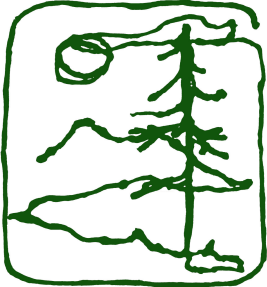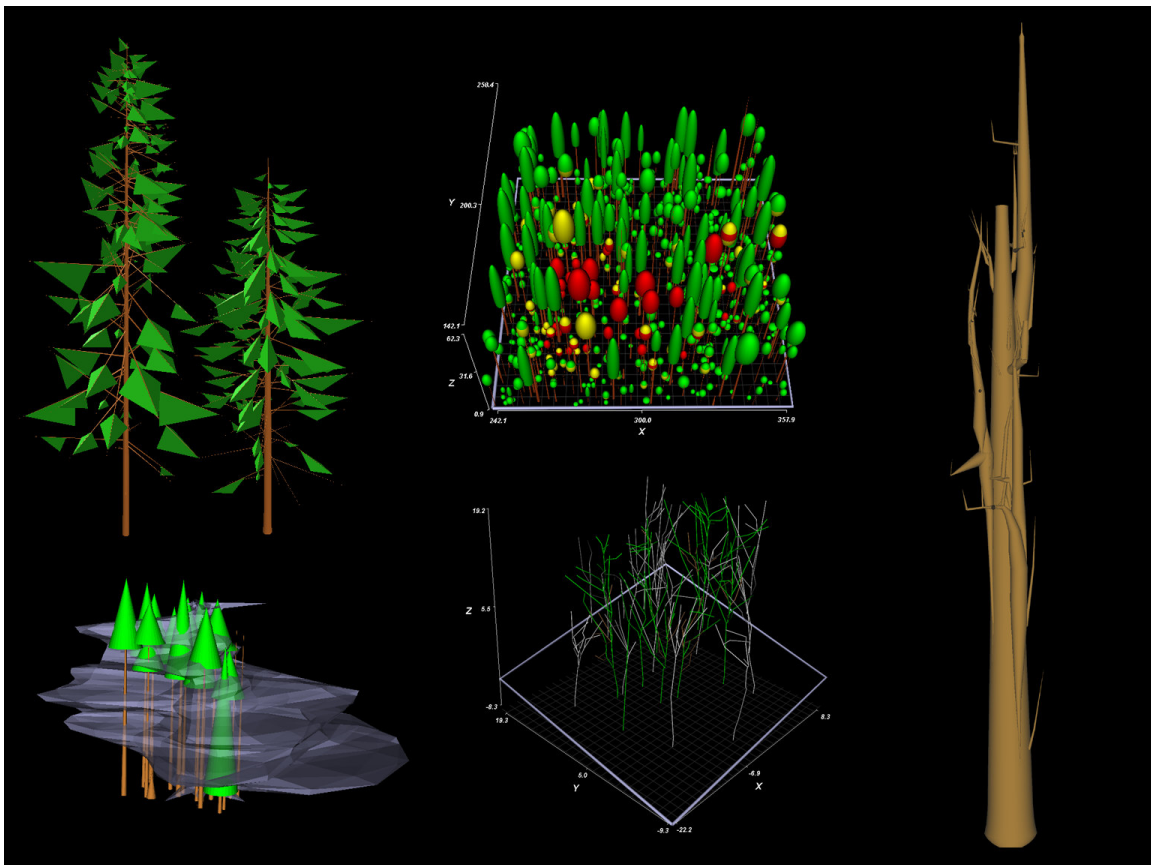# CanopyView User Manual

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CanopyView is a visualization tool for forest ecologists. It uses well-formed Microsoft Access Databases as a data source. These well-formed databases are created from the Canopy DataBank database generator.

Please see http://canopy.evergreen.edu/databank for more information about the DataBank project.

