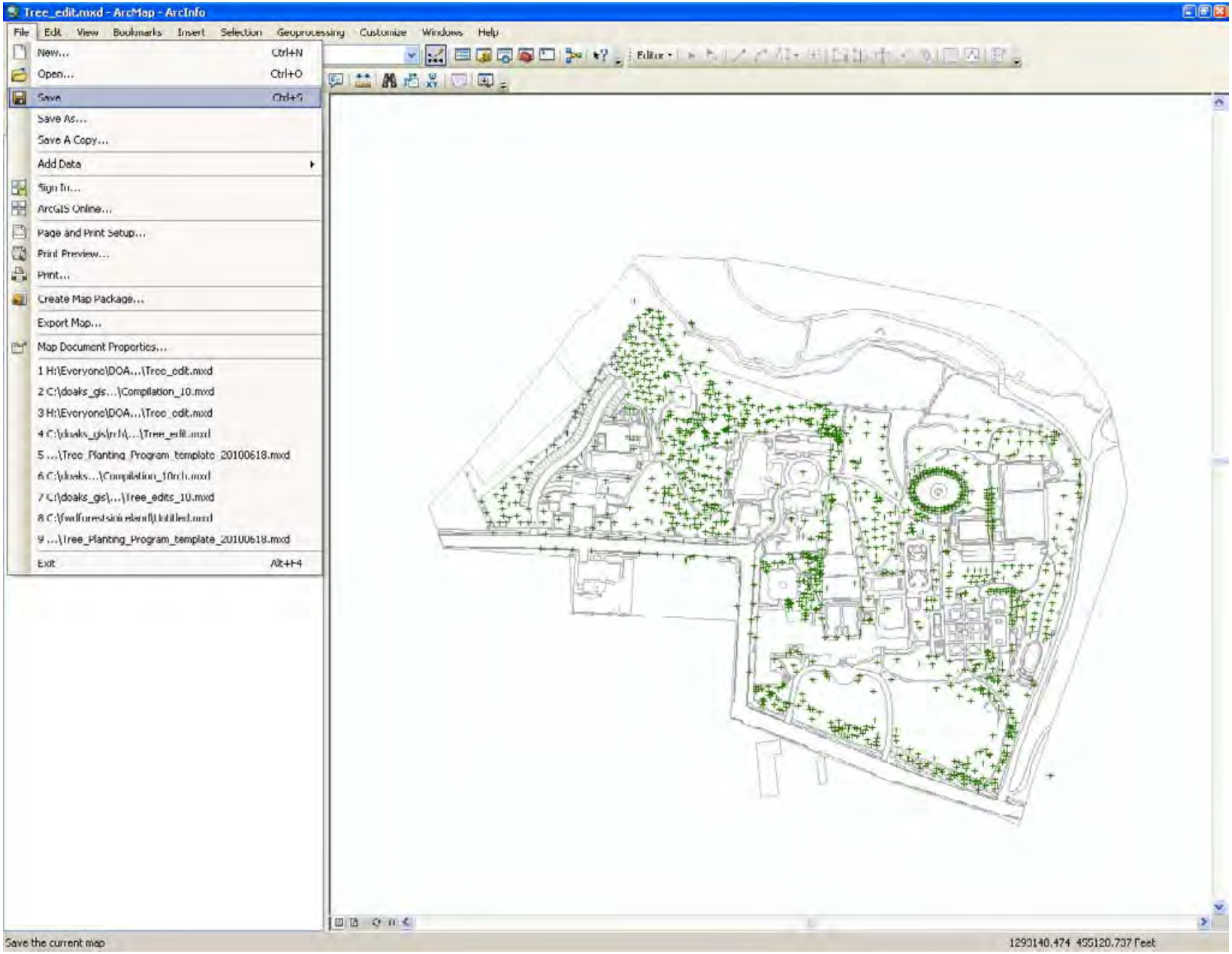
The *Observation* table is linked to the tree points on the map via the *tree_id* number.
Use the *Related Tables* button it is possible to select tree points based on the *tree_observations_ms* records.
For example: If we wanted to see all of the trees that have at least one observation record we could 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



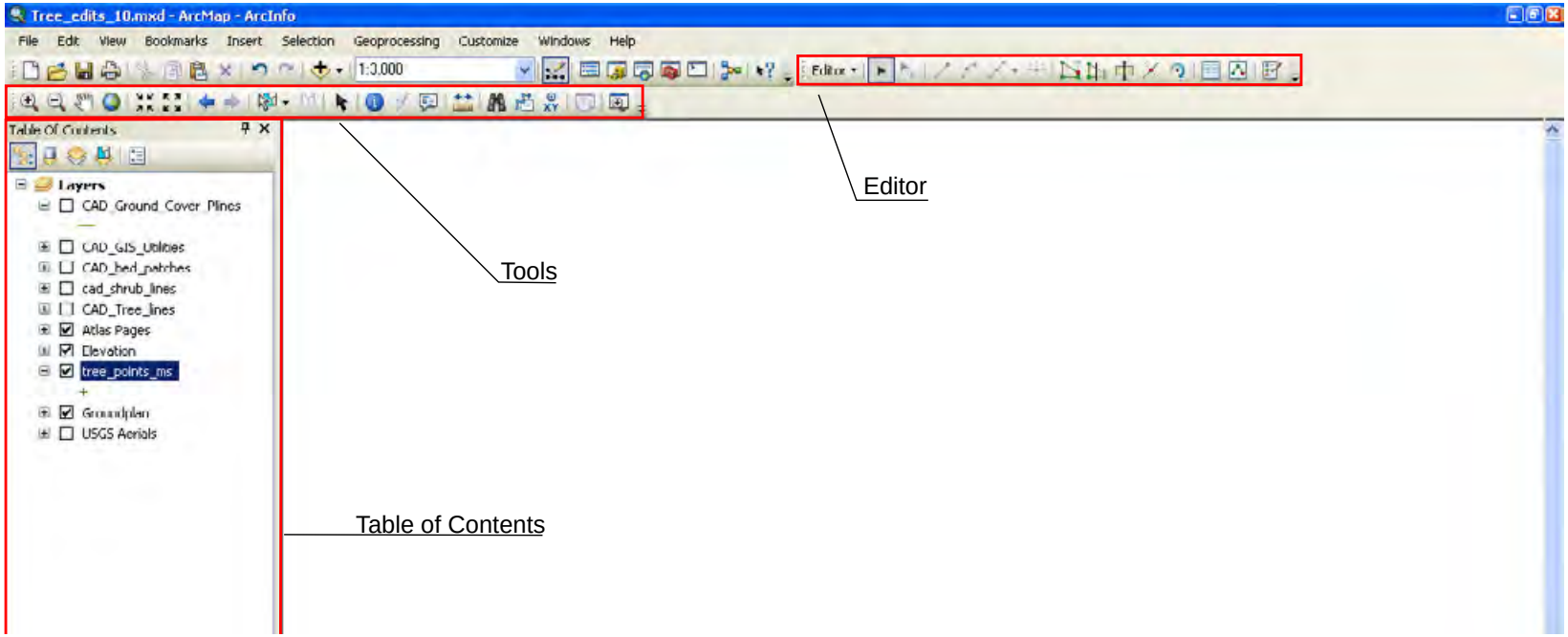
Open the map document customized for tree editing. Navigate to *H:\Everyone\DOAKS GIS\tree_edit* > double click *Tree_edit.mxd*. Notice the associated files as highlighted above. These files hold information that ArcMap displays when you open *Tree_edit.mxd.* If you wish to copy *Tree_edit.mxd* to use 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>

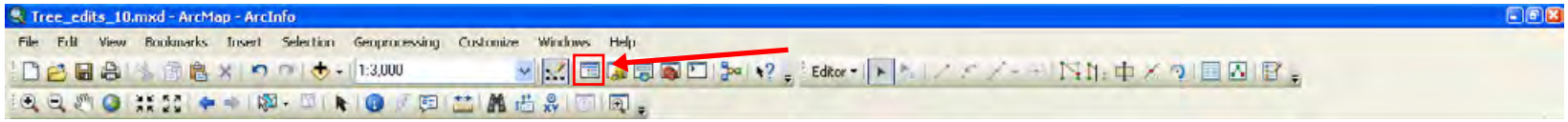


As you edit the tree database and save your edits (page 18) the file is updated automatically, there is no way to undo the save other than to do so manually. When you save the document itself: File > Save, you are saving the configuration of the map document - layer color, which layers are on and which 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.

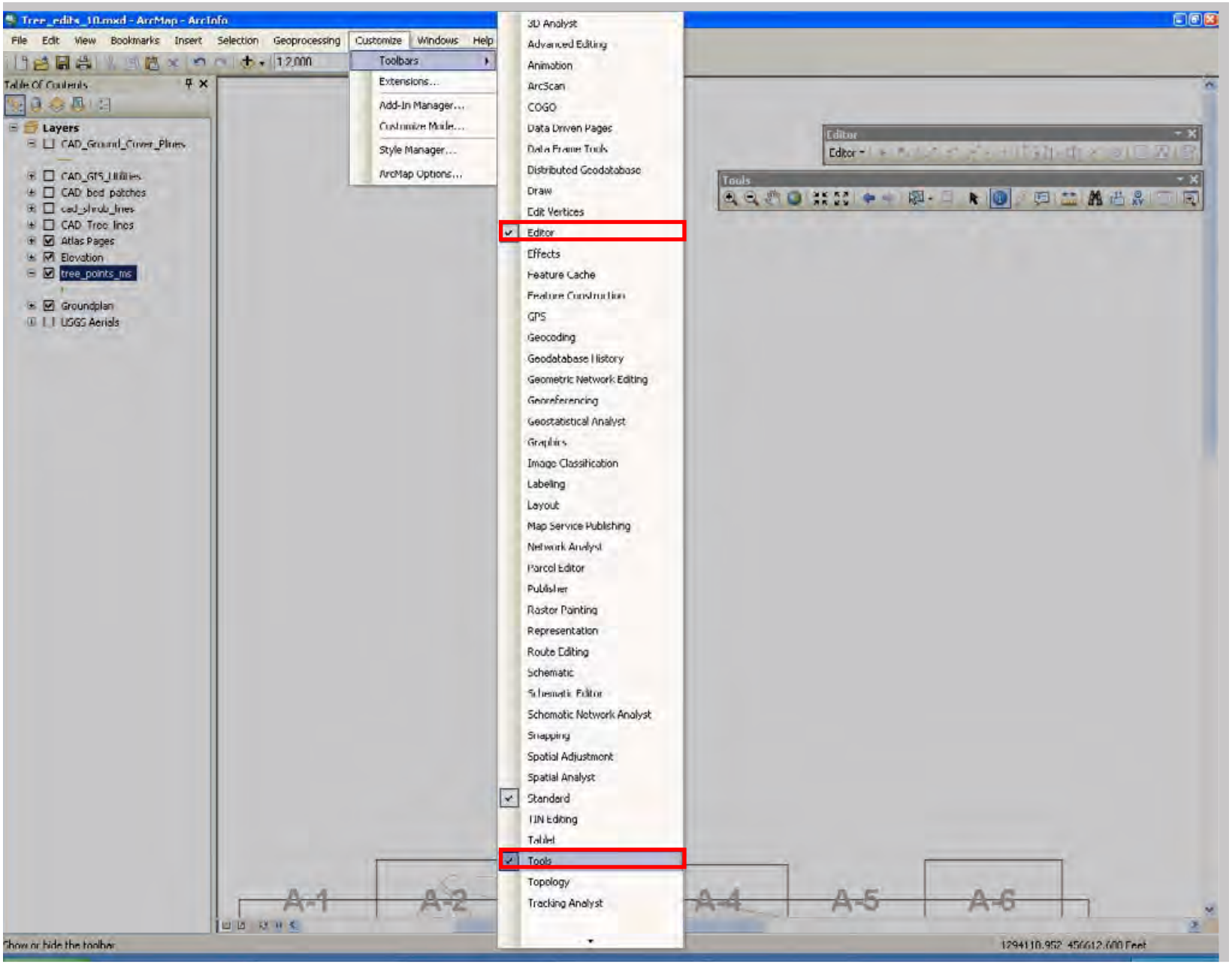
THE WORKSPACE



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)



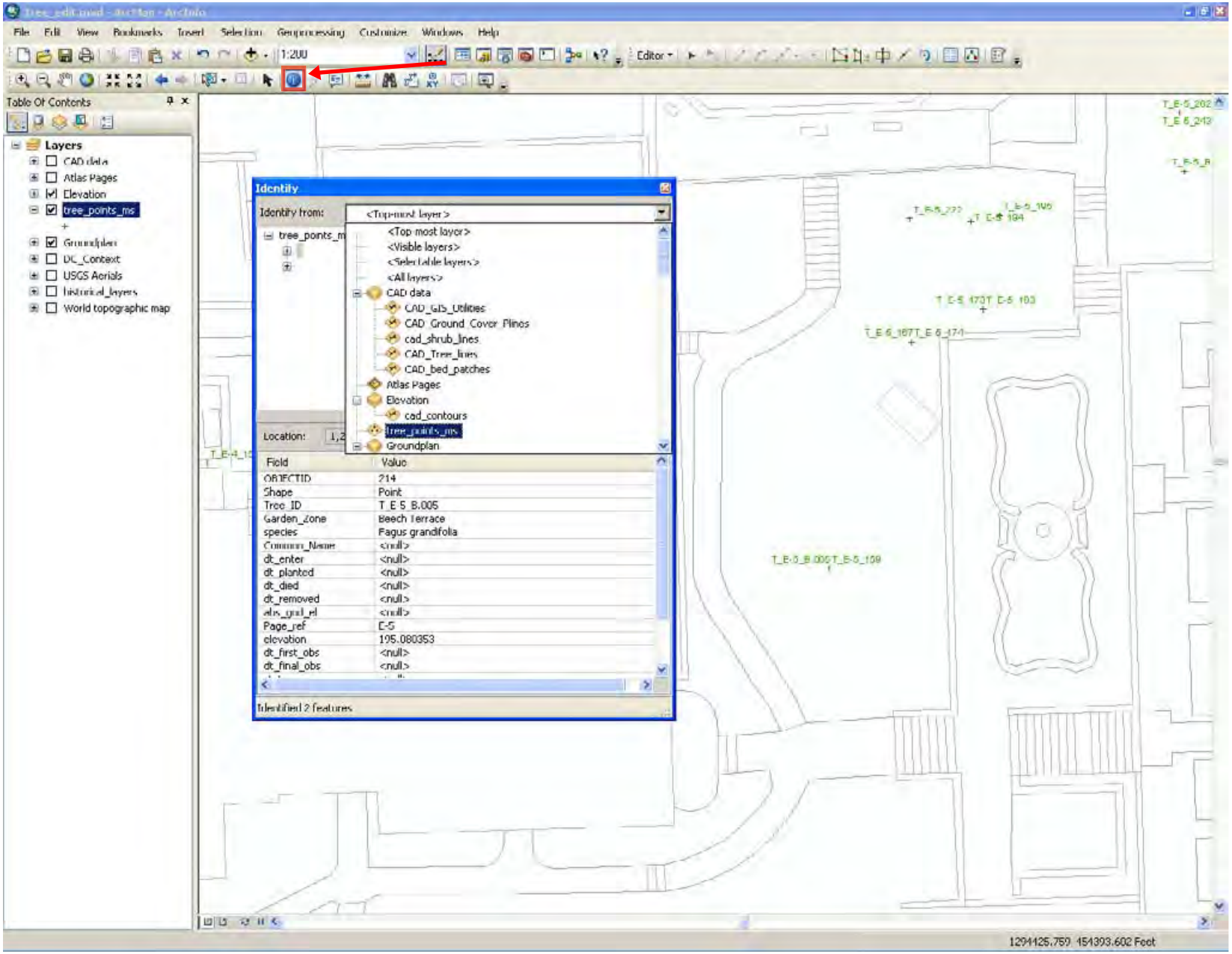
Display the *Table of Contents* by simply clicking the *Table of Contents Window* button above



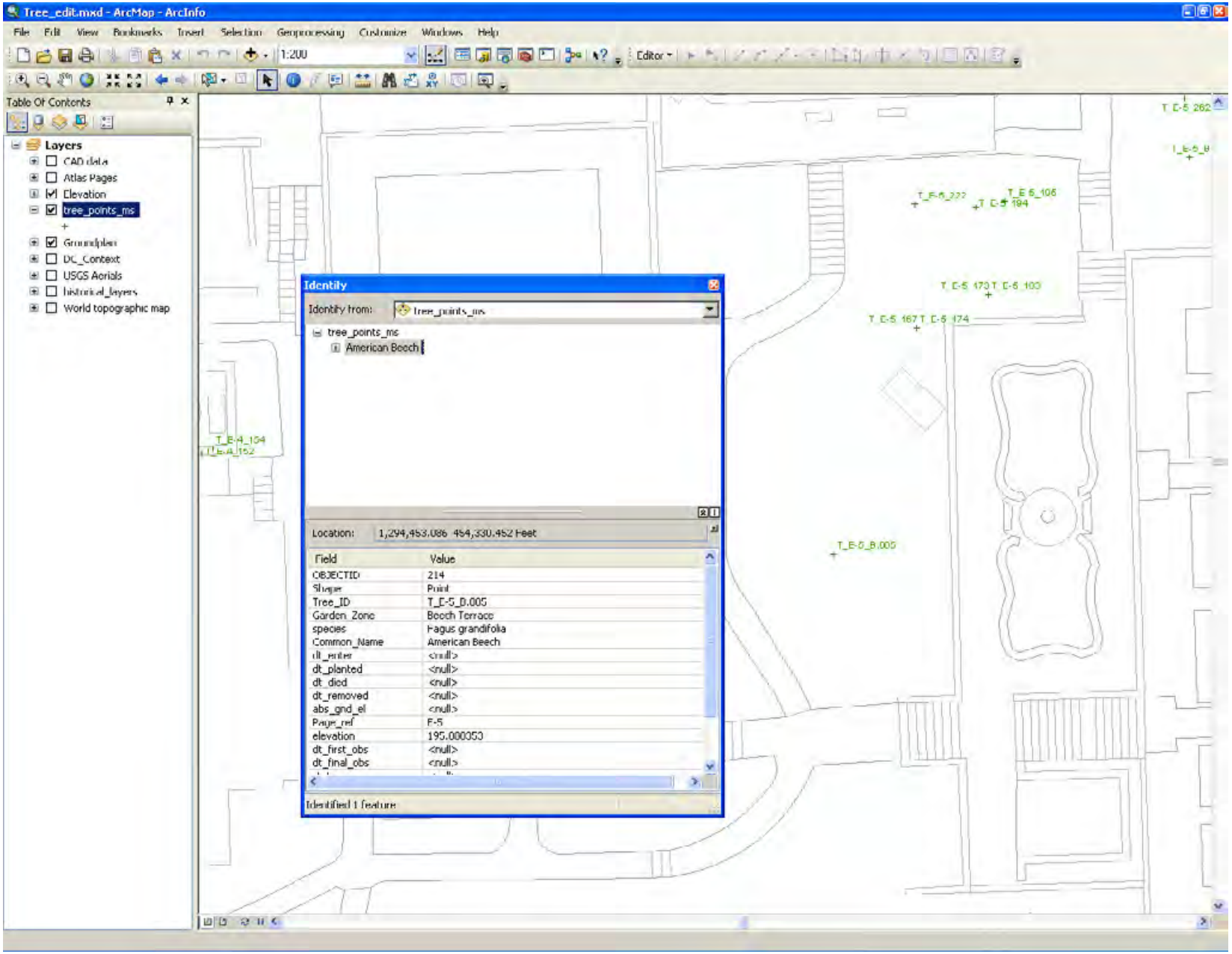
to show *Tools* and *Editor* toolbars: go to *customize* > *toolbars* > and select from dropdown menu.
Once displayed the bars may be dragged to the menu at the top of the workspace.

IDENTIFY

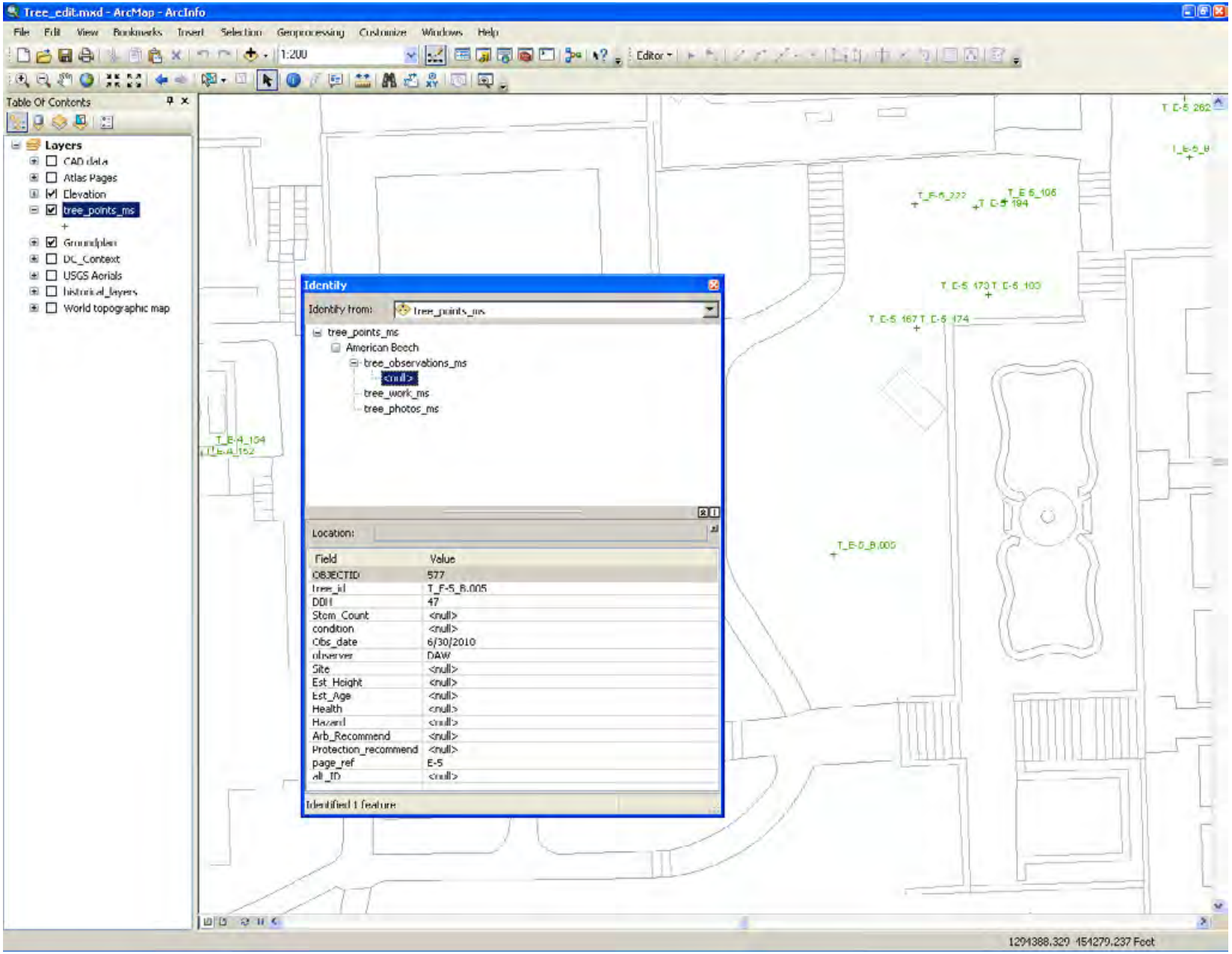
The *Identify Tool* provides the most direct method for accessing object information through the map interface.
To learn what information the DO tree database contains for a particular tree, such as the American Beech on beech terrace, simply find the tree on the map, activate the *Identify Tool* by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

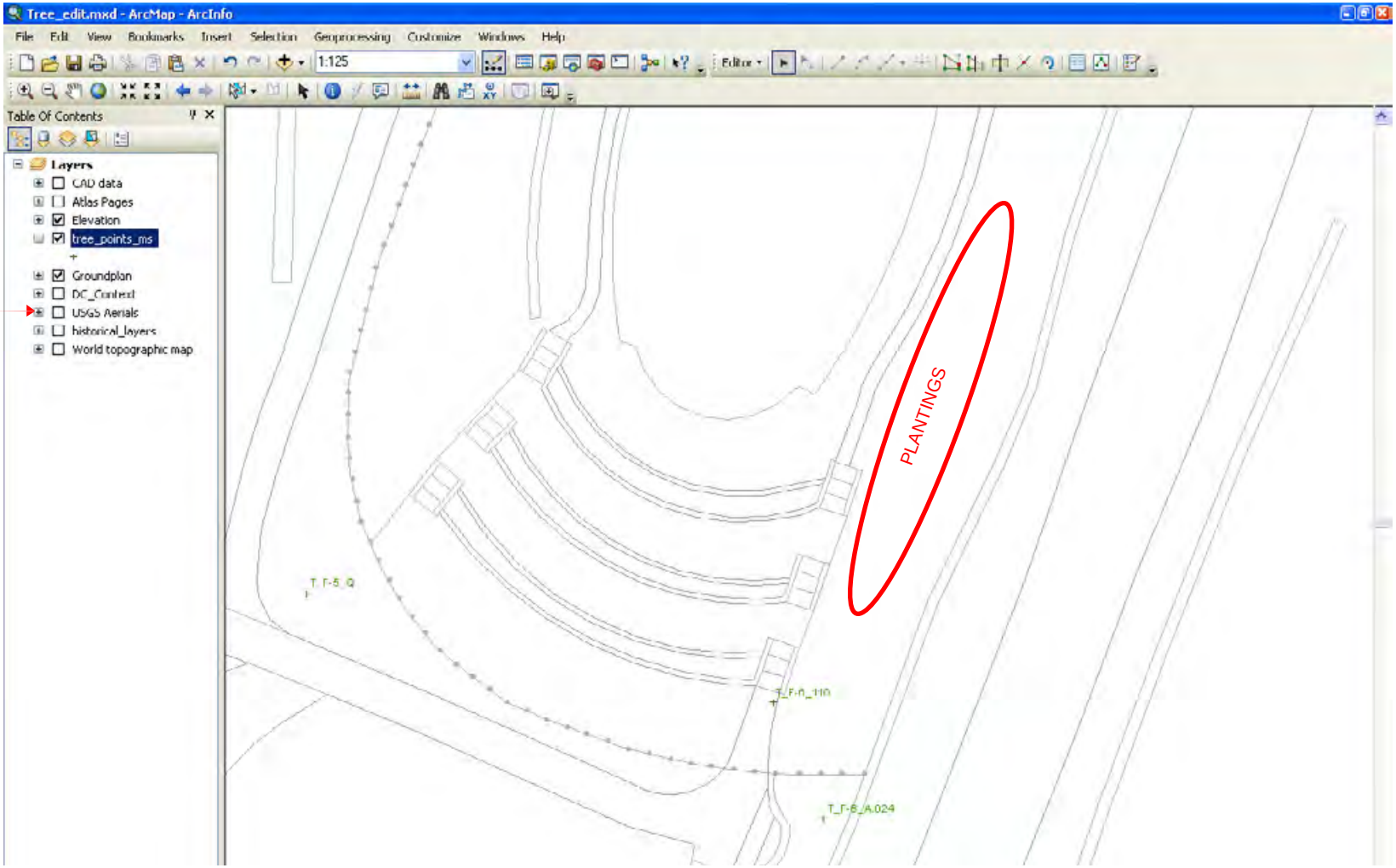


Again click the tree point and the *Identify* window now displays the *tree_points_ms* record. To view the associated tables expand the information tree by clicking the plus sign.



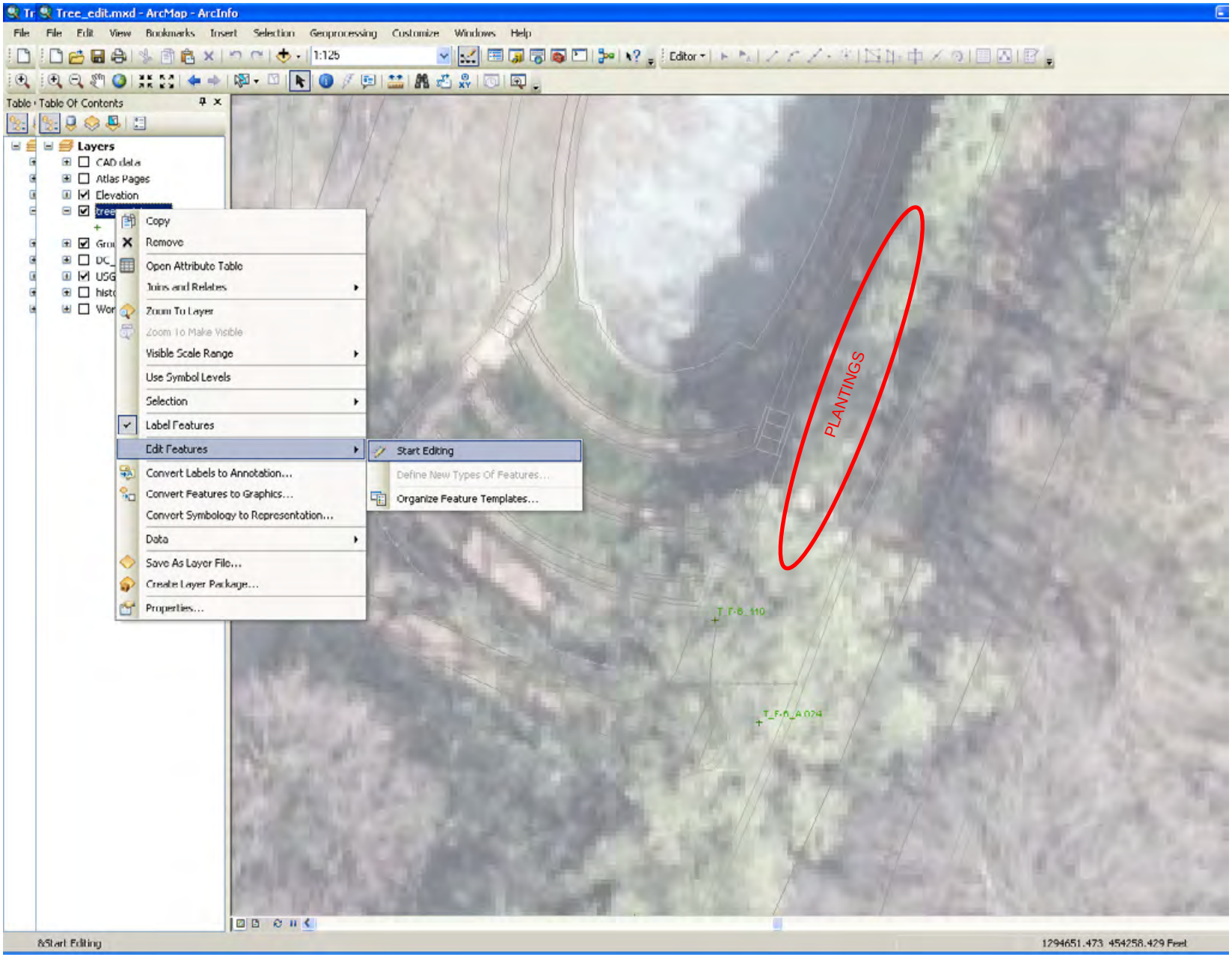
The *Identify* window shows that one *tree_observation_ms* record is associated with the tree point and no *tree_work_ms* or *tree_photos_ms* records are present for this tree. By clicking the record below *tree_observations_ms* we see that DAW, measured a DBH of 47 inches on 6/30/2010. *While this is 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

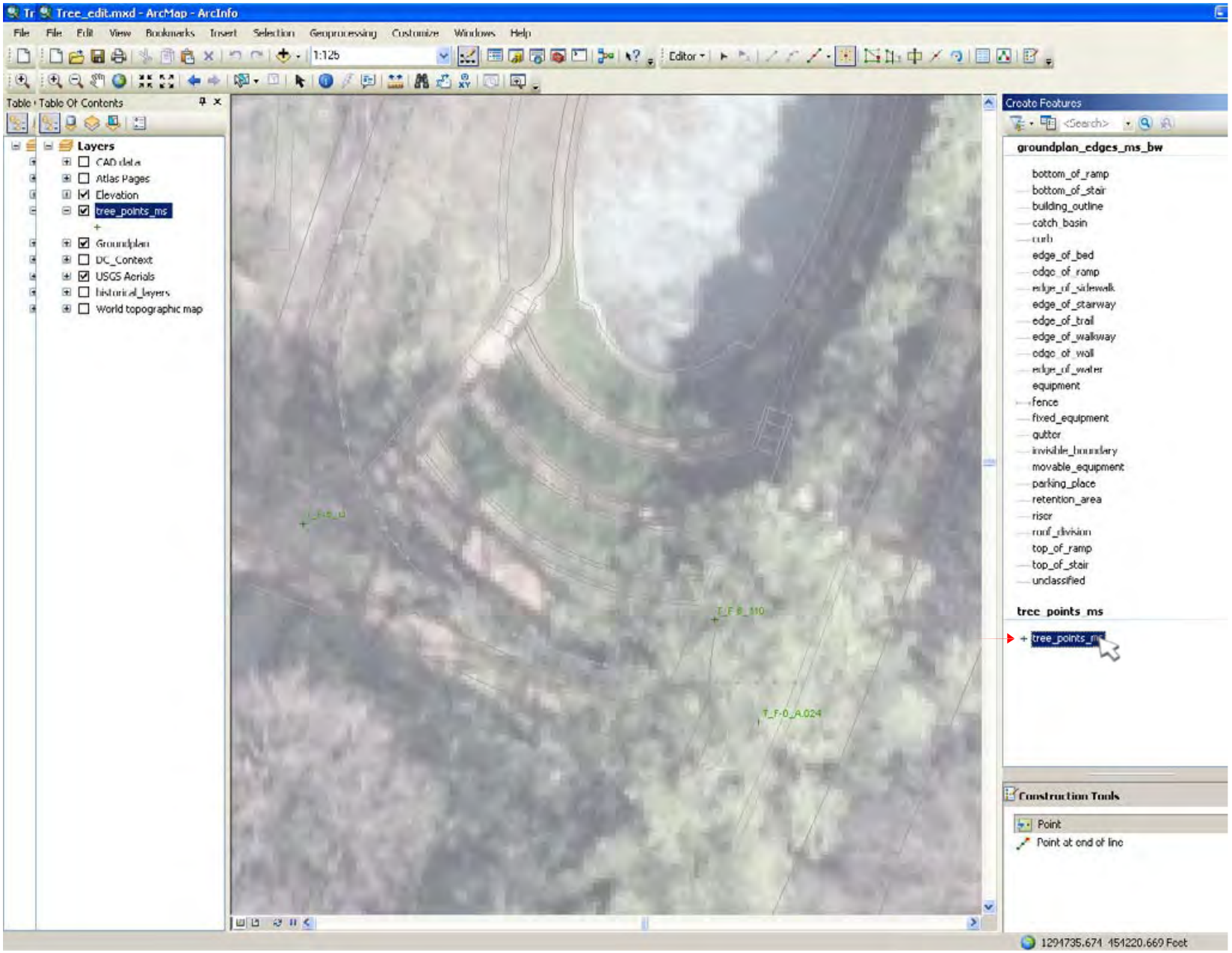


To add new trees to the tree database *tree_points_ms* we first navigate to the area where the new trees are located. In this case we will add three trees points on the west side of the Lovers' Lane Pool. To help locate the trees it might be helpful to turn on the USGS aerial layer by clicking the check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

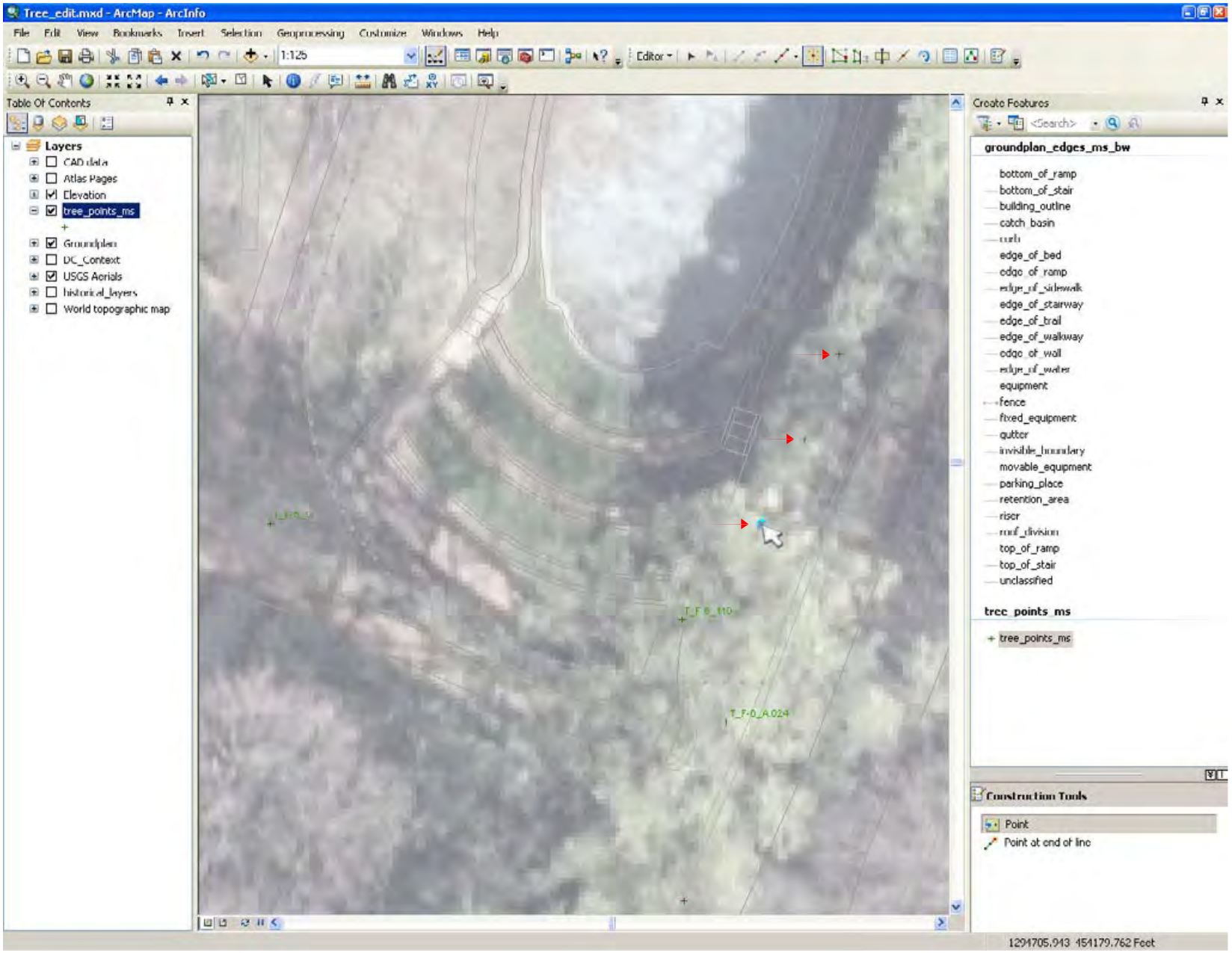
*If the image is not displayed you may have to open the *USGS aerials* group by clicking the plus sign and then check the box next to the image file.



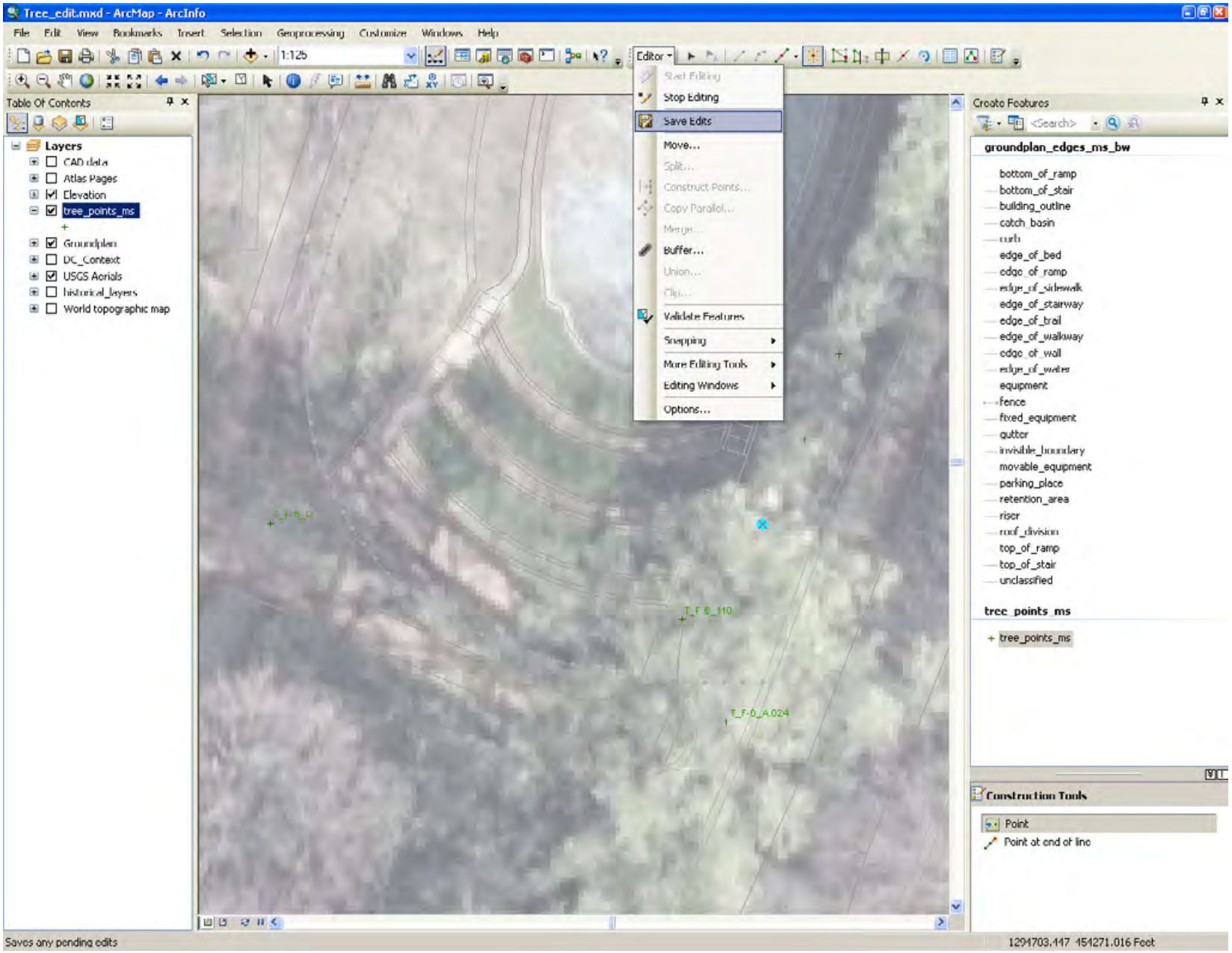
To edit objects or tables you must turn on the editing feature. *Table of Contents* > *tree_points_ms*, right click > *Edit Features* > *Start Editing*.
*This will allow editing of the entire geodatabase, which includes tree points, image, and observation tables.



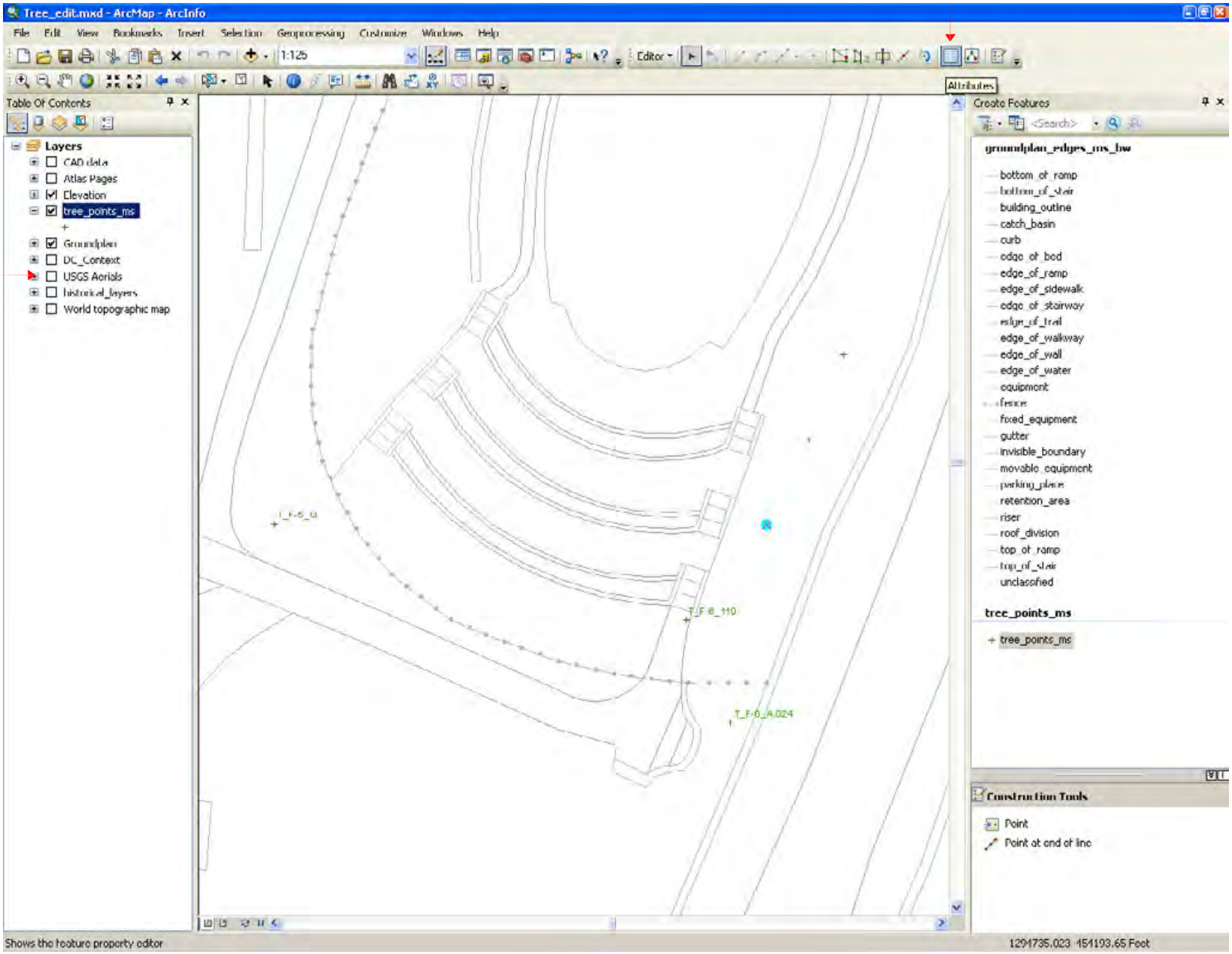
The *Create Feature* dialogue expands. To create a new tree click on the *tree_points_ms* layer: *Create Features* > click *tree_points_ms* (the cursor is now 'active') > click on the map to add a new tree.



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 accidentaly click in the wrong location, that’s fine, you can move and delete points after done adding them.



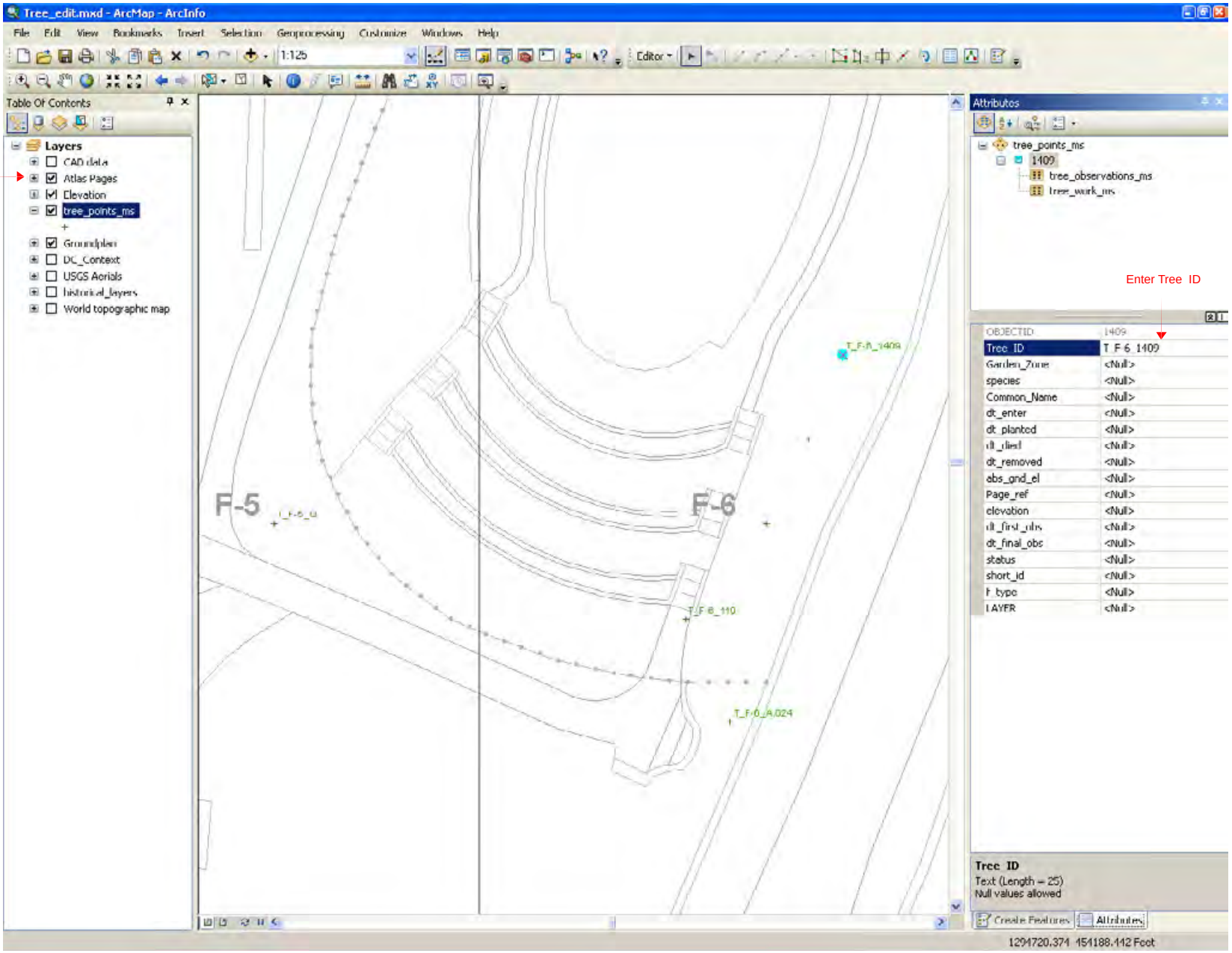
To stop adding trees: click *Editor* > *Save Edits*. The cursor is no longer active.



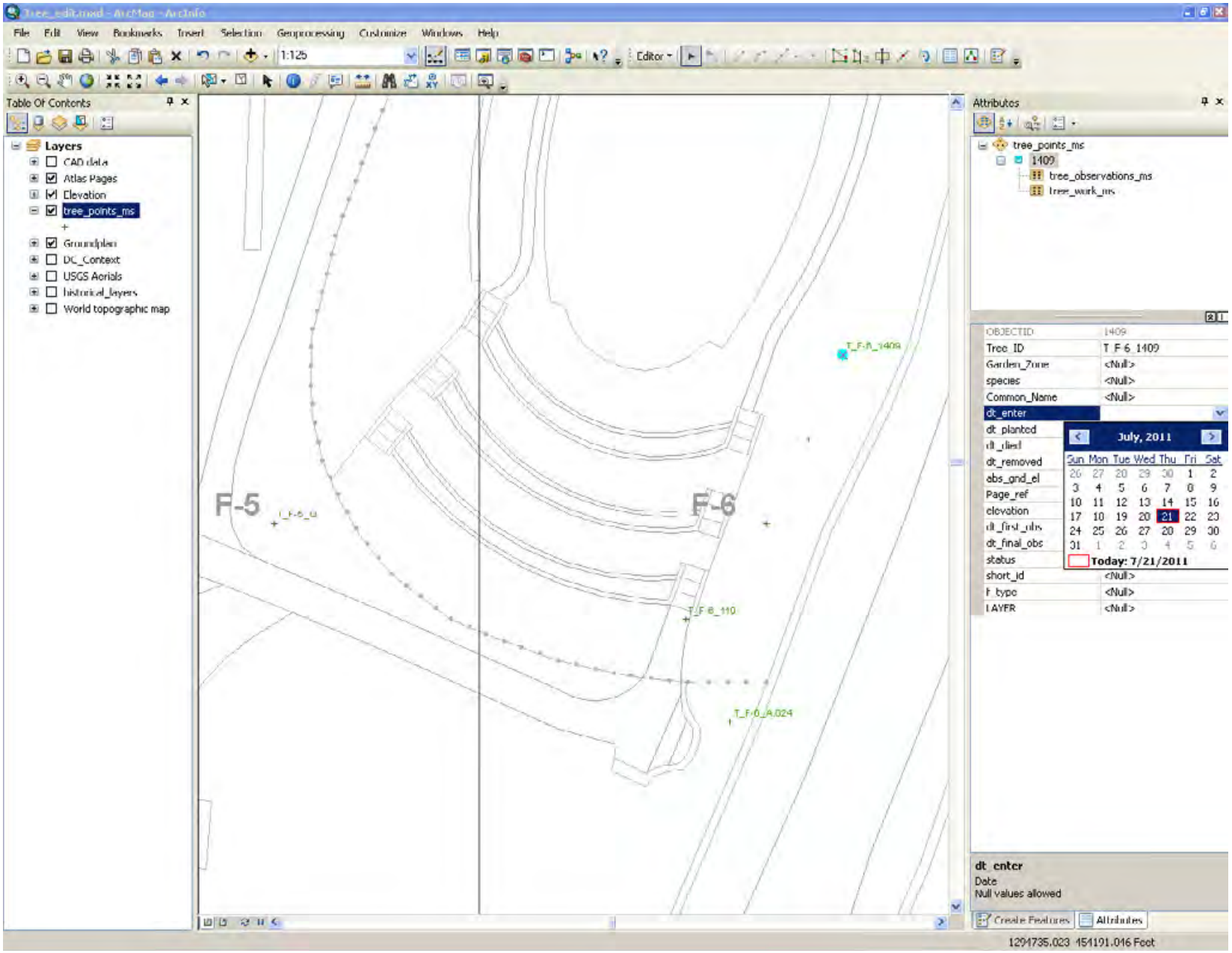
turn off aerial

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

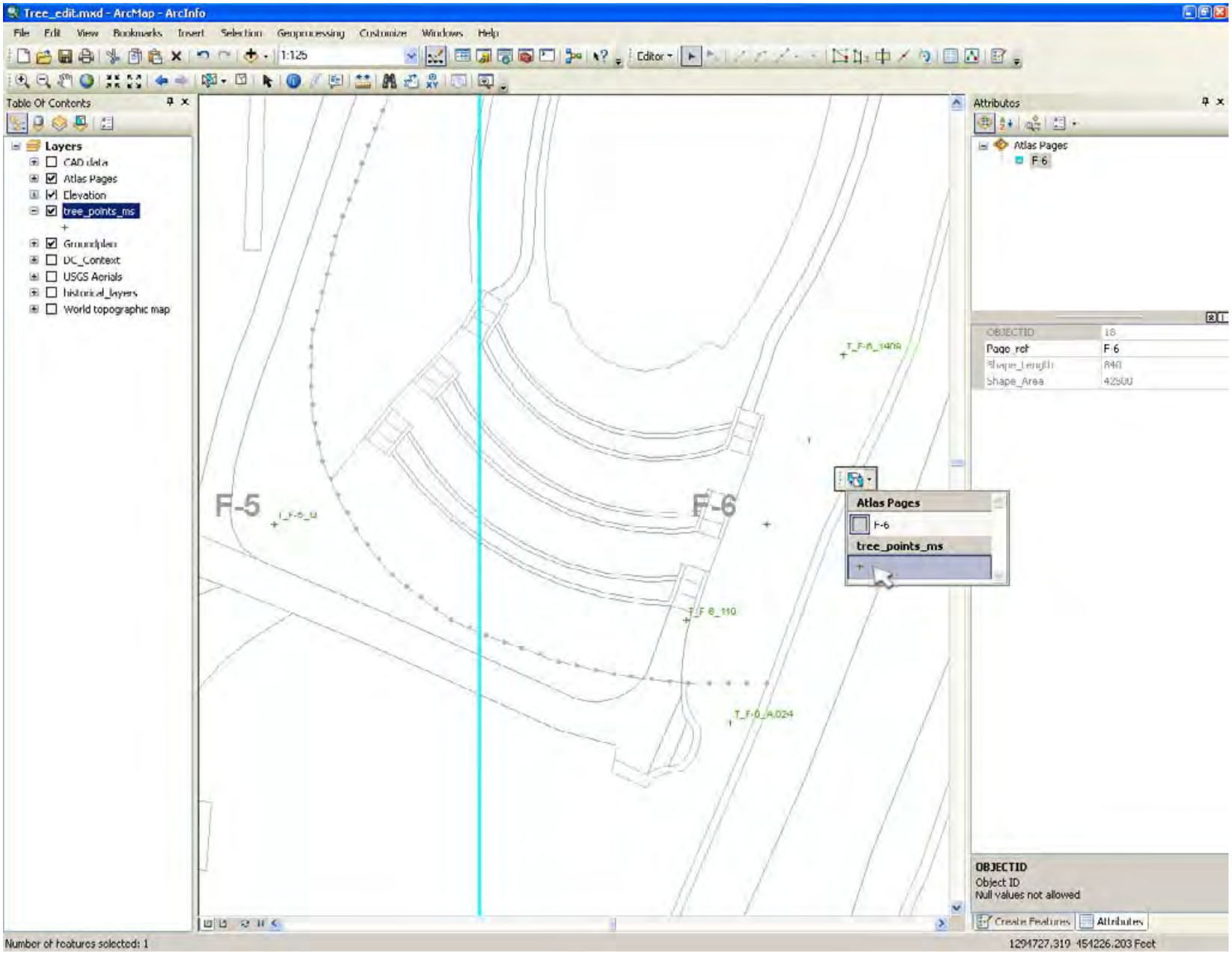
Open the *Attributes* dialogue by clicking the icon in the *Editor toolbar*.