The goal of CanopyView is to build up a library of common canopy data structures and corresponding visualizations. CanopyView addresses the exploratory data visualization needs of researchers, allowing them to examine their 3D data in near real time after data entry.

This version of CanopyView ships with three test databases. One is based on field measurements taken at Martha Creek, WA, another is based on epiphyte on stem data, and the other is based on Eucalyptus trees in Tasmania. The three different visualizations have different characteristics. For example the Martha Creek default database models stems with branches and foliage cover. The stem exists in a 3D space defined by X, Y and Z coordinates. The shape of the stem is assumed to be perfectly vertical with a taper defined by an arbitrary number of height/diameter pairs going up the stem. The branches originate from the center of the stem and have a height, diameter, azimuth, slope, extent and percent foliage cover.

The attributes that define a stem with taper and branches are recorded in an Access database that ships with CanopyView. CanopyView can then retrieve the records from the database and build interactive 3D models of the stem entities.

Any comments, questions, suggestions, bug reports and praise should be directed to scidb@evergreen.edu.

## 2 Installation

### 2.1    System requirements

The standard CanopyView distribution has the following minimum requirements:

- 300 MHz PC or better (Pentium, Athlon, etc.)
- 128 MB RAM or more
- Windows 98/Me/2000/XP
- 3D graphics card with at least 8MB of video RAM (32MB or more recommended)
- Approximately 70MB of free disk space
- Microsoft Access 2000

Bottom line:  Install CanopyView on the fastest machine you have access to!

### 2.2    Download

The CanopyView application can be downloaded here:
http://canopy.evergreen.edu/canopyview: . The download is approximately 25 megabytes.  Check that page for updates.

### 2.3    Installation

Once you have downloaded the CanopyView setup program to your hard drive, you may begin the installation by simply double-clicking on the file.  Follow the instructions on screen to complete installation.  If desired, the program will create a shortcut on your desktop and on the start menu for you to use to run CanopyView.
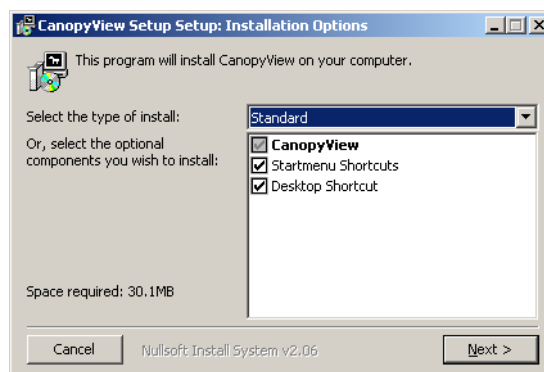


Figure 1: Installing CanopyView

### 2.4    Uninstall

To uninstall CanopyView select from the Start menu

- Start → Programs → CanopyView → Uninstall

Then follow the instructions on screen to fully uninstall CanopyView

### 3.1    Starting CanopyView

Launch CanopyView by clicking on the CanopyView icon either on the desktop or in the start menu.