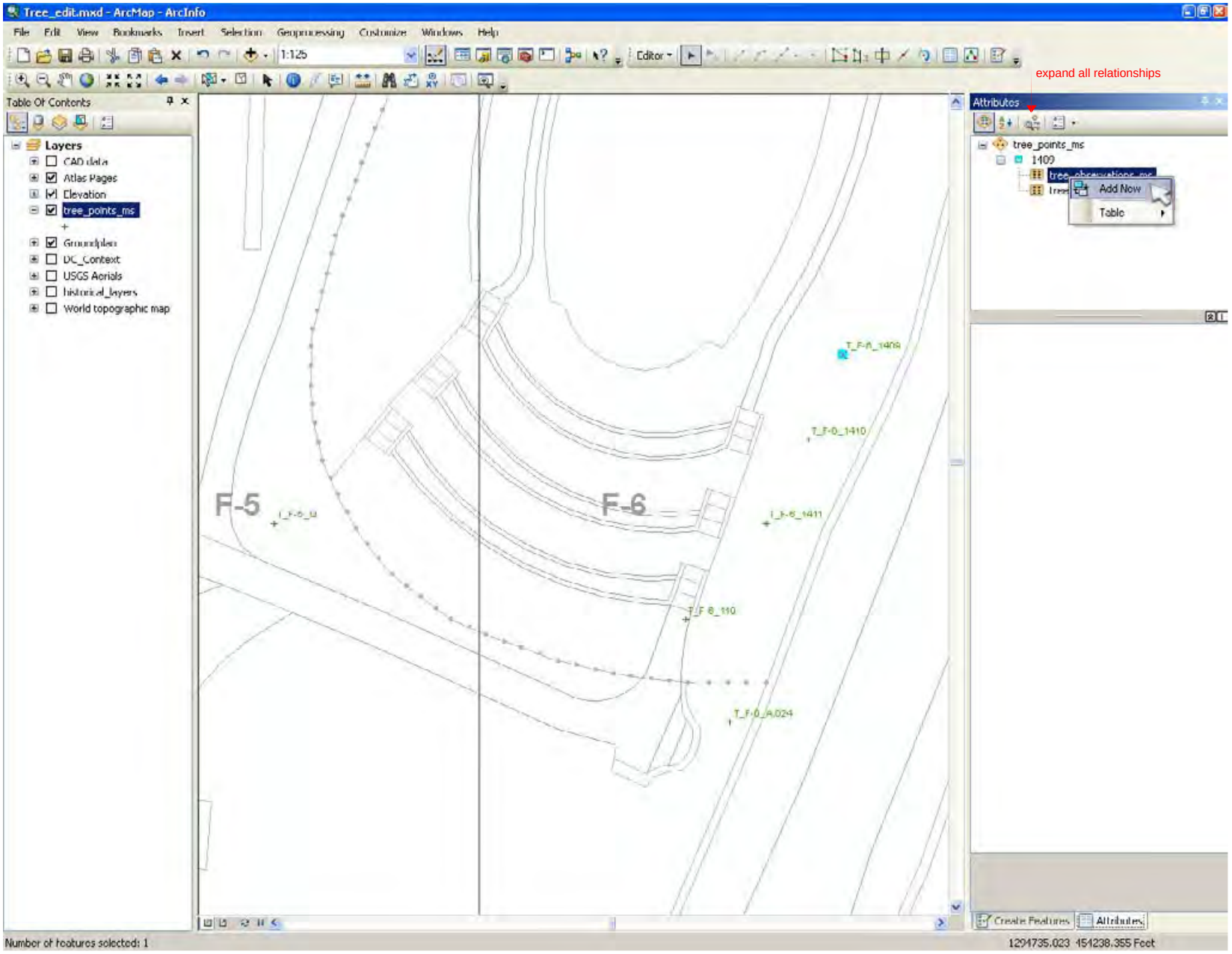
Select one of the new points by clicking on it. The tree record will appear in the *Attributes dialogue* on the right side of the screen. We will enter a tree id number by clicking in the cell to the right of the *Tree_ID field*, but first turn on the *Atlas Pages* layer for reference. Each *Tree_ID* 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* dialogue. In this example I type T_F-6_1409.



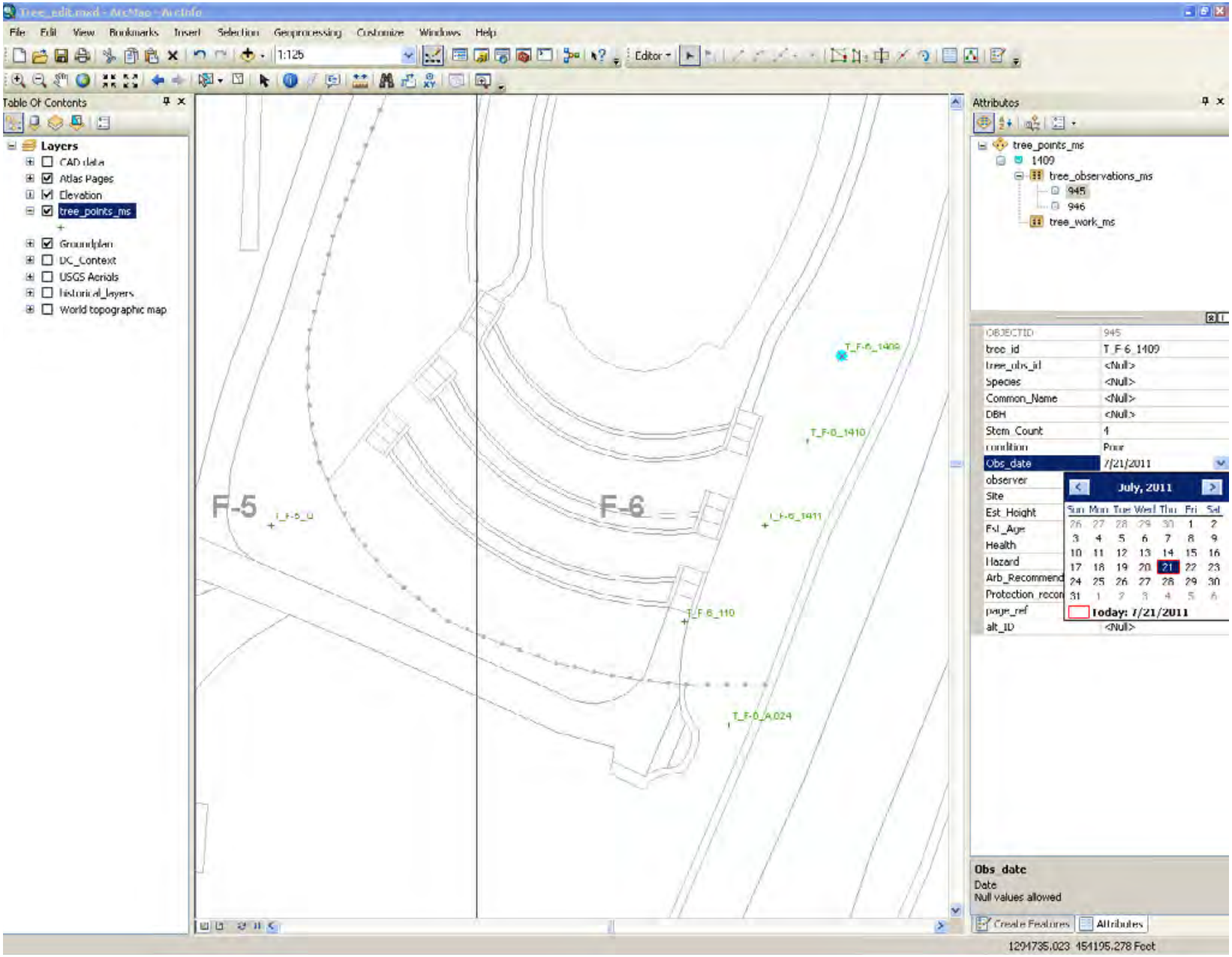
Enter all of the appropriate data before moving on to the next point.



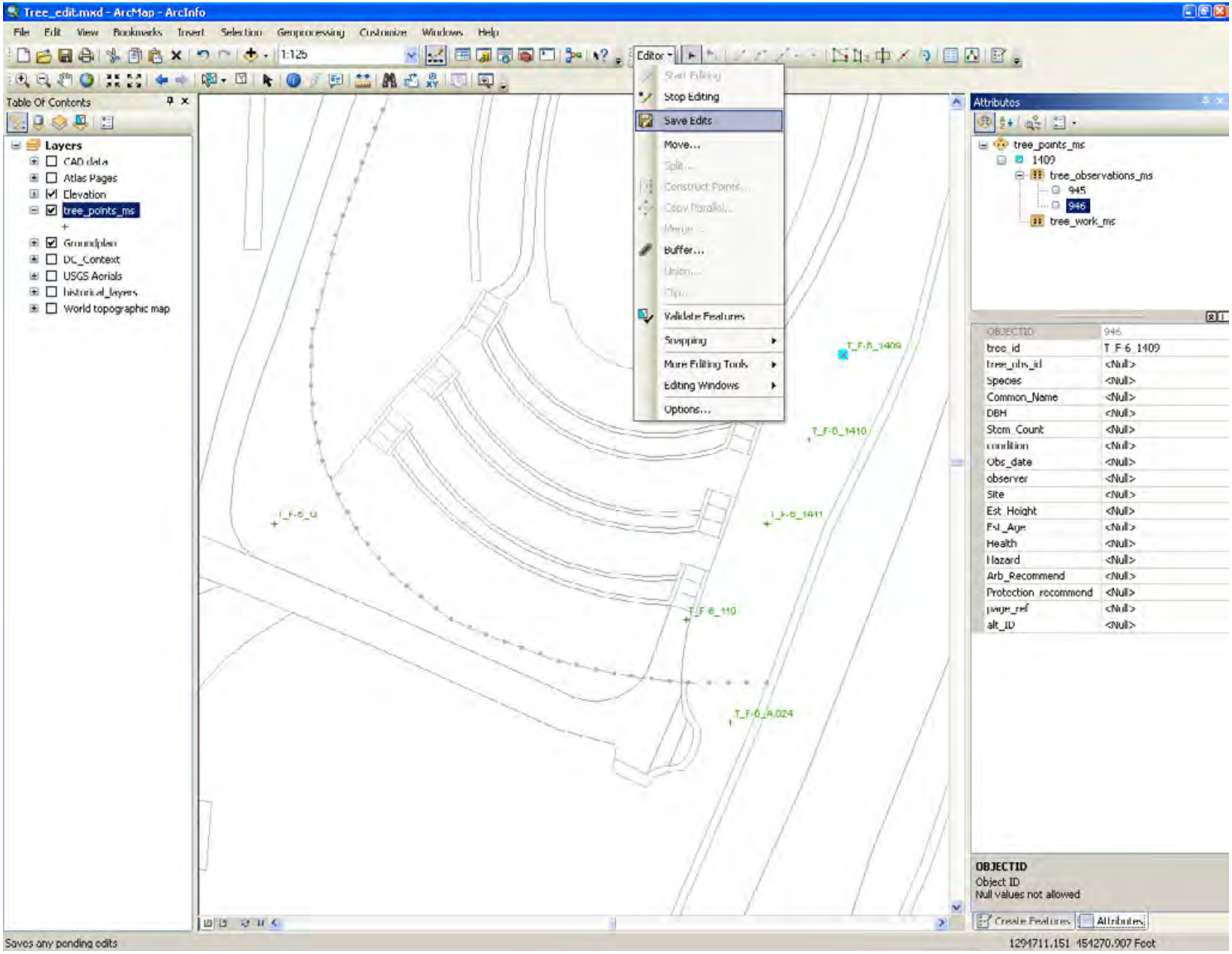
Click on the next tree point - ArcMap recognizes that there are overlapping objects where we clicked (*Atlas Pages* and *tree_points_ms*) and allows us to choose between them. Click point > choose *tree_points_ms*
Now enter a *Tree_ID* as before and all additional data. Next we will add an observation.



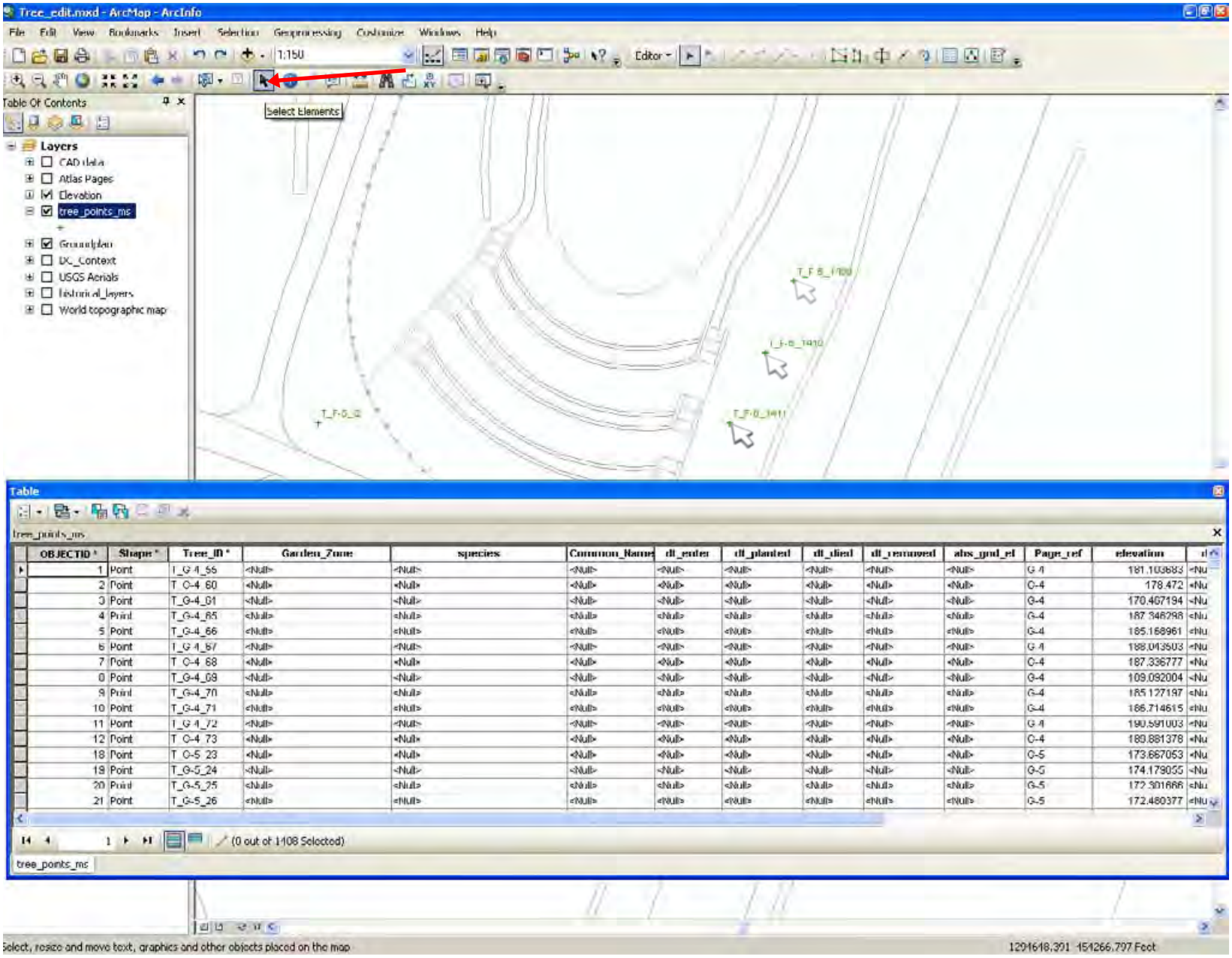
To view observations, or in this case add a first observation, expand the data tree in the *Attributes dialogue*. Click '*Expand All Relationships in Branch*'  We see that there are observation and maintenance tables linked to this the tree records (*tree_points_ms*).
Add a new record by right-clicking 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.



Enter observation data.

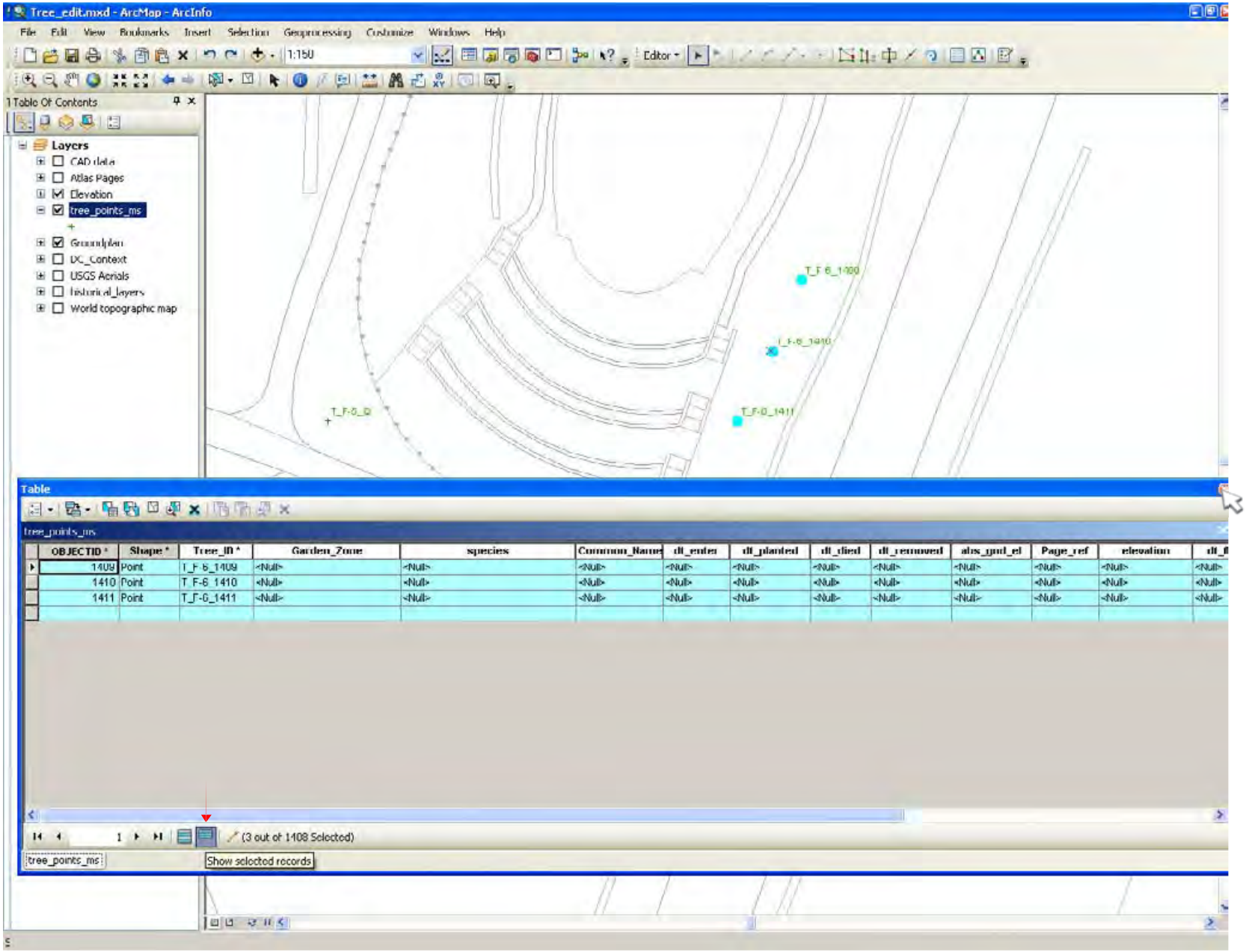


Save edits when finished. Click *Editor* > *Save Edits*. *Do not 'stop editing' we will make further changes outside of the *Attributes dialogue.*



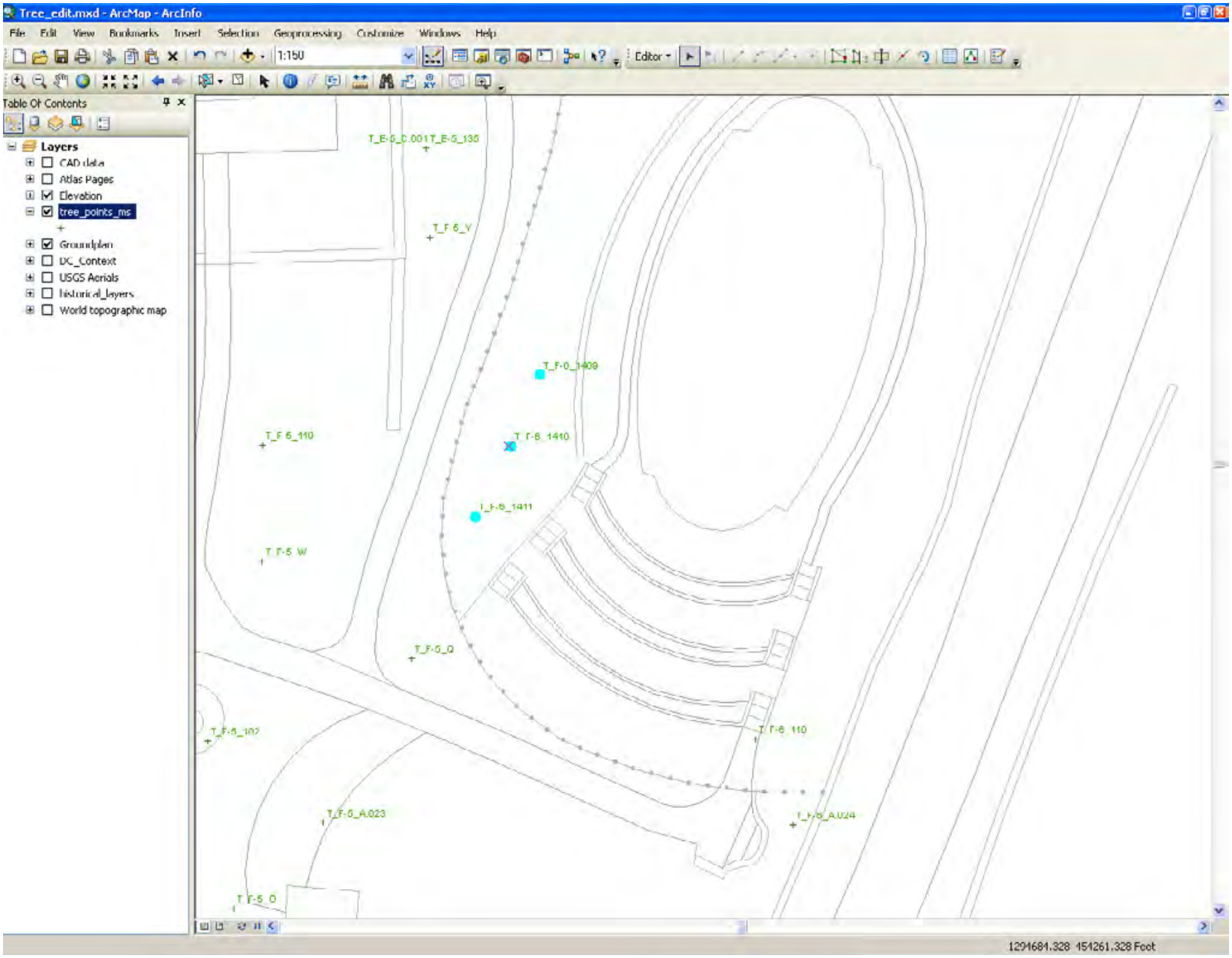
View the new data entries in the *tree_points_ms* table. *Table of Contents* > Right click *tree_points_ms* > *open attribute table*.

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.

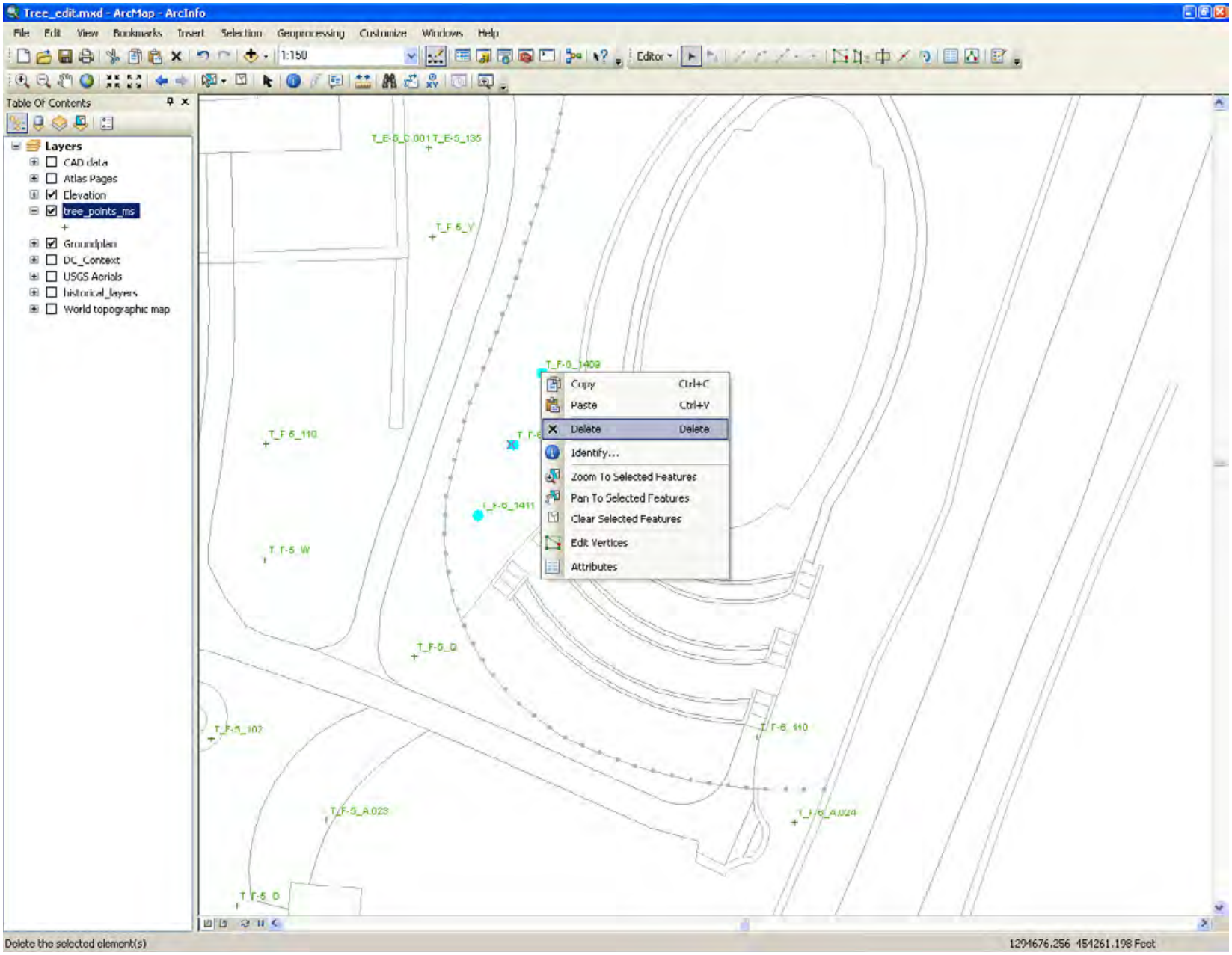


View the selected records within the table view. Click '*Show selected records*' at the bottom of the *tree_points_ms table*.

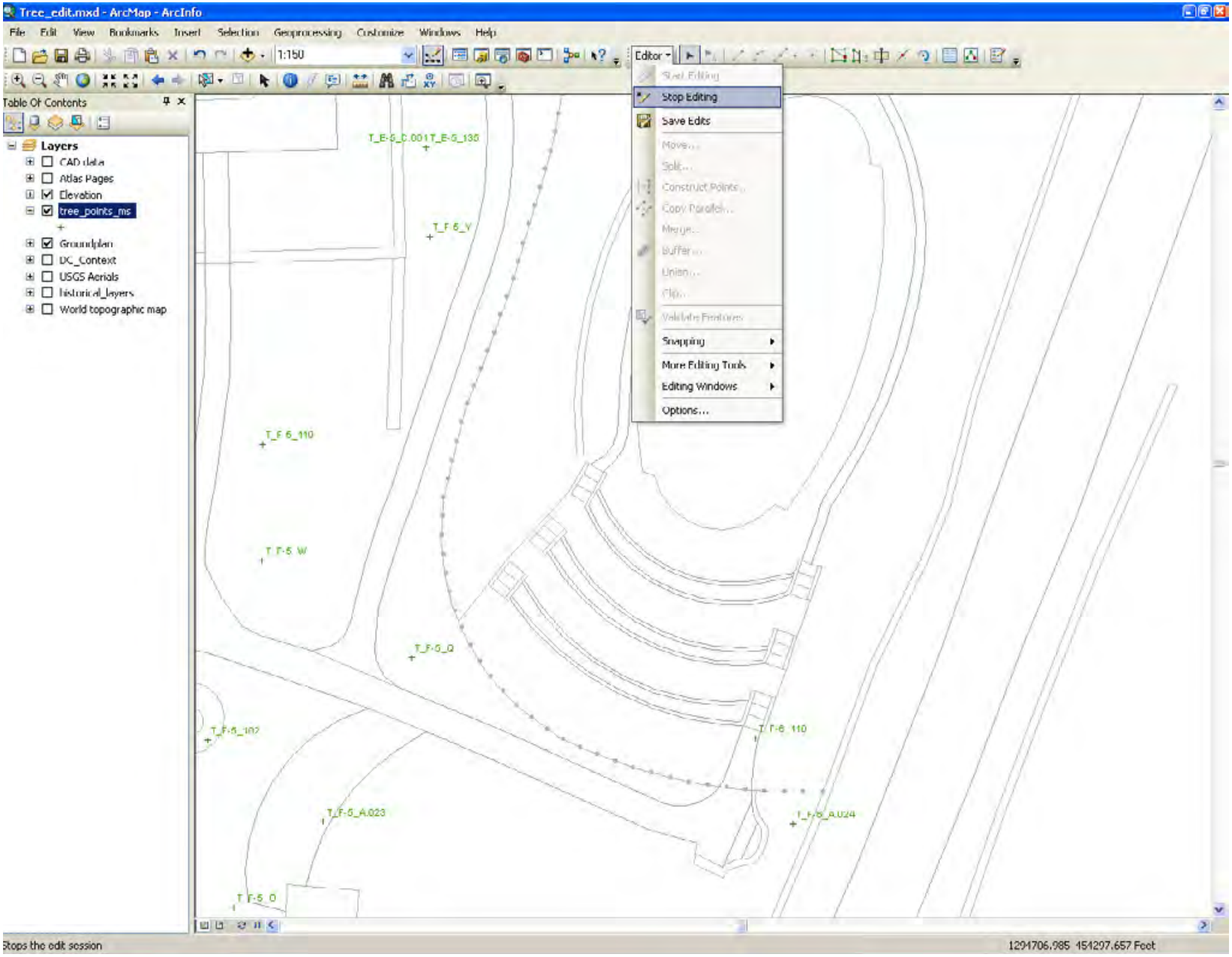
Now close the table by clicking



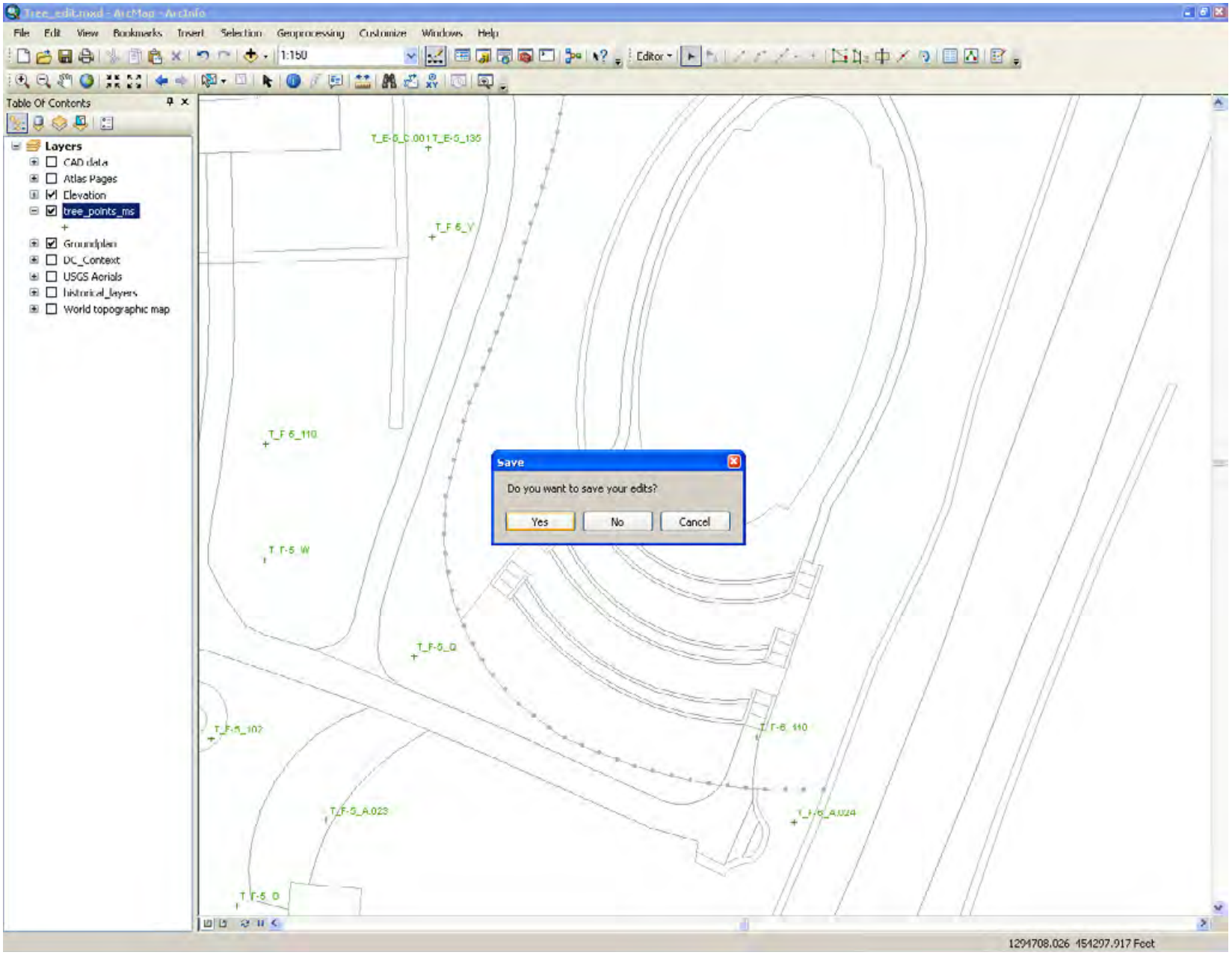
Move selected points to a new location. If you originally misplaced the points or moved a tree, the point can be dragged to a new map position. In this case, we move the three trees from the east of the pool to the west. Highlight all points if they are not still highlighted, then click on one and hold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

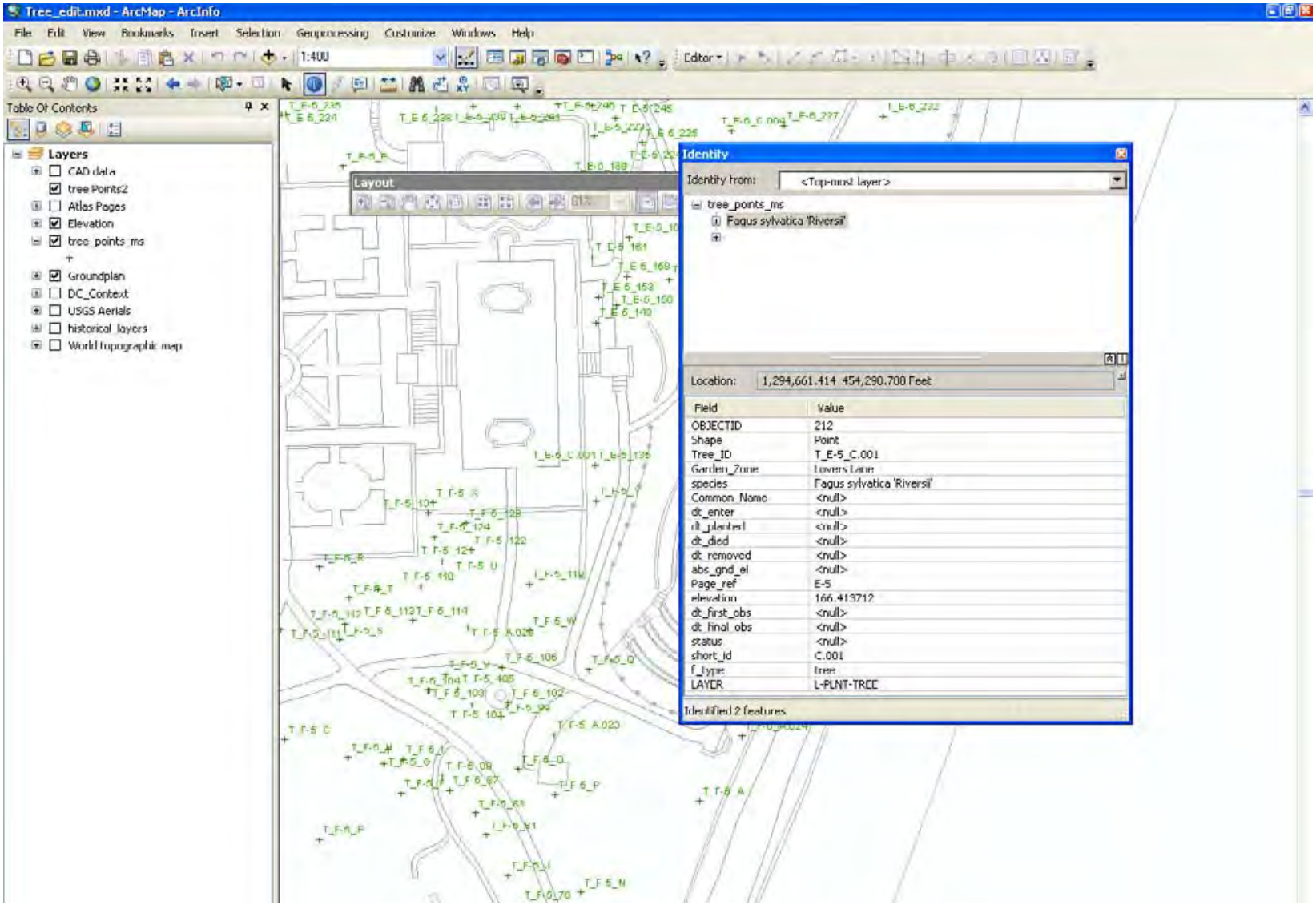


Stop editing after making all of the desired changes. Click *Editor* > *Stop editing.*

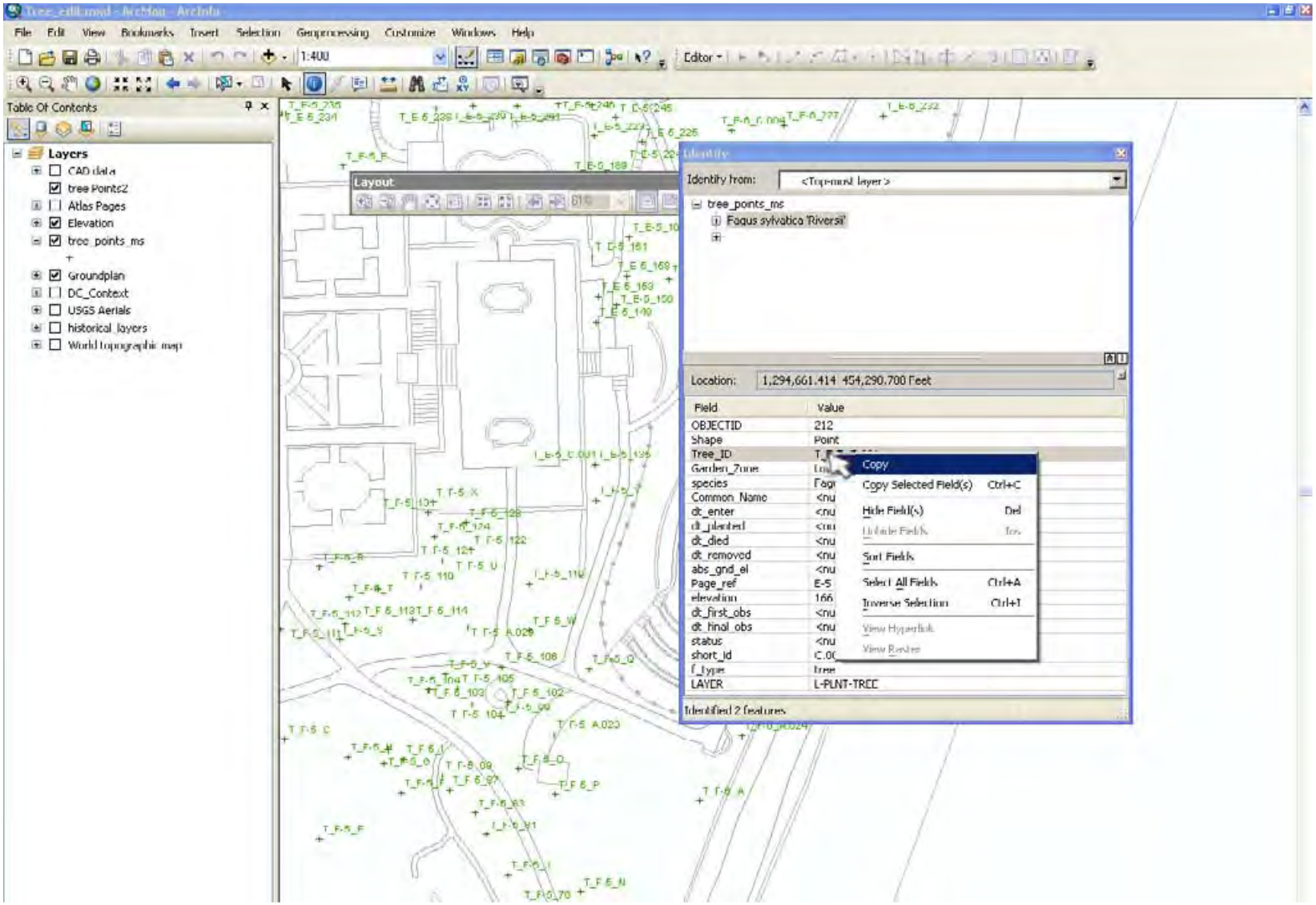


Save edits. Click *Yes*.

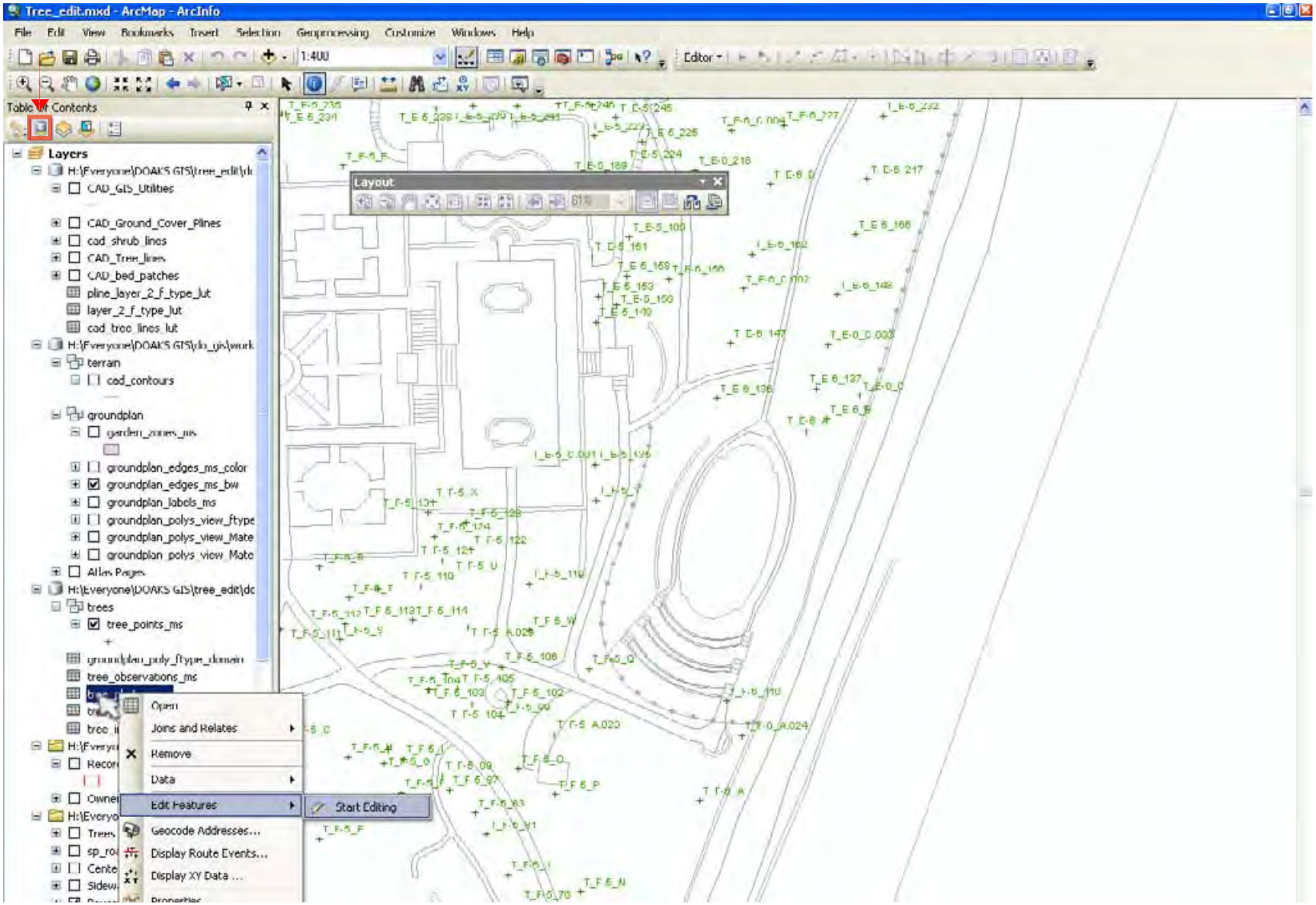
ADDING IMAGES



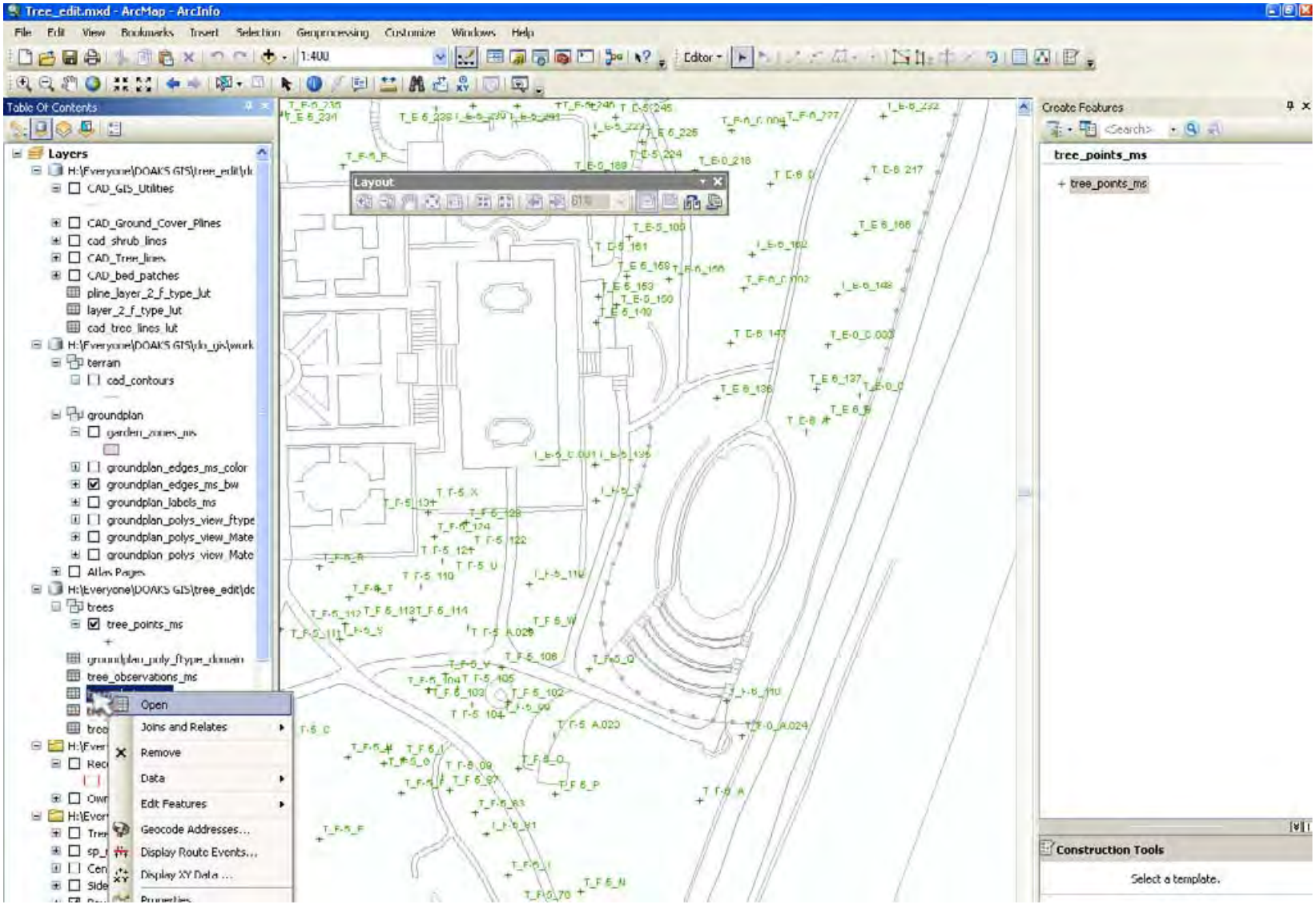
Add an image to the images database. Each image added to *tree_photos_ms* database will be linked to one tree point. First locate the tree point and use the Identify tool to access the *Tree_ID*. Click Identify (standard toolbar) > click the tree point on the map.



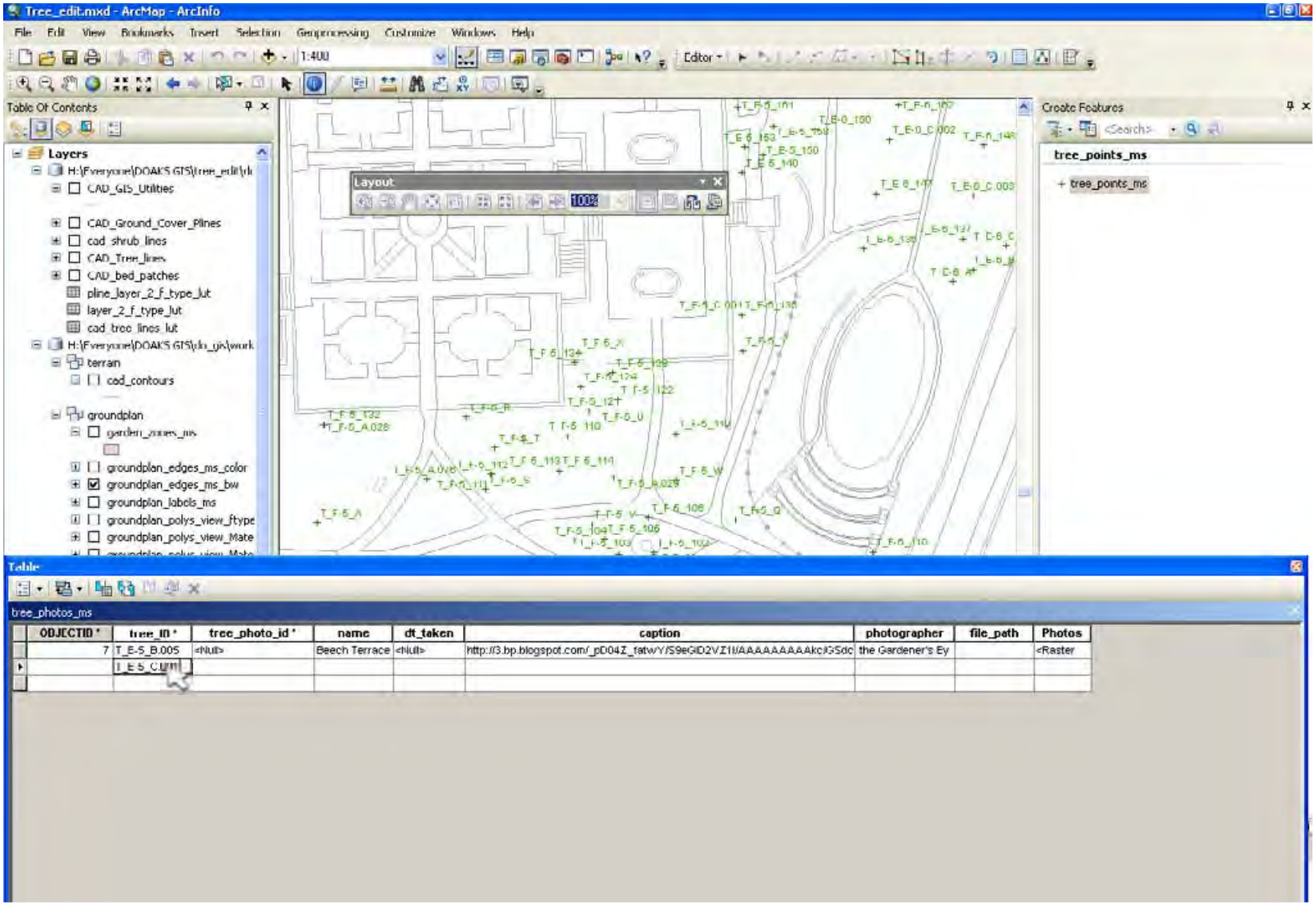
Copy the *Tree_ID* number for the selected tree point. In the *Identify* dialogue, click in the cell containing the *Tree_ID* number > Right-click the same cell > Select 'Copy'



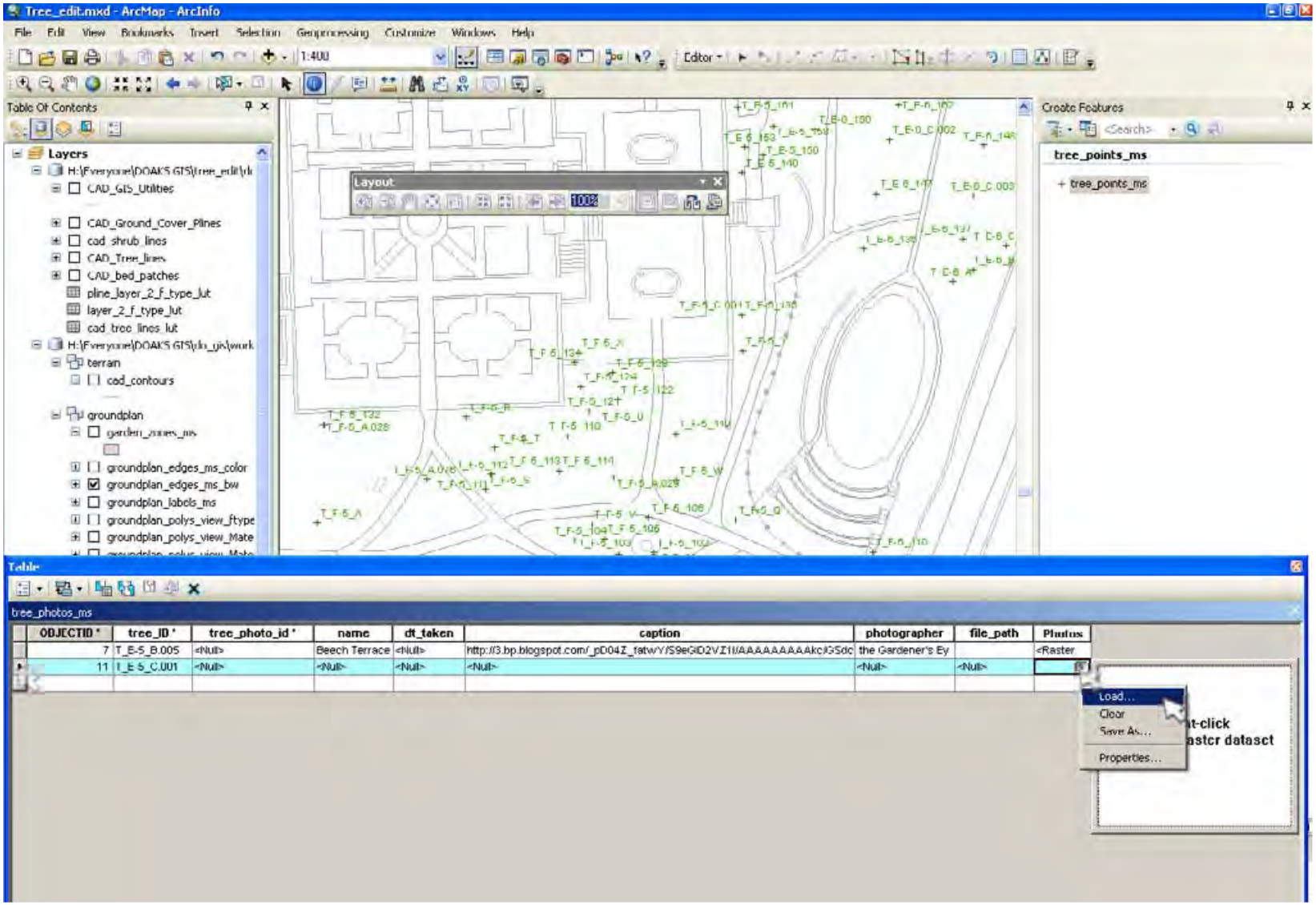
Begin editing the *tree_photo_ms* database. Right-click *tree_photo_ms* (make sure that the table of contents is displaying by 'source') > Edit Features > Start Editing



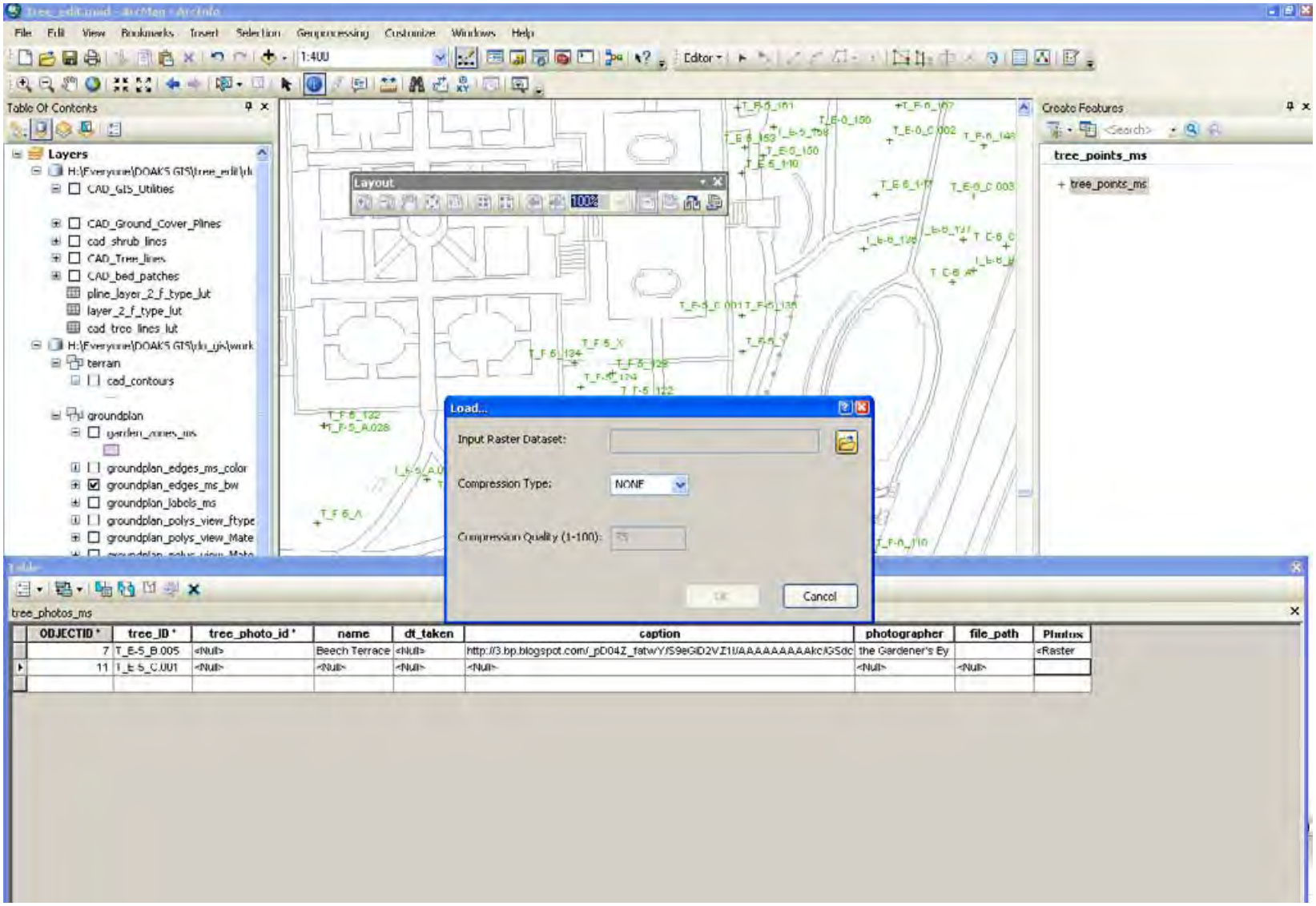
The create features dialogue opens. We will not create any objects but will add an image entry to the *tree_photos_ms* table. Open the table. Right-click *tree_photos_ms* (table of contents) > Open.



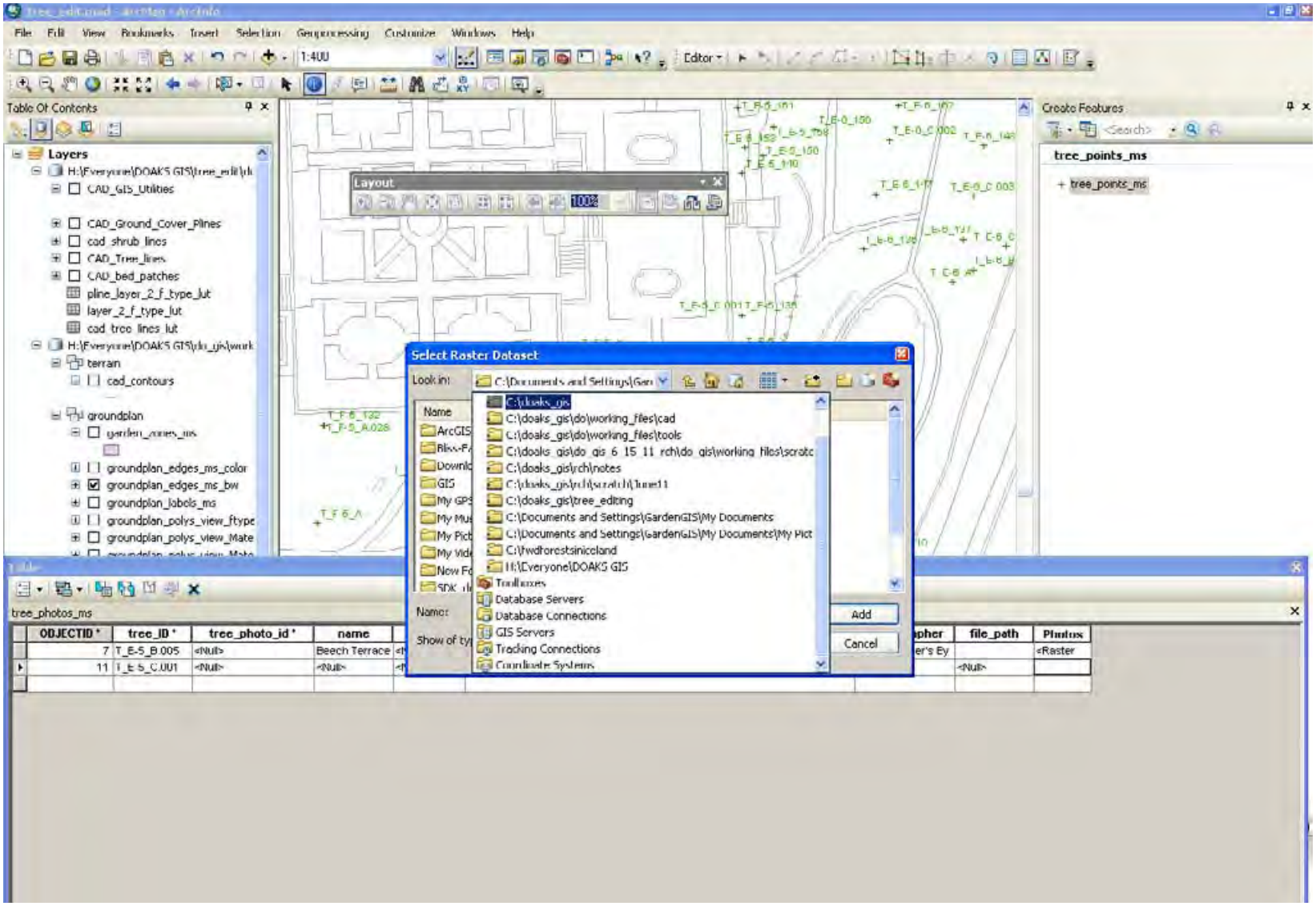
Create a new entry by clicking in the bottom most cell in the *tree_ID* field. Click to select cell > right-click > Paste (alternatively, you can manually enter the *tree_ID* of the tree point you would like to reference, but spelling and punctuation must be identical to the tree_ID entry in *tree_points_ms*.)



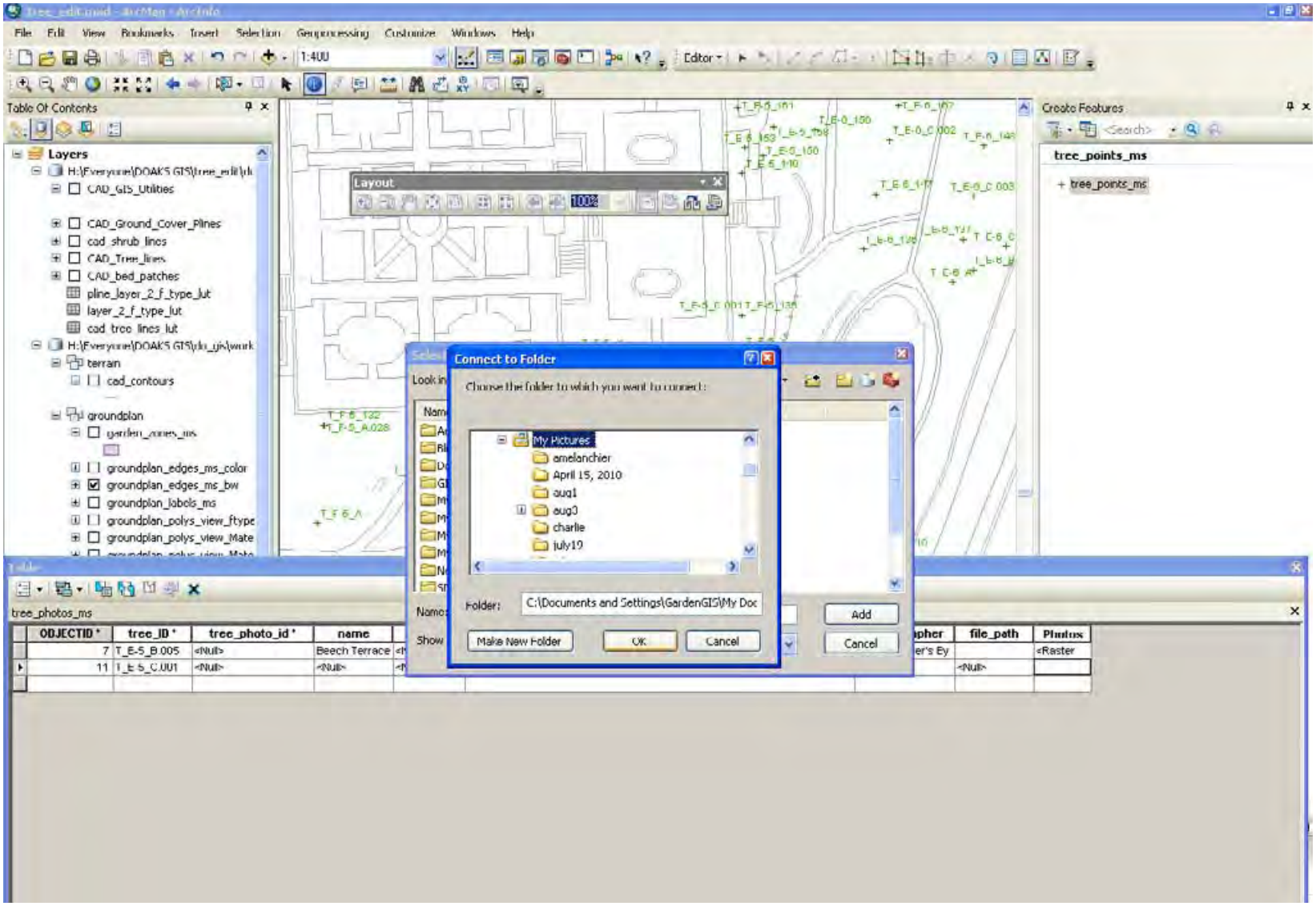
Confirm the entry by clicking in the gray box on the left side of the row. Then enter the image by clicking the cell in the same row under the Photo field > click the arrow > right-click in the image box > select load.



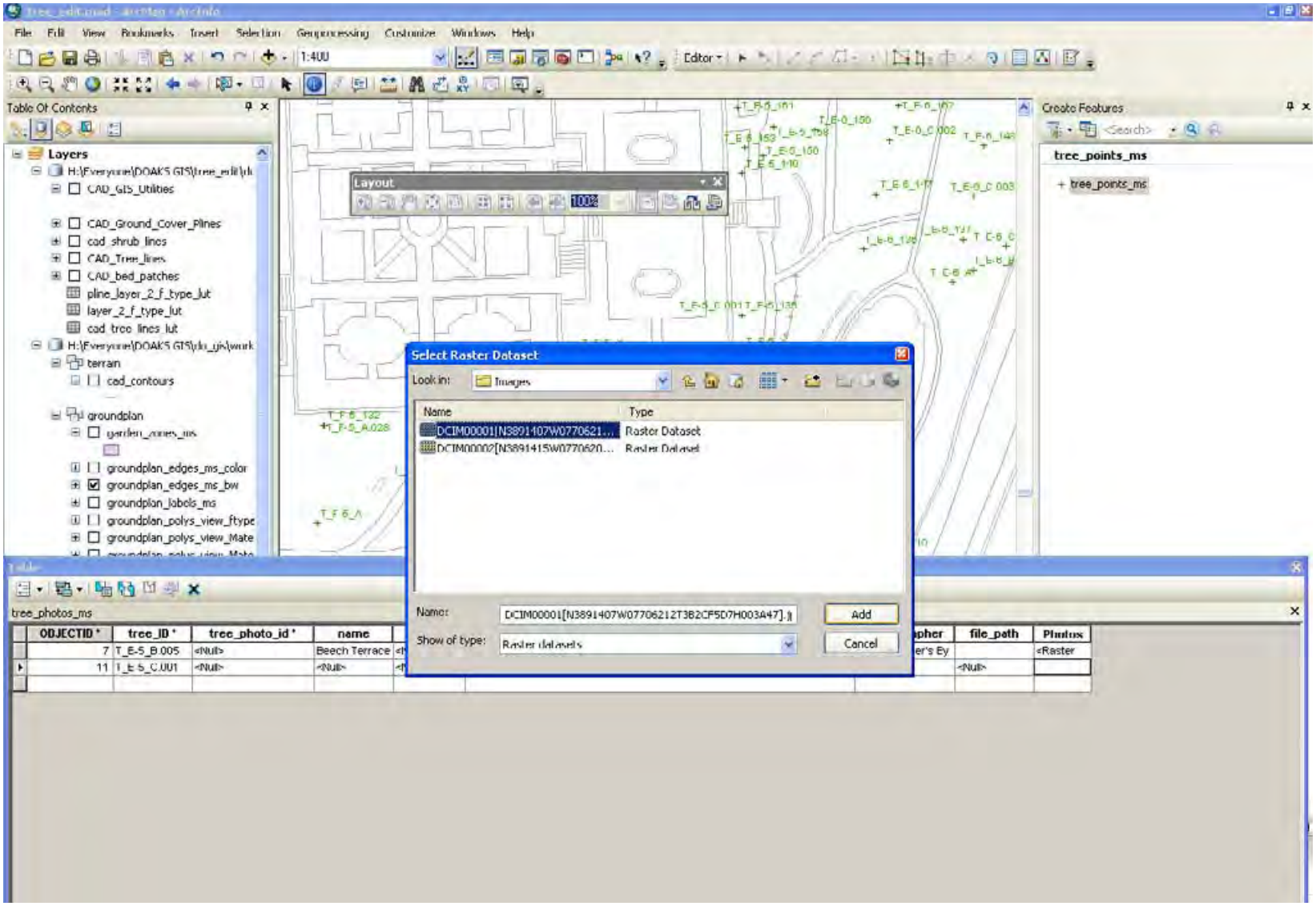
The *Load...* interface opens. Accept defaults and click the folder button to locate the desired image.



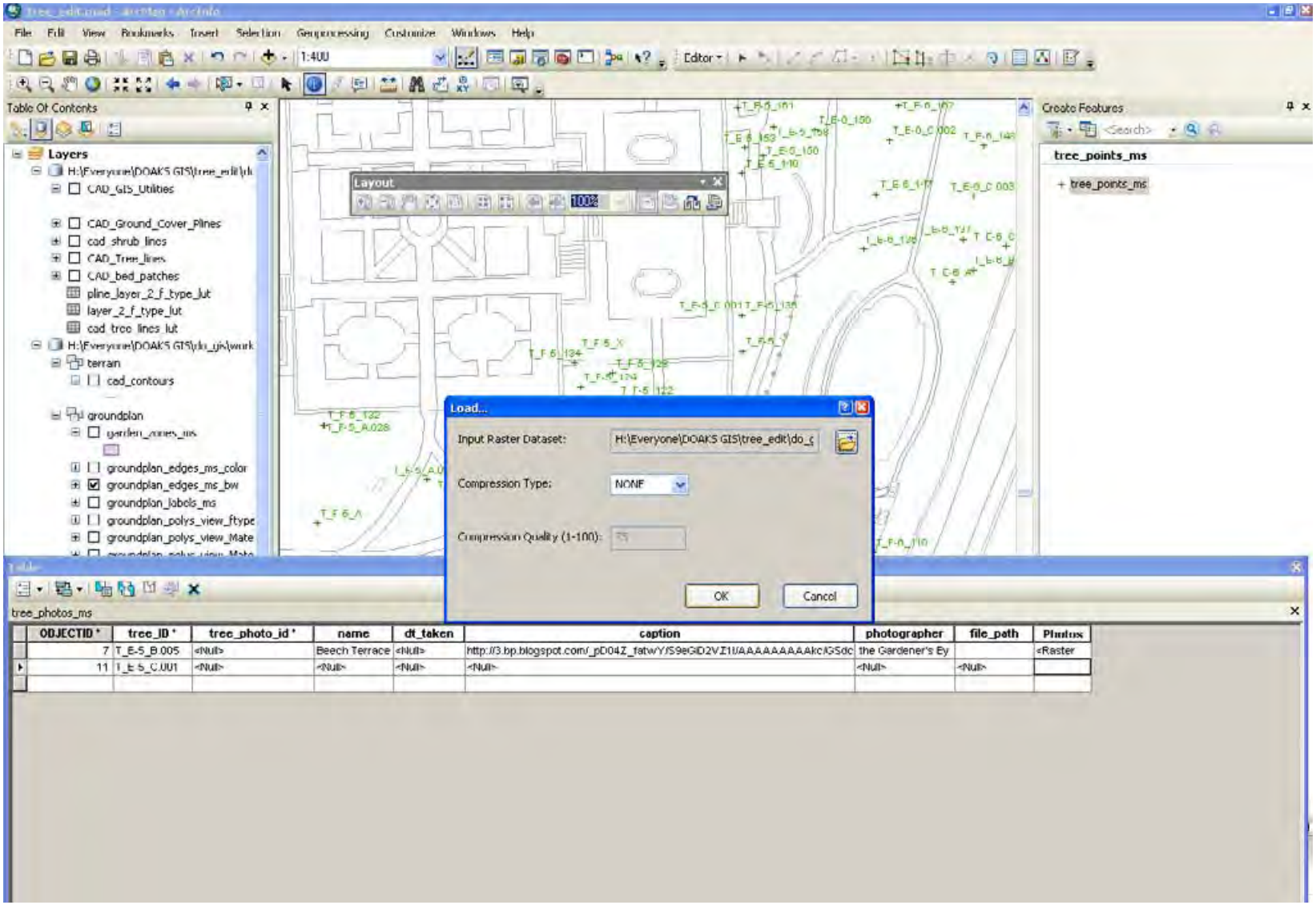
Use the drop-down menu to locate the directory where the image is located. If the directory is not shown you may have to add it using the *Connect to Folder* button. *Unlike in windows explorer where all folders are immediately 'browseable', in Arcmap folders must be added to the list of connected directories.



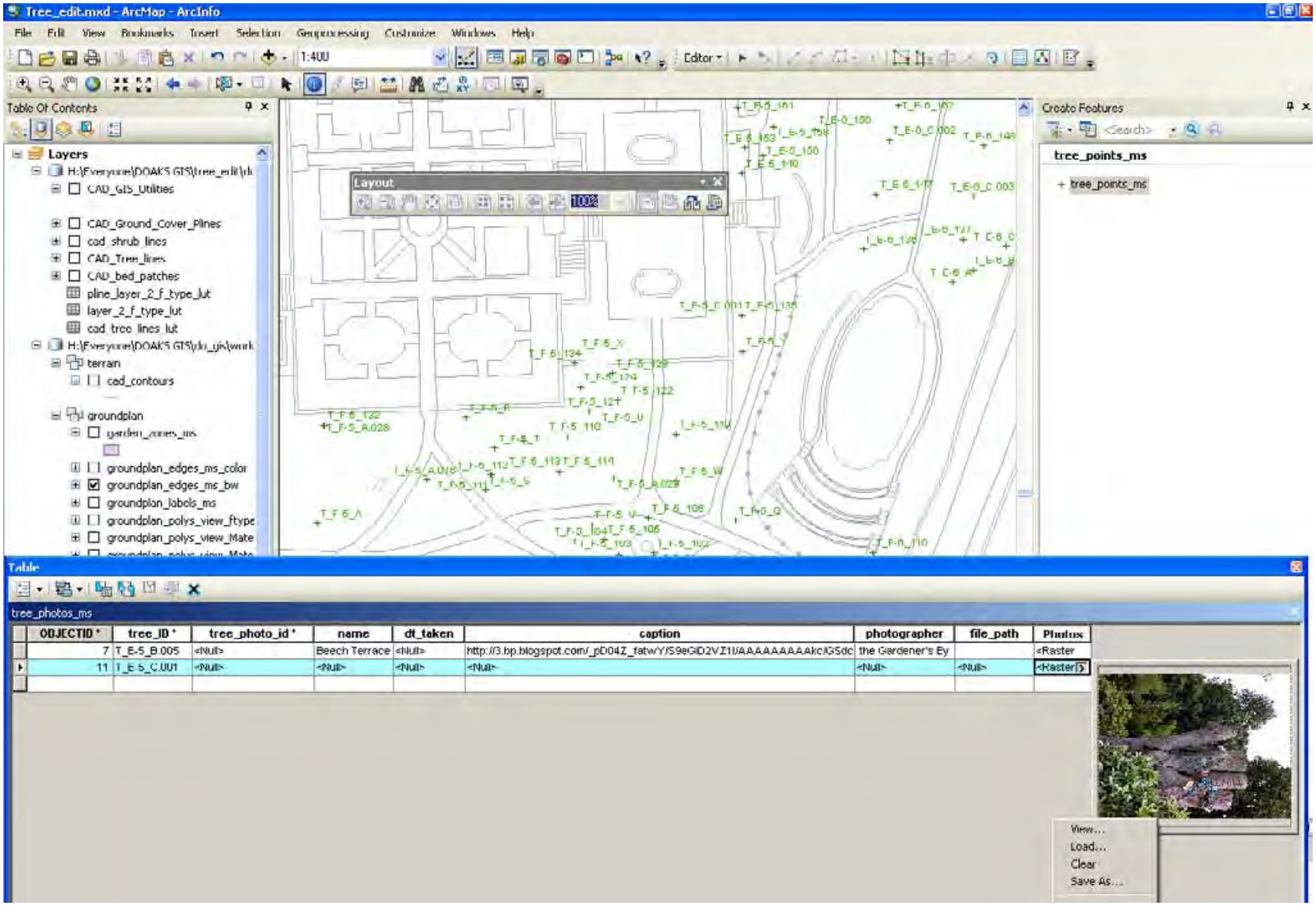
Click the Connect to Folder button  > locate the folder or directory where the image is located > click OK. * You can not add the image itself only the directory or file, which contains the image.



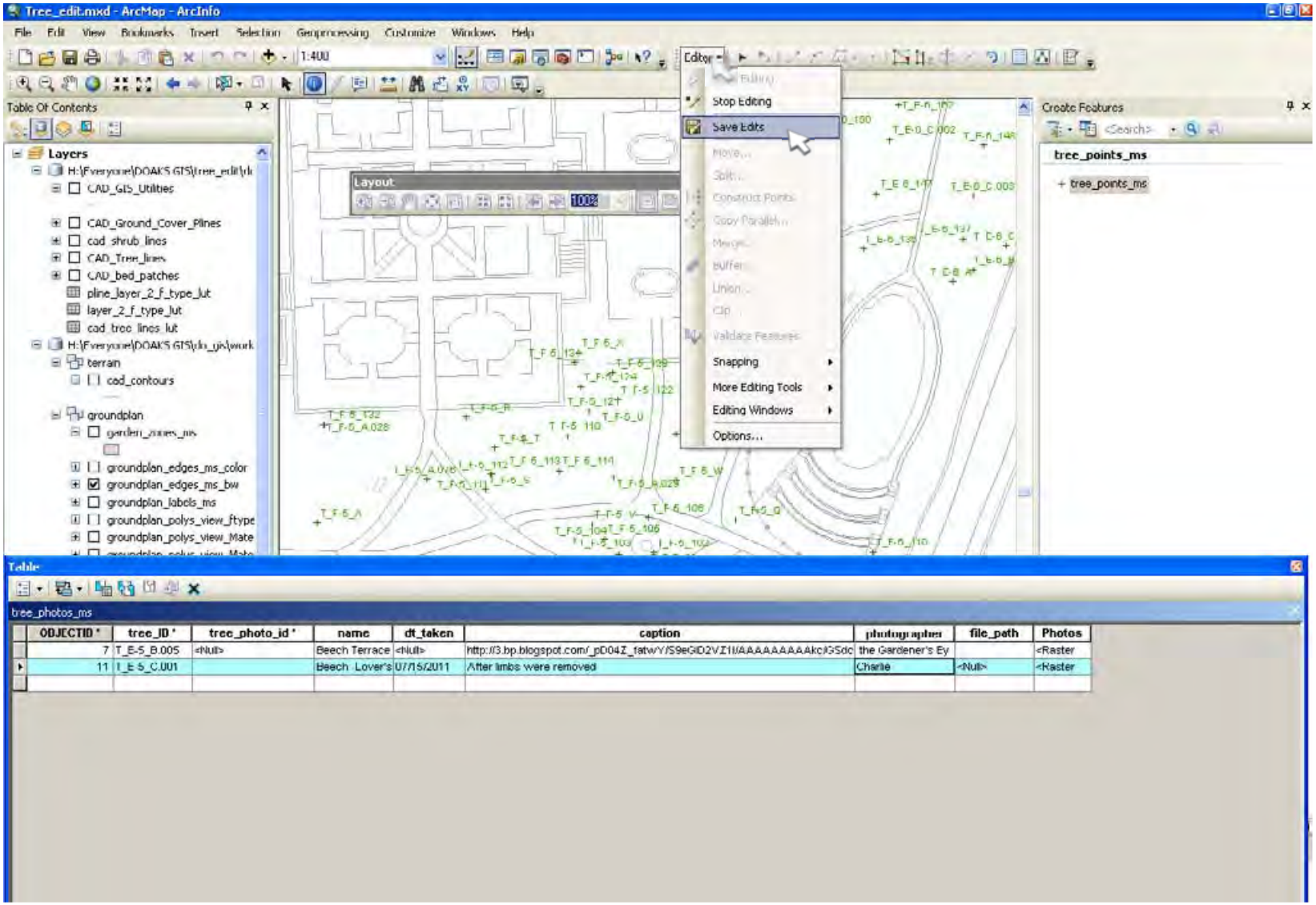
Locate the folder which contains the image > select the image > click Add.



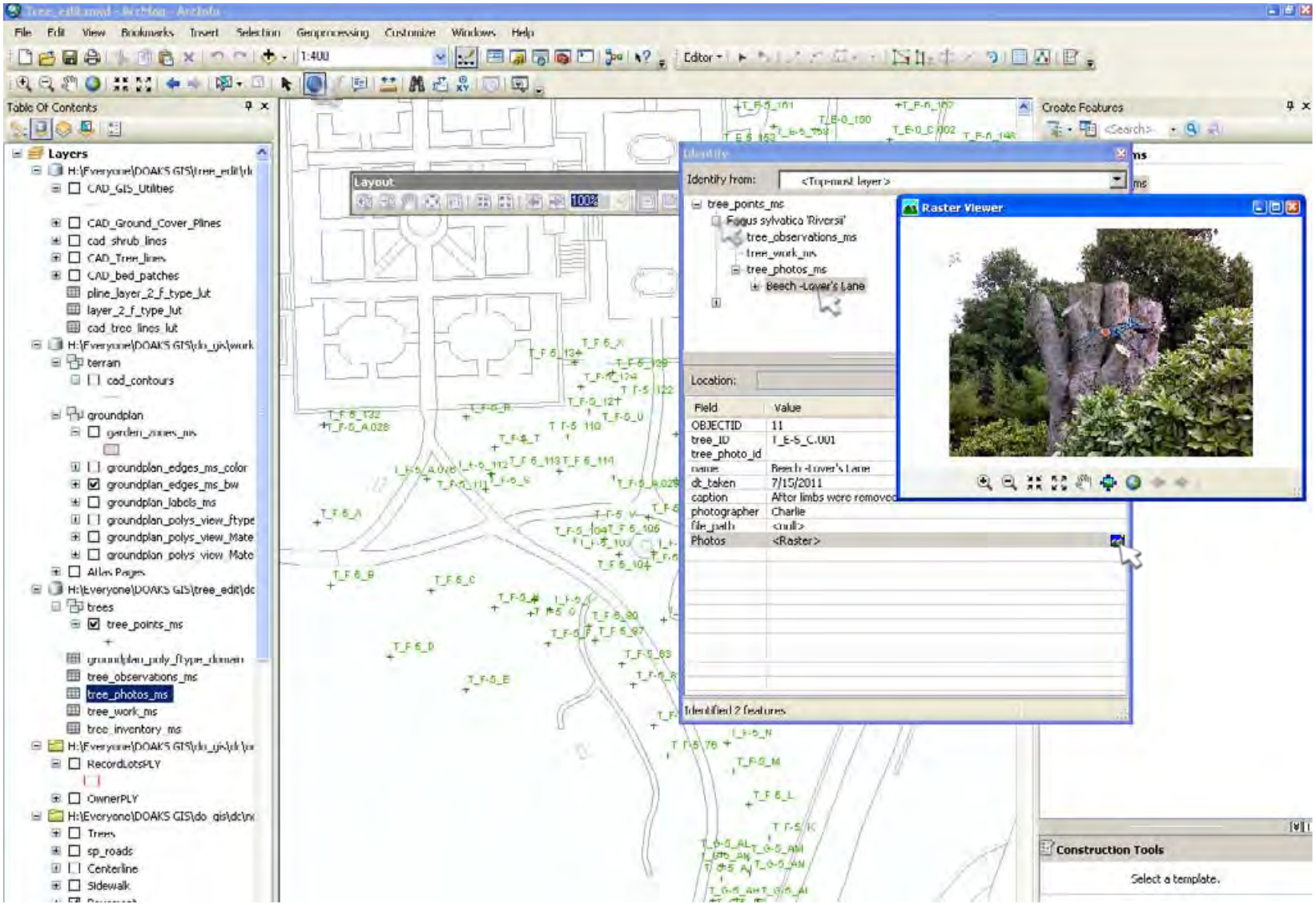
Accept defaults > click OK.



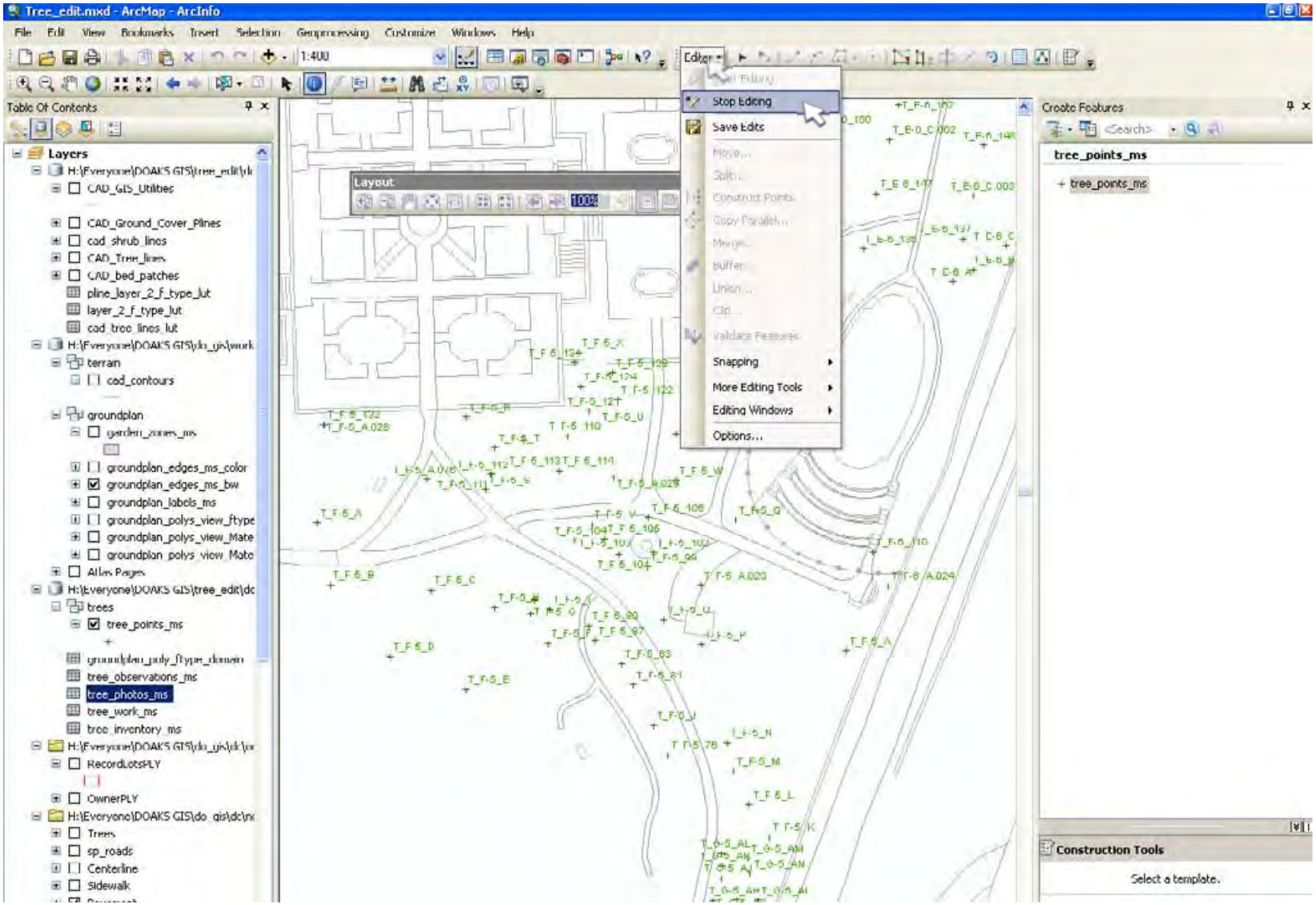
The image is now shown in the raster window.



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.



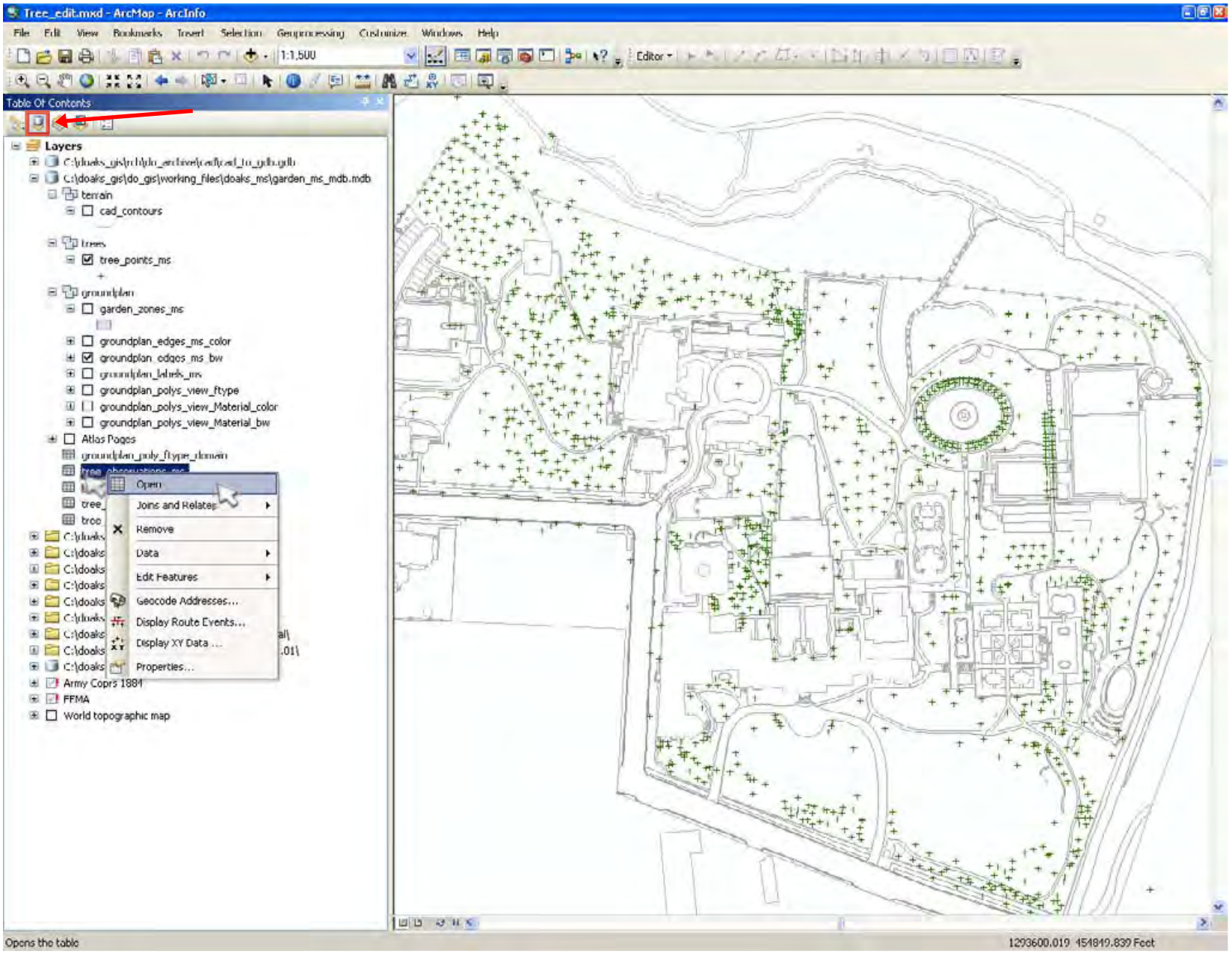
Turn off editing. Click Editor > Stop Editing.

SORTING AND PRINTING DATA

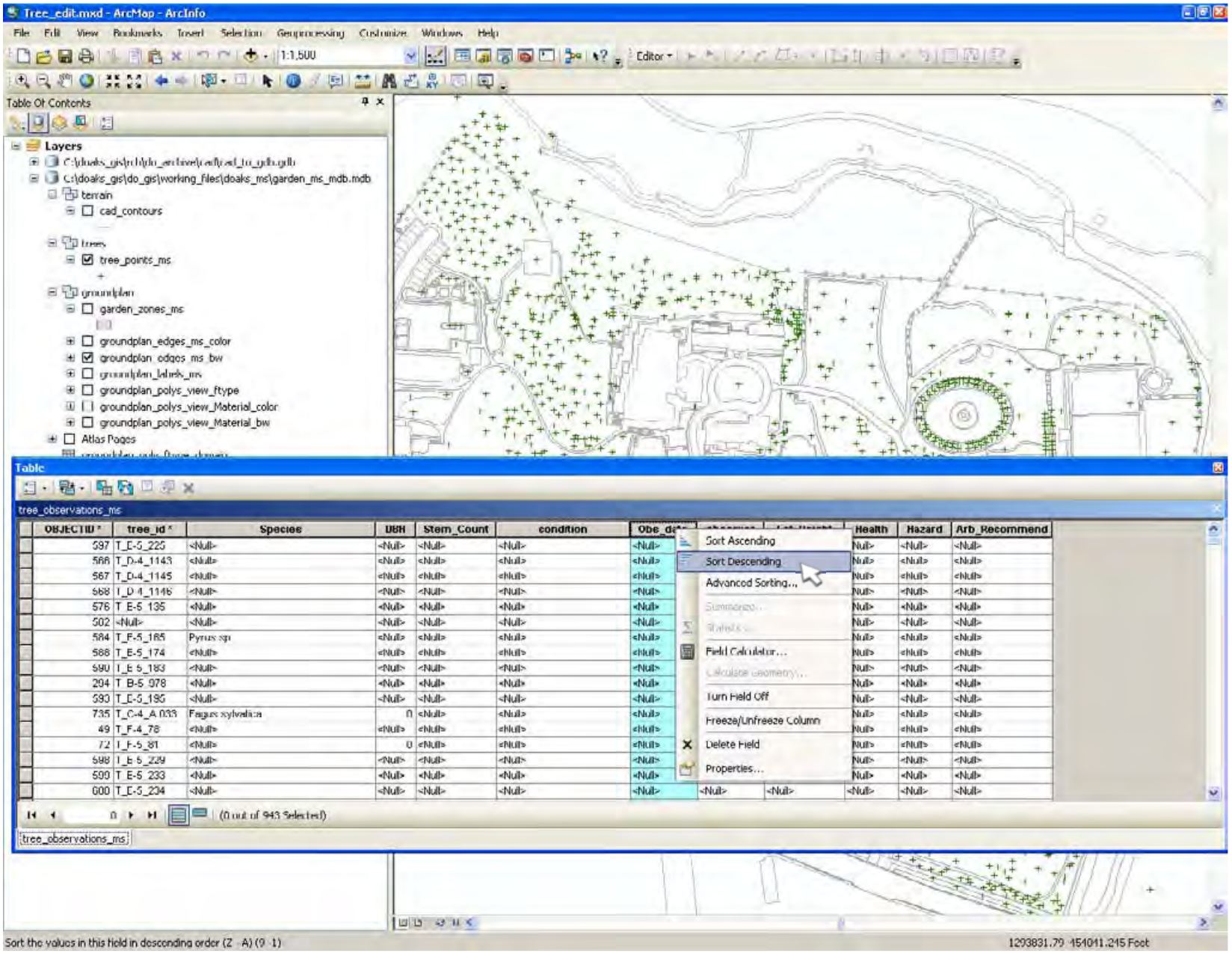
Tree Observations 2010

page_ref	tree_id	Species	DBH	Ster	condition	Obs_date	observer	Est_Height	Health	Hazard	Arb_Recomme
B-4											
	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>
C-4											
	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>

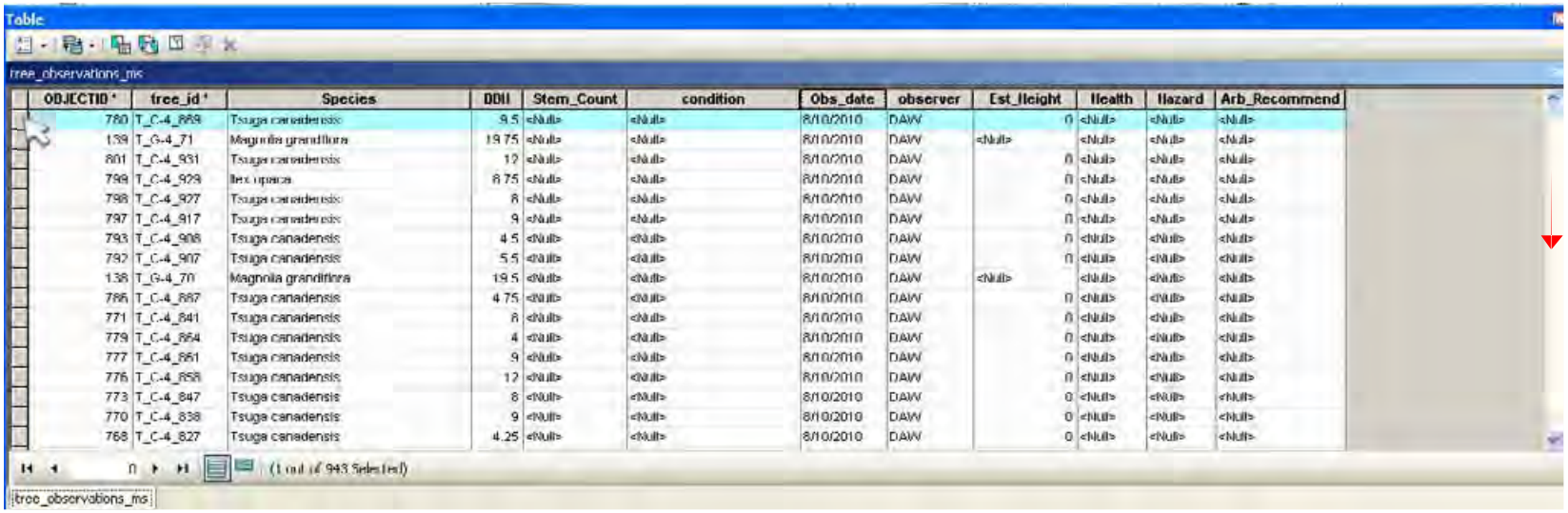
Sort data tables as you would in Excel and print the selected records or entire tables.

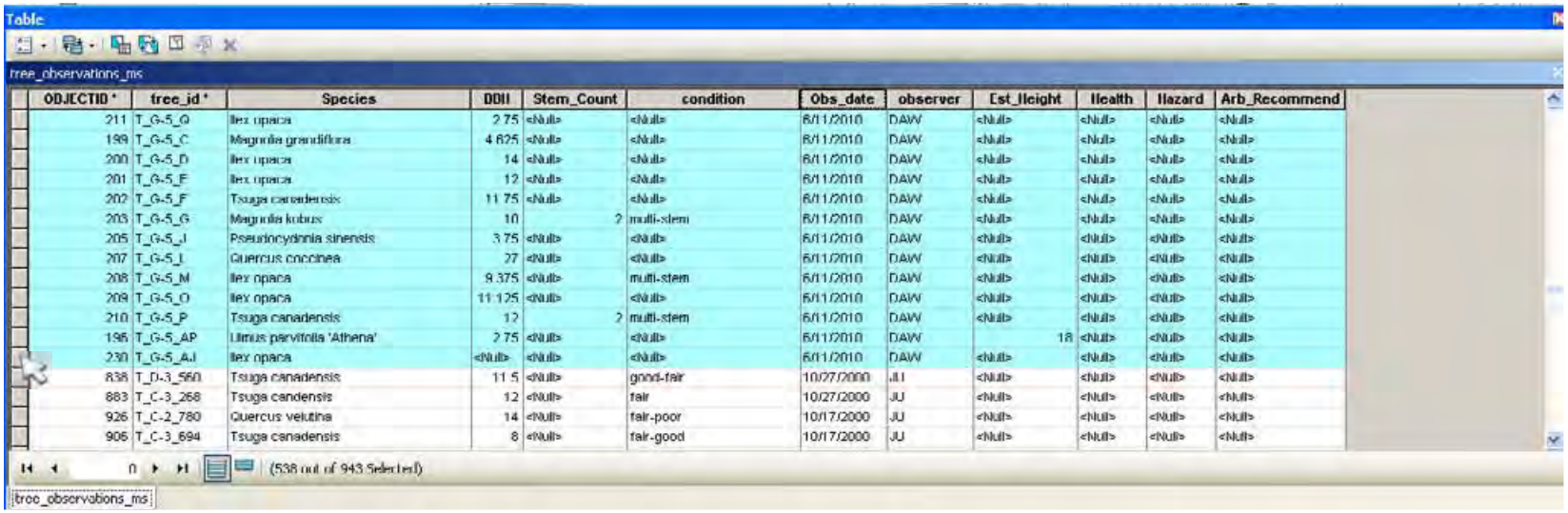


Open a table. Display all related tables in the table of contents by clicking List by Source view. 
Open *tree_observations_ms* table: right click *tree_observations_ms* > Open.

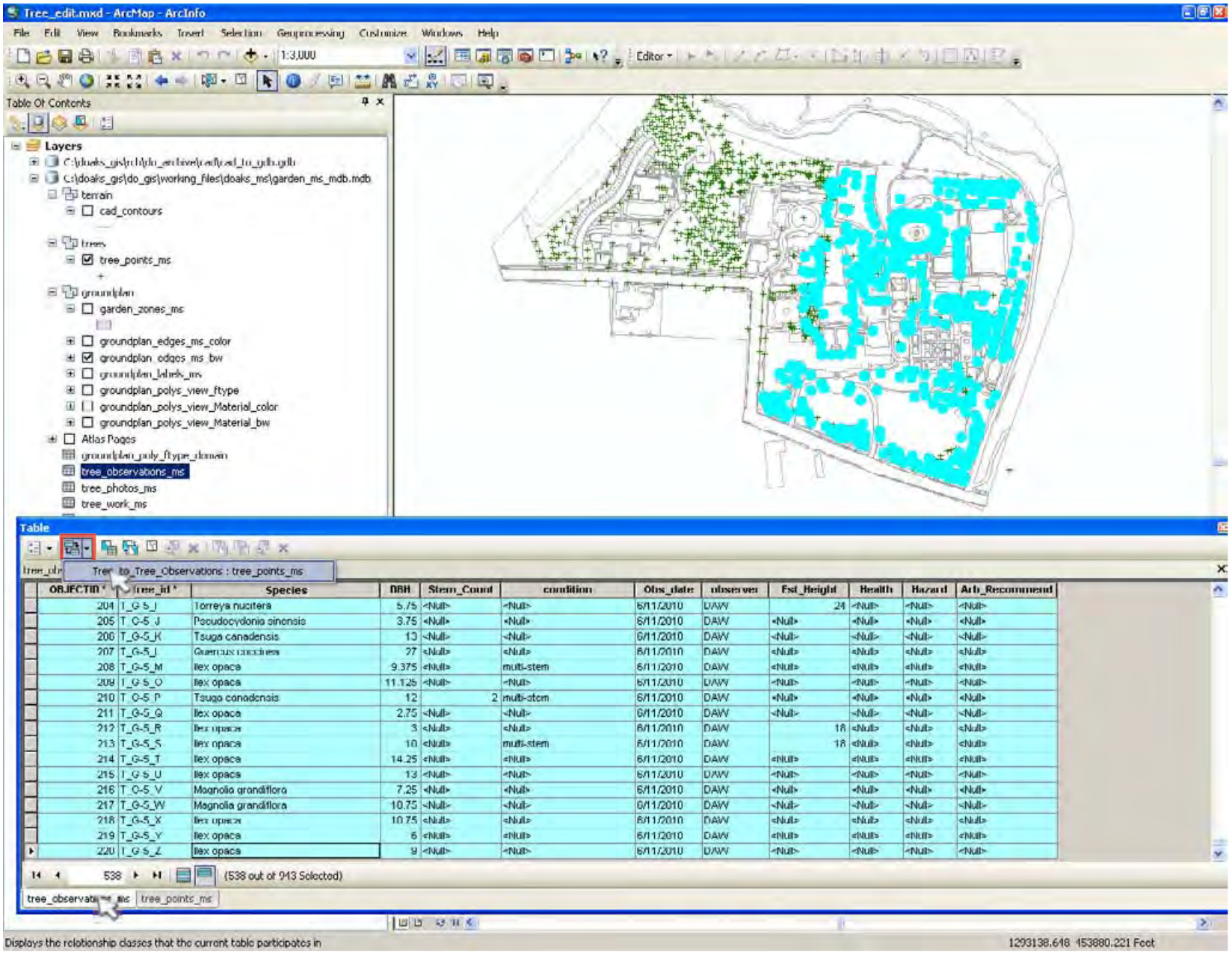


To select only the most recent tree observations, we will use the *Sort Descending* command in the *Obs_date* field: Right-click *Obs_date* > *Sort Descending*. We can now select all of the newest records, those from 2010.

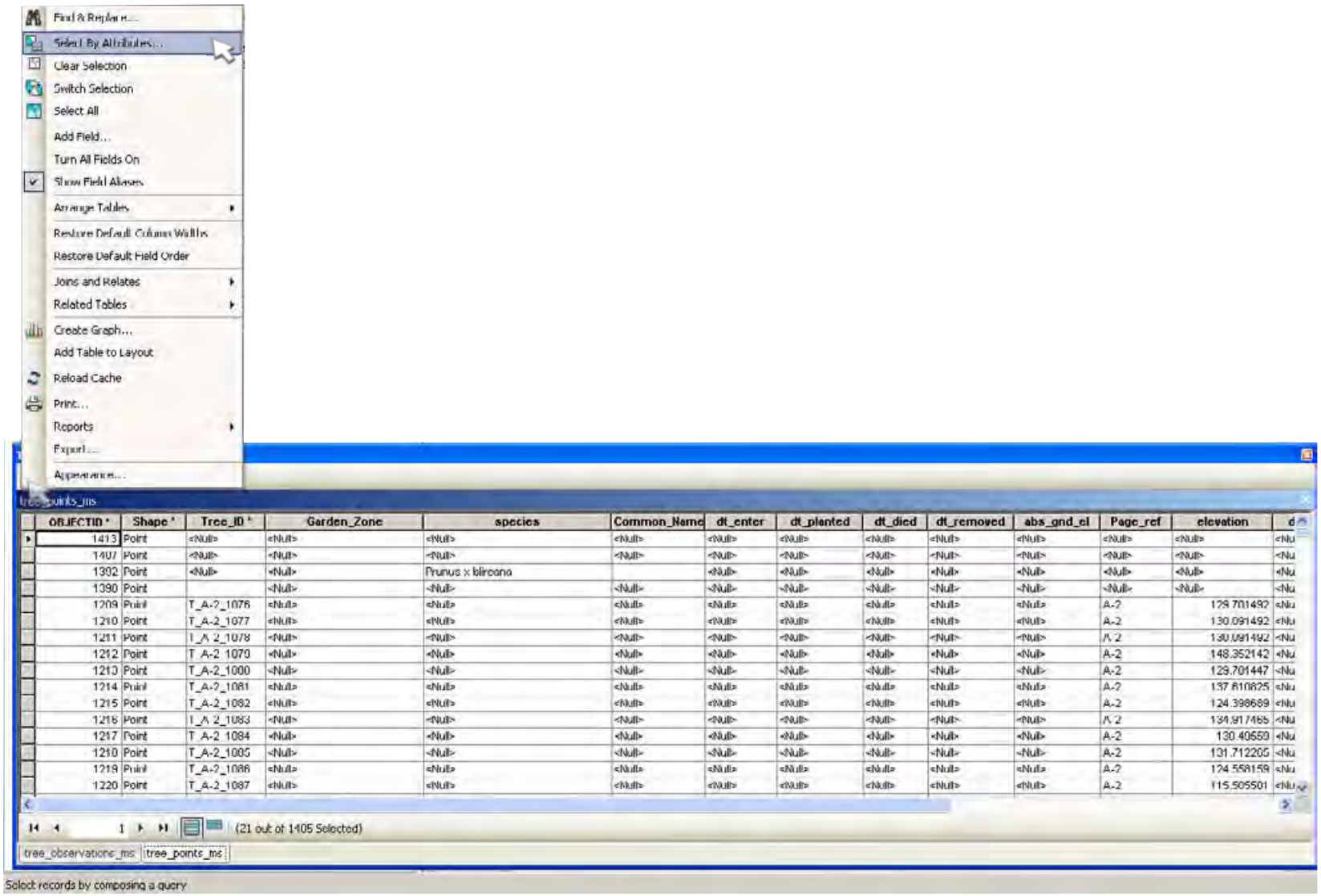




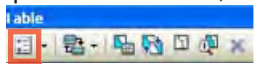
Select the records. Scroll to the top of the table and select the top row by clicking in the cell at the far left. Then scroll down to the last record with a date in 2010; hold shift and click the cell to the left of this record. This will highlight all of the records from 2010.

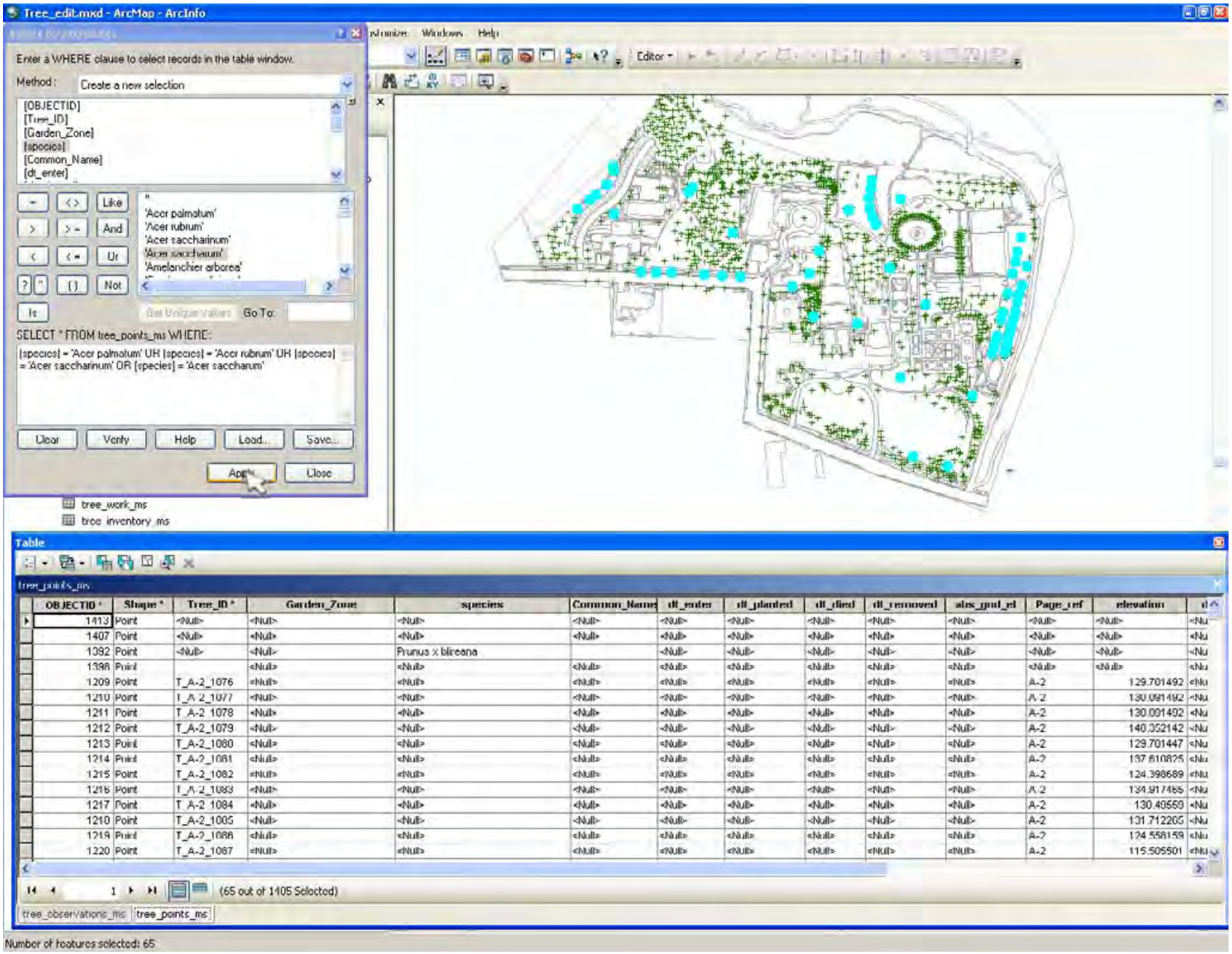


To view the tree points that are associated with these observation records use the related tables button. Click *related tables* > choose *Tree_to_Tree_Observations : tree_points_ms.* The related tree points are now selected and the *tree_points_ms* table is open. Switch back to *tree_observations_ms*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

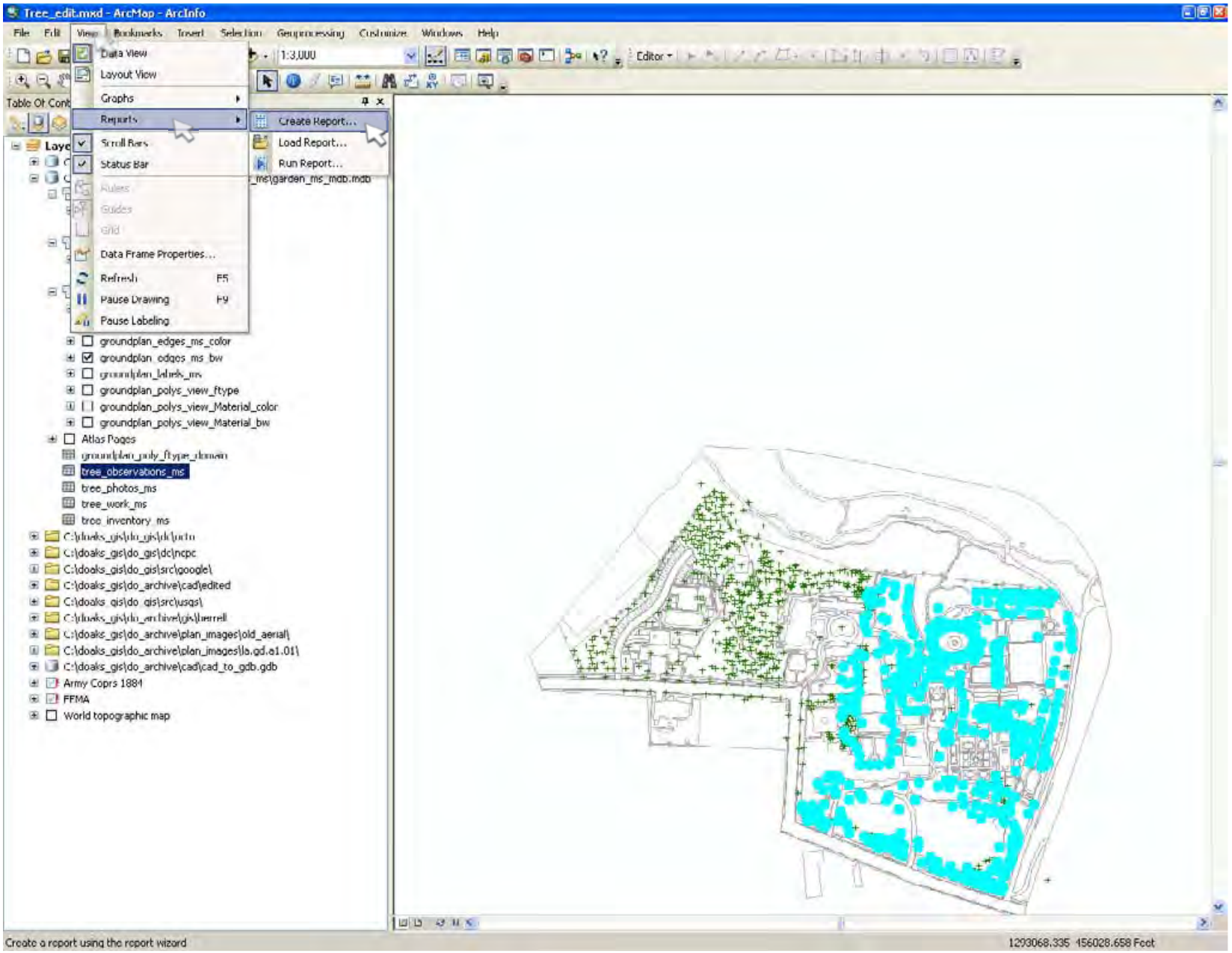


To make a more complicated selection, one that selects multiple types of records, use the *Select By Attributes Tool*.

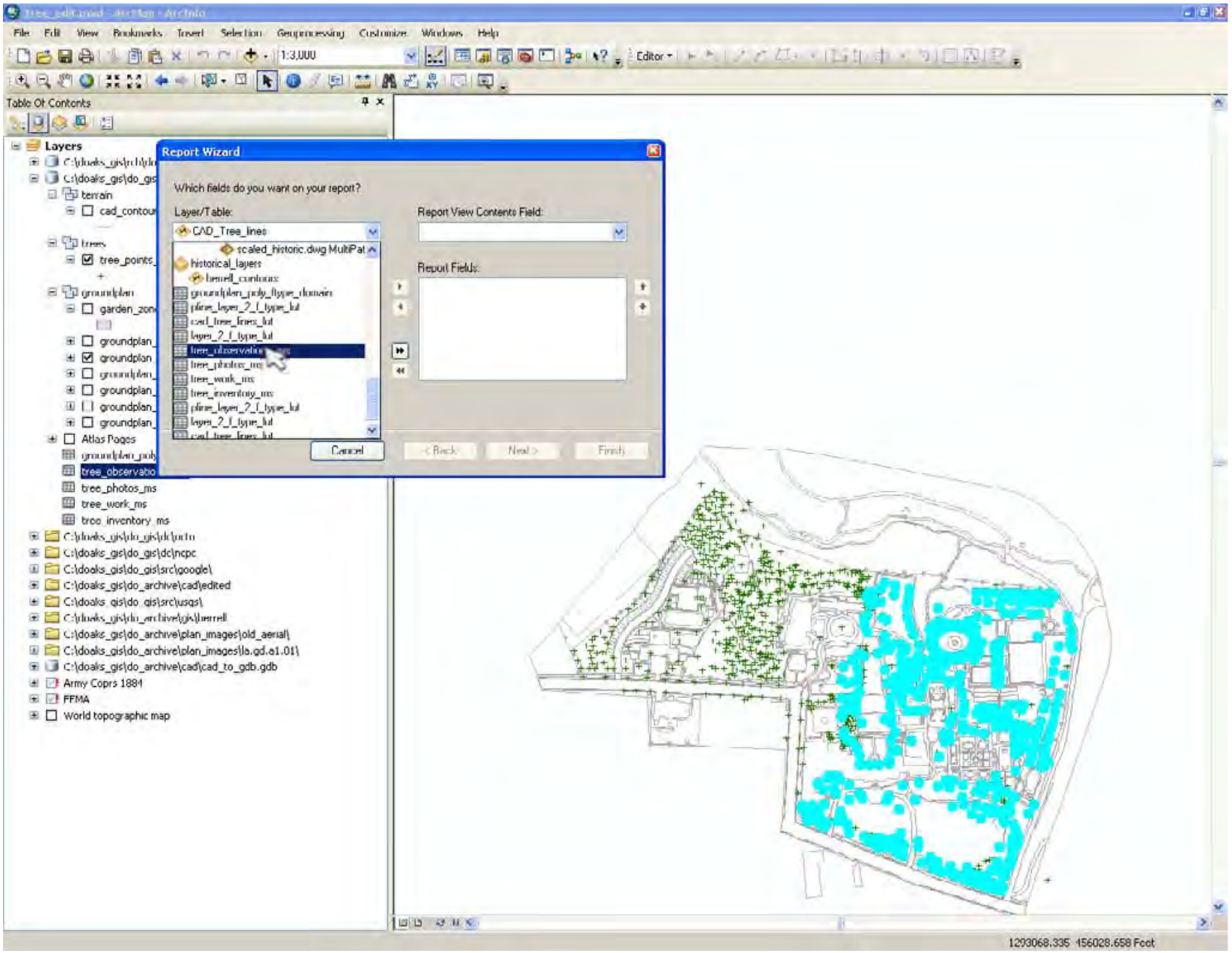
Click *Table Options*  > *Select By Attributes*.



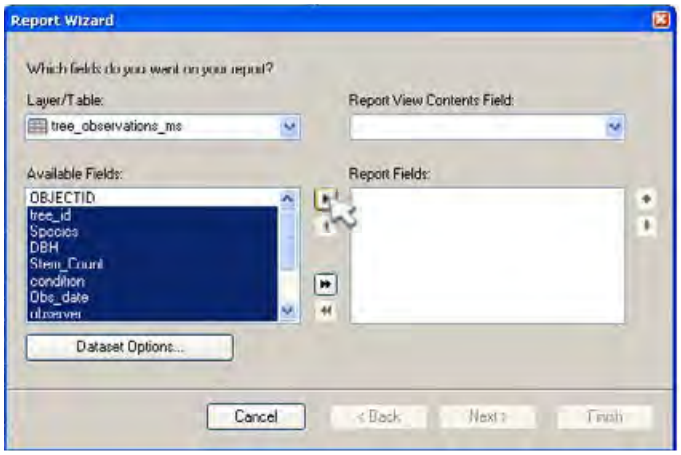
Structured query language commands within the *Select by Attributes* dialogue makes it possible to create complex selections. In this example, we will combine selections for individual maple species to see all maples. Using the buttons in the dialogue box, create the query: [species] = 'Acer palmatum'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

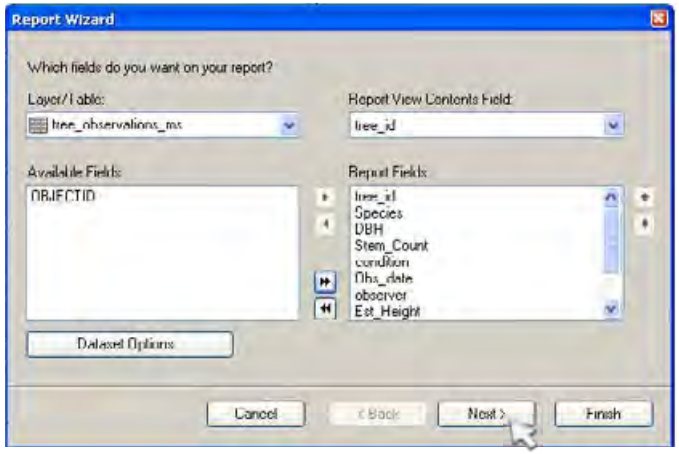


Printing. Using the *Create Report* feature, we can format a table to print selected records with some or all of the information fields. We'll start with 2010 observations selected. Open the Create report dialogue: click *View* > *Reports* > *Create Report.*

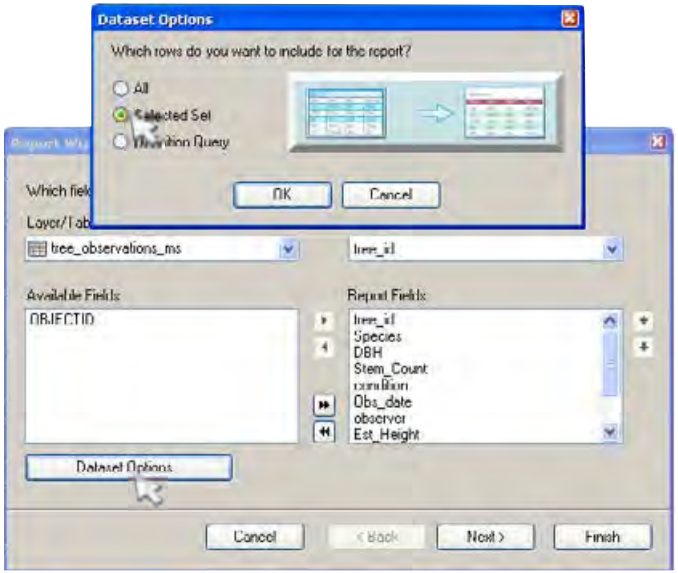


Choose *tree_observations_ms* in the Layer/Table drop down menu. *Unfortunately the *Report* feature only allows us to print one table or layer at a time.

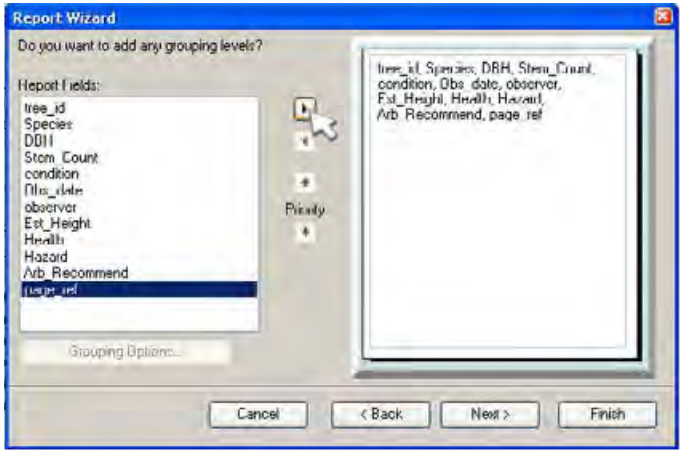


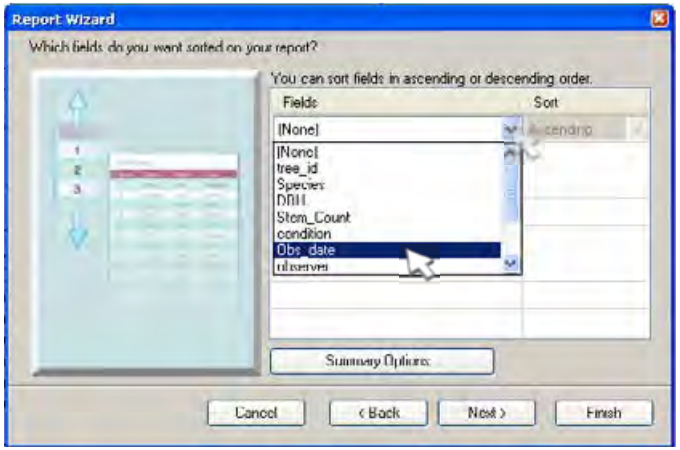


Choose all of the information fields that you would like to include in the report. In this example, I choose to include all fields except the *Object ID*, which is a record identification number generated automatically by the table. Click the right arrow to move the fields to the *Report Fields* column.

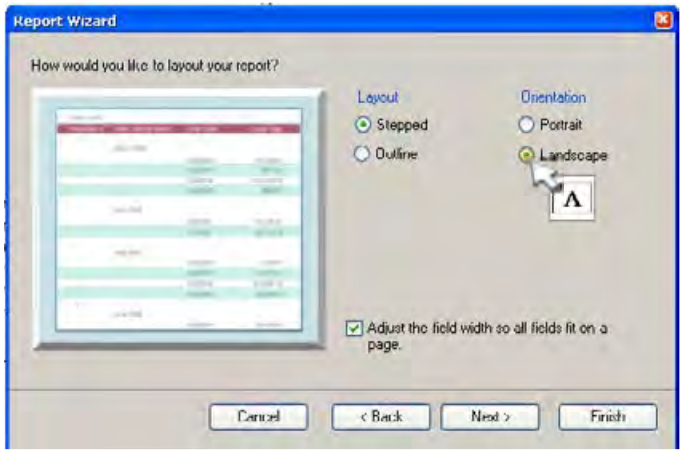


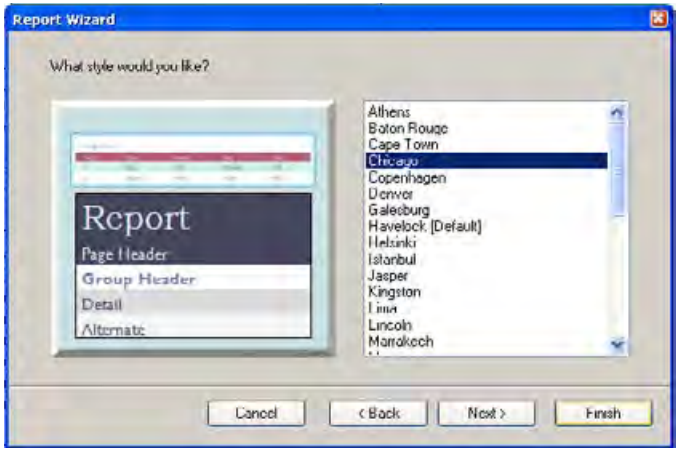
We will print only the year 2010 records that we have preselected. Click *Dataset Options* > *Selected Set*.



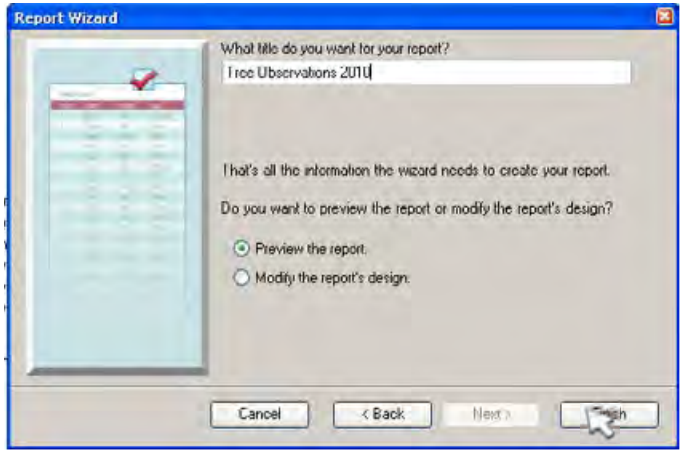


Group the records by the quadrant (page ref) each tree falls in on the map. Highlight *page_ref* > click the right arrow. Click *Next*. Within each group of records sort the records by date, in ascending order. Click *Next*.

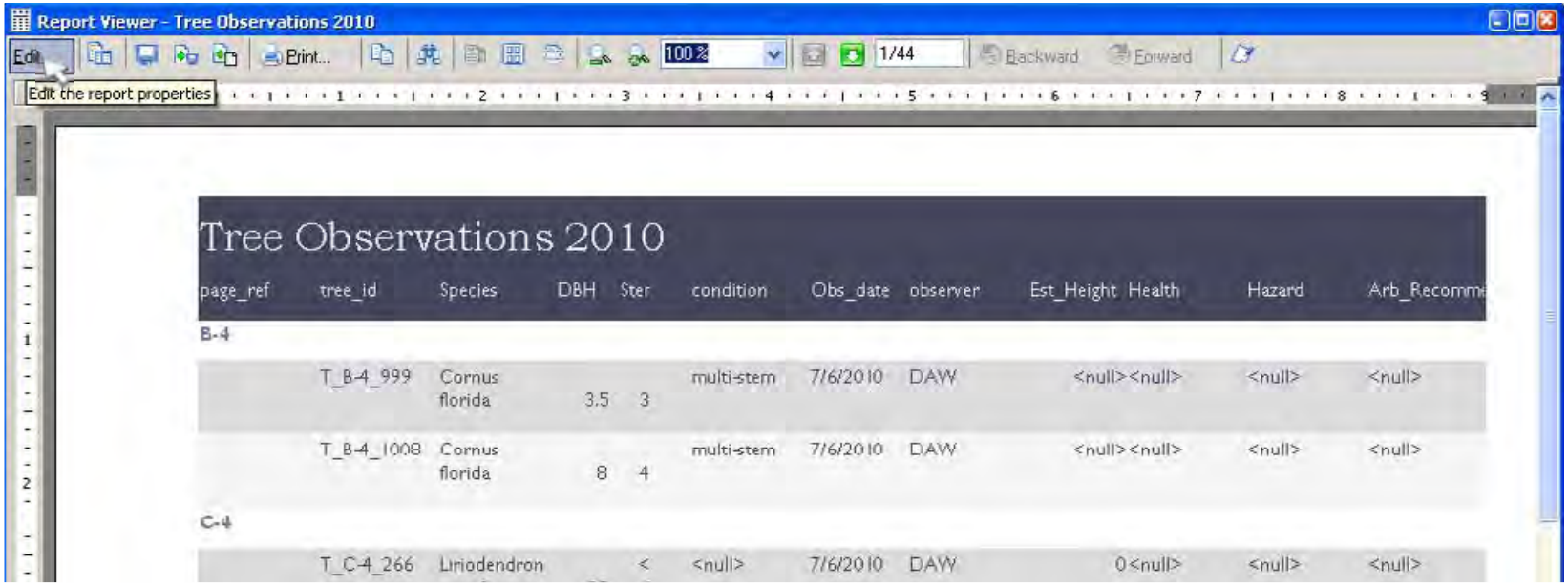




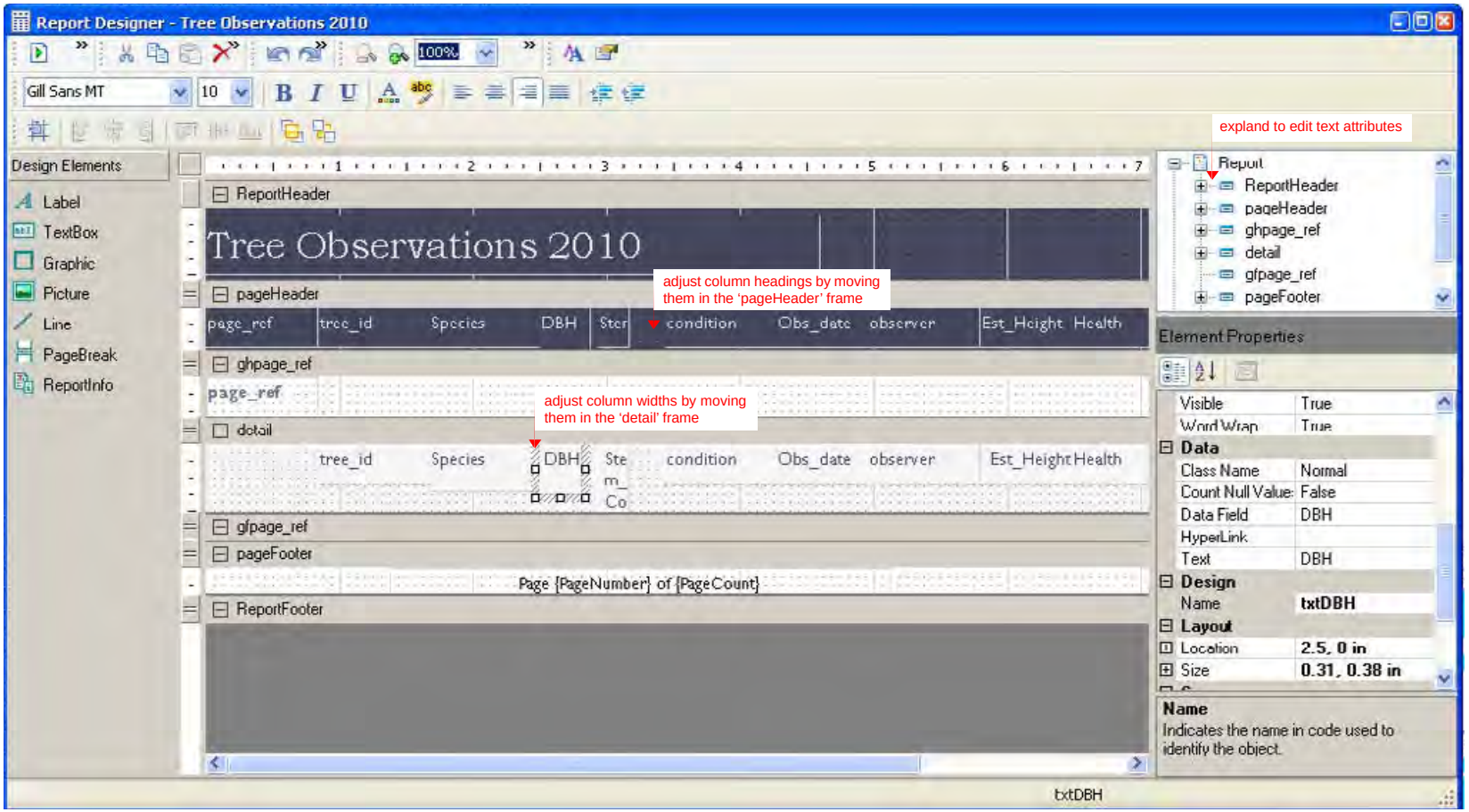
Since we have decided to include nearly all of the information fields we will choose a Landscape orientation to fit the entries. Click *Next*. Choose a report style, I pick Chicago.



Enter a title. Click *Finish*.



Click Edit to view the *Design Report* dialogue.

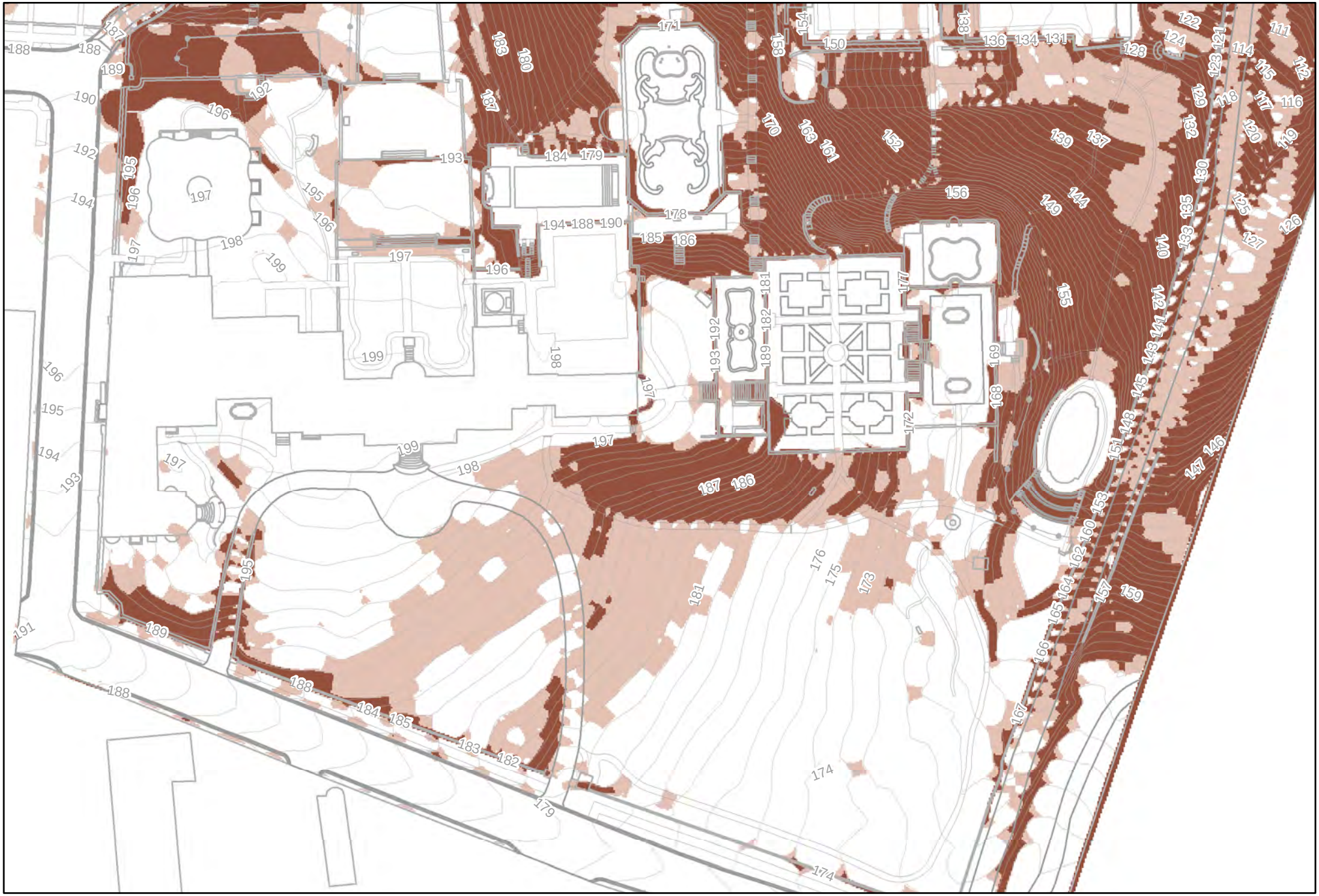


This complicated looking *Report Designer* interface provides customization of column widths, font, etc. Adjusting the width of the labels under *header* will only adjust the header bar and adjusting the labels under *detail* will adjust the column widths where the data is displayed. Click on the expandable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

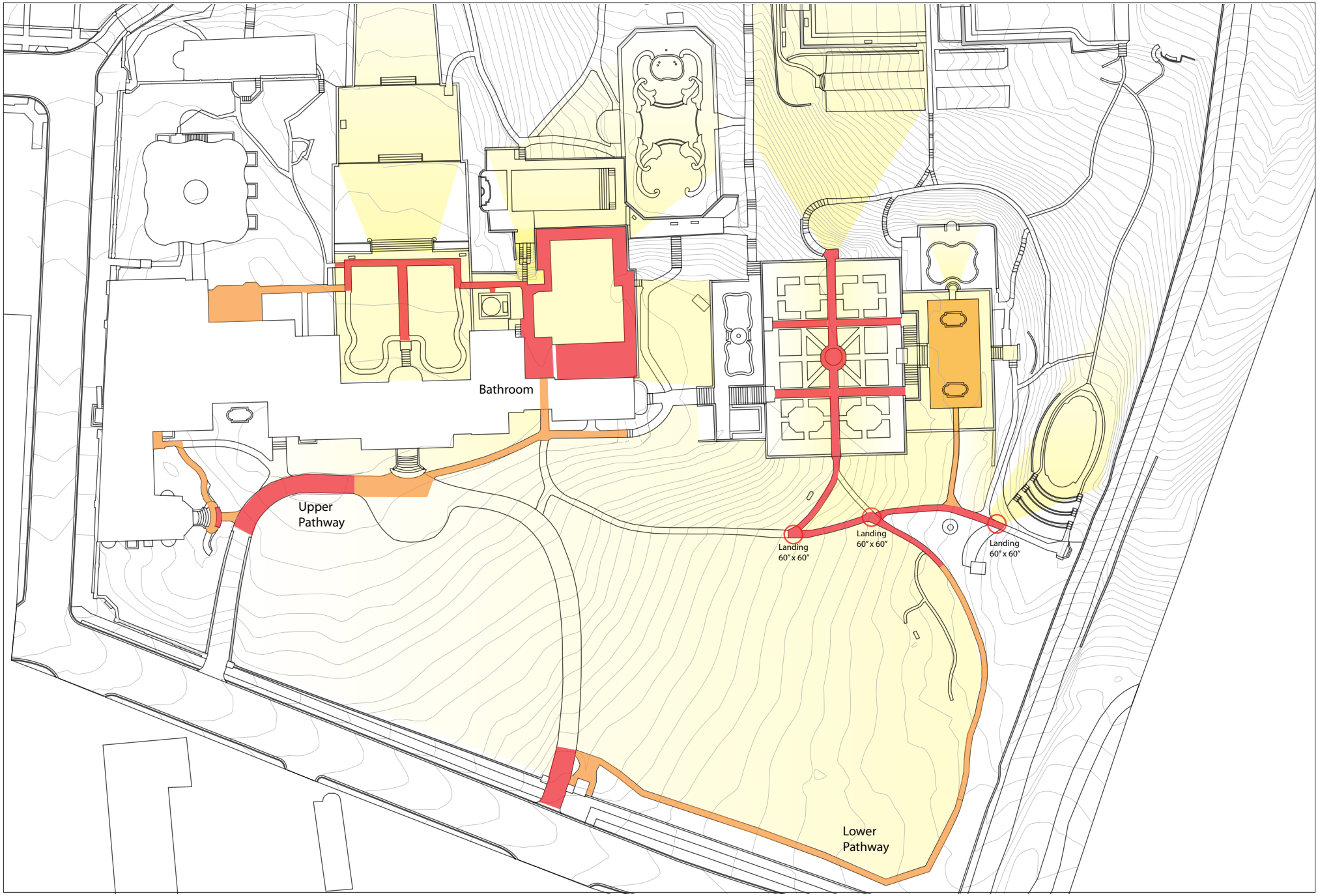
Tree Observations 2010

page_ref	tree_id	Species	DBH	Ster	condition	Obs_date	observer	Est_Height	Health	Hazard	Arb_Recomme
B-4											
	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>
C-4											
	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>
	T_C-4_637	Syringa pekinensis	6.75	<null>	multi-stem	7/6/2010	DAW	40	<null>	<null>	<null>
	T_C-4_645	Carpinus caroliniana	3.75	<null>	multi-stem	7/6/2010	DAW	16	<null>	<null>	<null>
	T_C-4_647	Syringa pekinensis	13.5	<null>	<null>	7/6/2010	DAW	25	<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 nformation on the *Report* feature at <http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/What_are_reports_in_ArcGIS/004v00000001000000/>



Dumbarton Oaks Garden Accessibility



Dumbarton Oaks Garden Accessibility

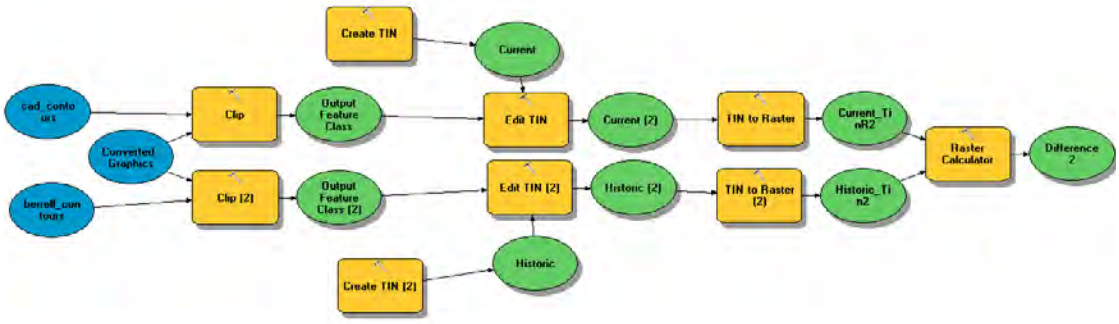
Modification Required
No Modification Necessary
Viewshed

0 125 250 Feet
Maryland State Plane Projection.

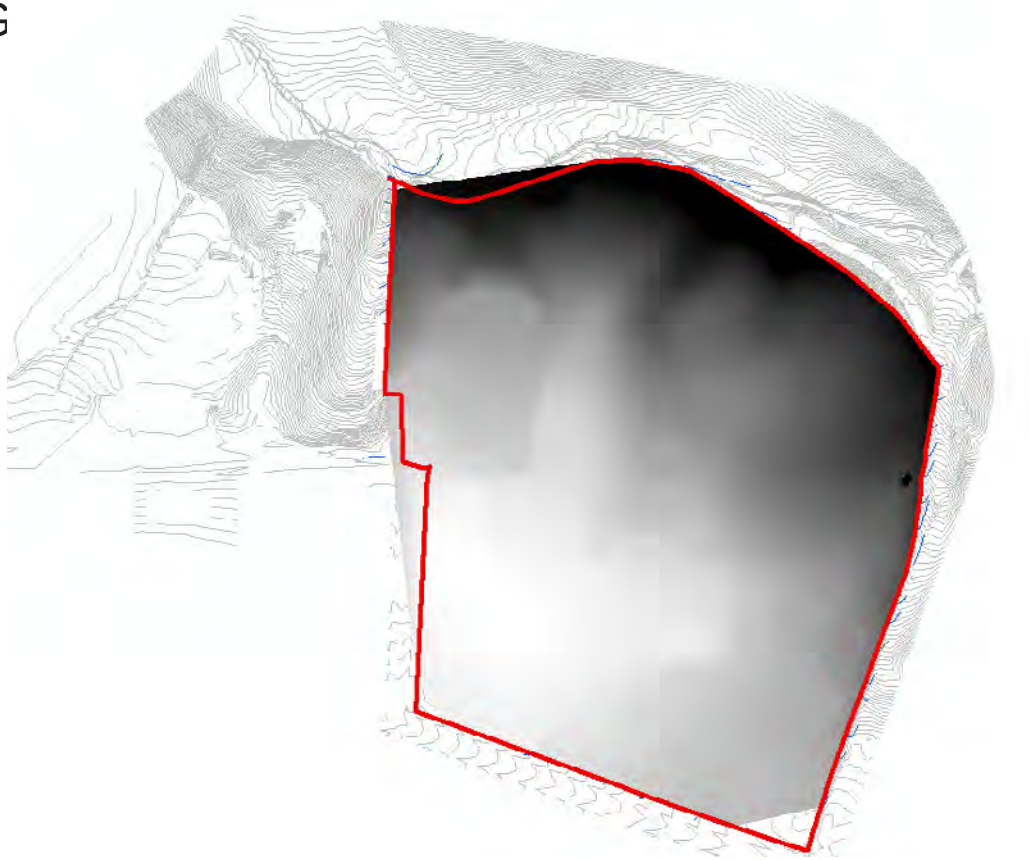
VISUALIZING TOPOGRAPHIC CHANGE

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.

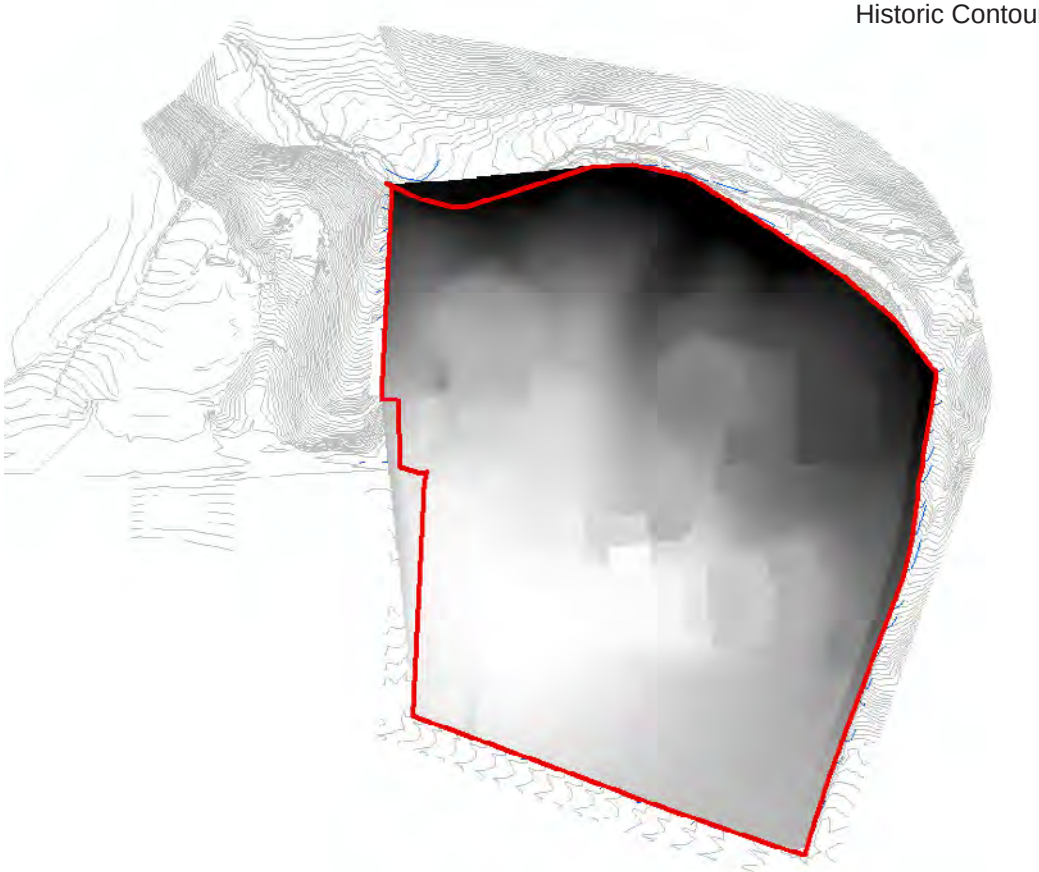
Dumbarton Oaks Garden
Charlie Howe, Intern



VISUALIZING TOPOGRAPHIC CHANG

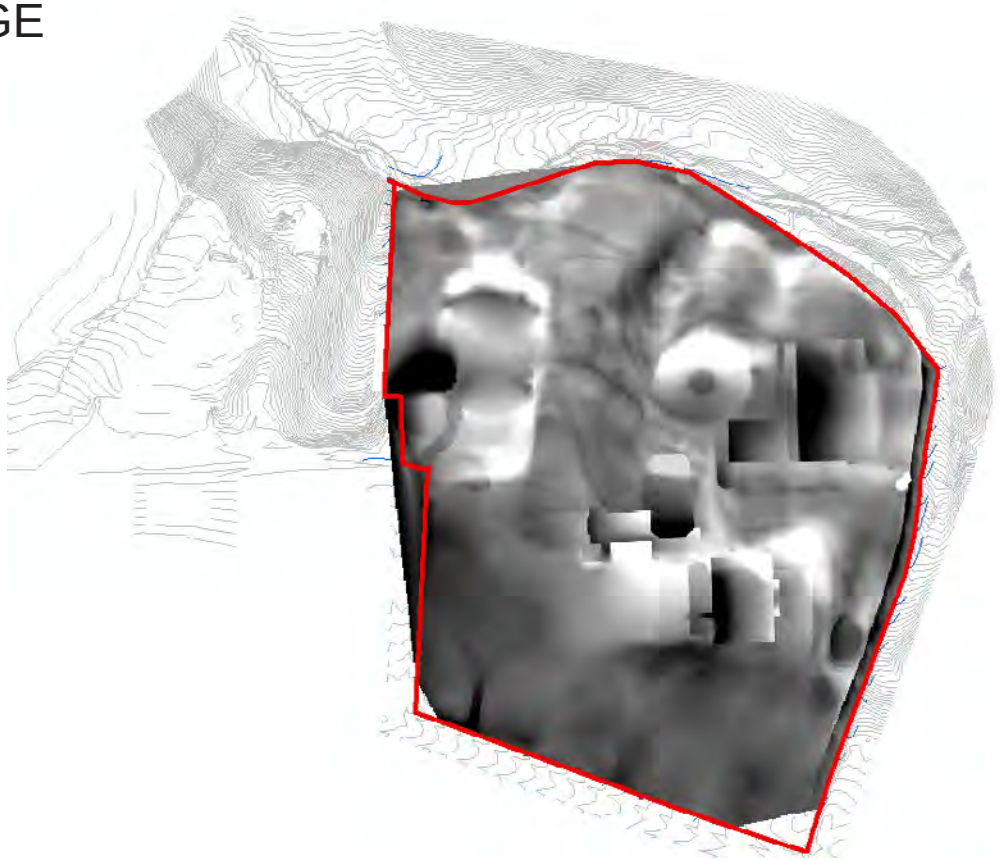


Historic Contour (5ft) DEM

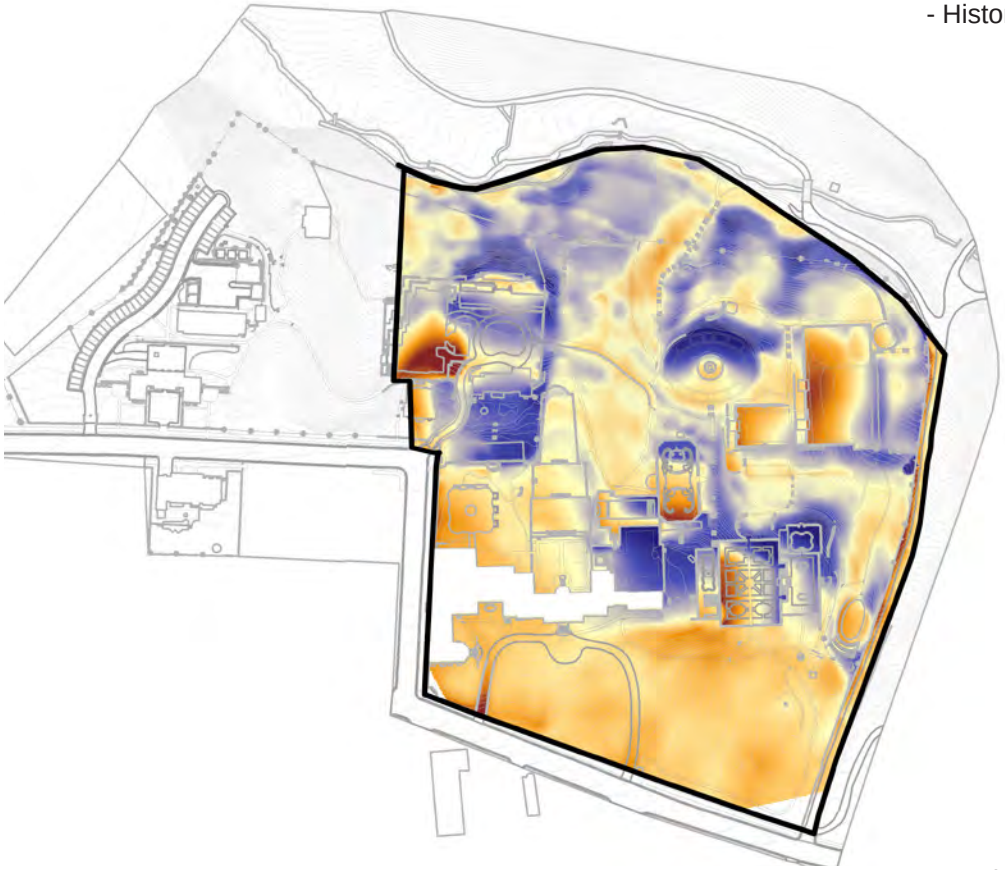


Recent Contour (1ft) DEM

VISUALIZING TOPOGRAPHIC CHANGE

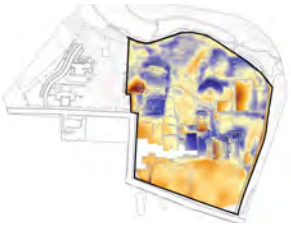


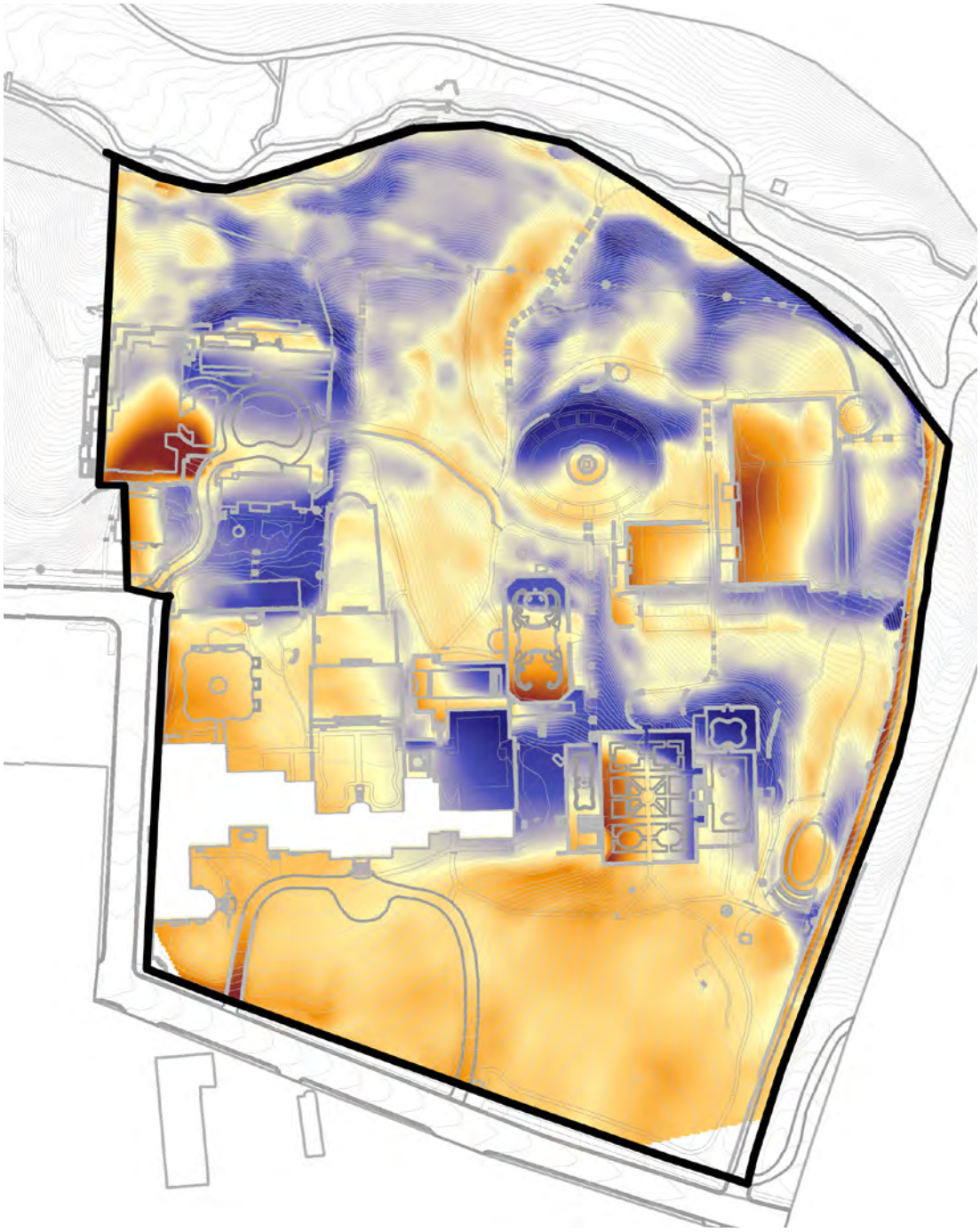
Recent Elevations
- Historic Elevations

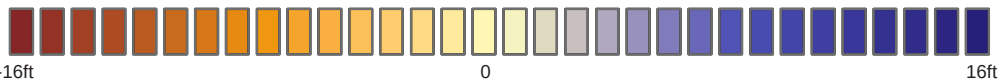


Color Symbology

VISUALIZING TOPOGRAPHIC CHANGE







Cut

Fill