Figure 2: The launch CanopyView icon

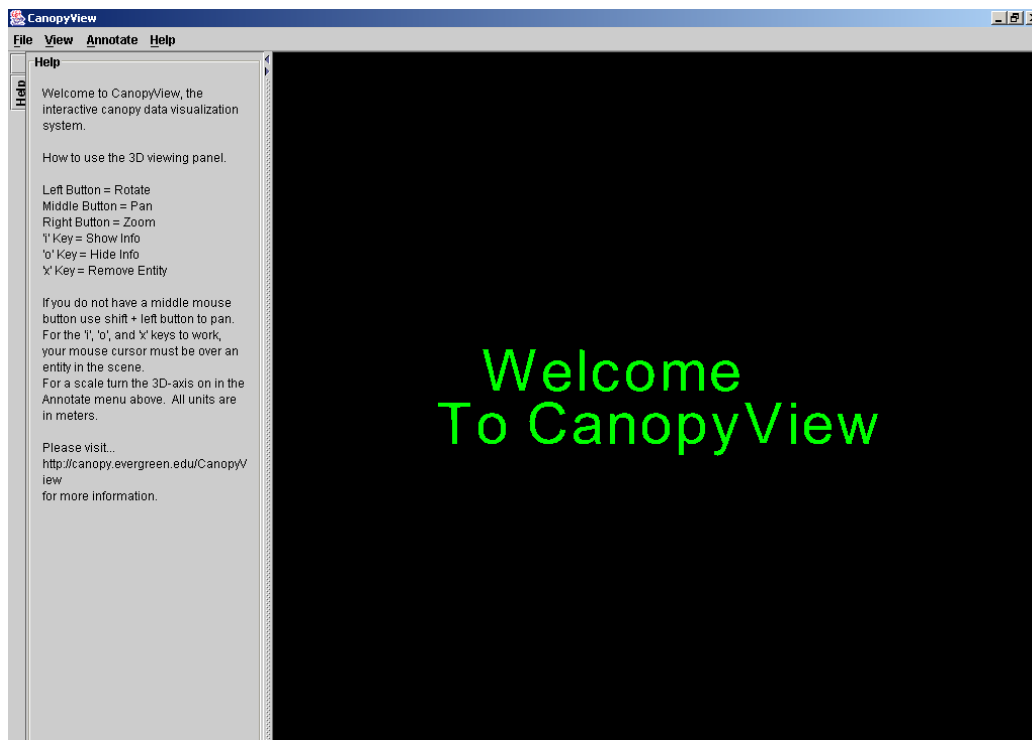Upon starting, CanopyView should look like Figure 3.



Figure 3: CanopyView upon startup

Now take your mouse pointer into the black region on the right that says, "Welcome to CanopyView":

- Use the left mouse button to rotate the visualization.
- Use the middle button of your mouse to pan around (alternatively if you do not have a middle mouse button, use the shift key + the left mouse button in order to pan).
- Use  the right button of your mouse to zoom in and out.

Become familiar with the 3D interaction before moving on. If ever you get lost or cannot seem to find anything go to the **View** menu and select **Reset Camera**.

## 3.2    Loading a dataset

CanopyView ships with one sample dataset that is ready for visualization.  Select **File → Load CanopyView State File**.  You should be looking in a folder named "sample data" and you should see one file called "stem with taper.cvstate".  Select this file and click **Load**.
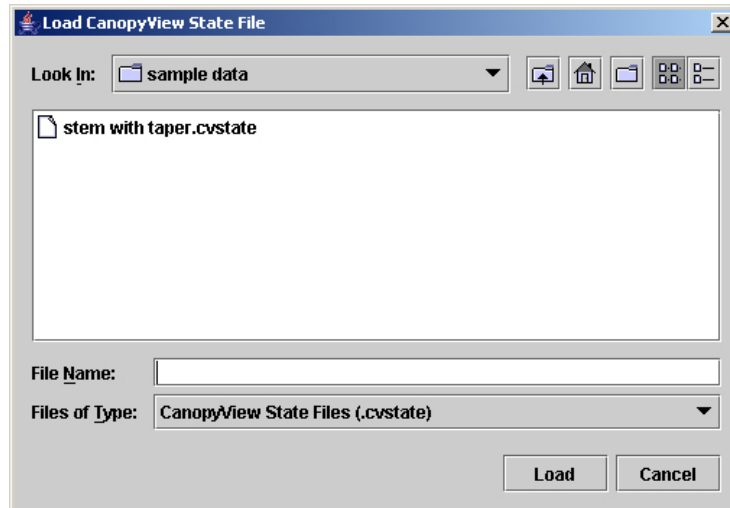


Figure 4: Loading the "stem with taper" datapackage for visualization

After opening the datapackage you should notice that CanopyView presents a new button on the lefthand side of the window, with the label **Load (Figure 5a)**
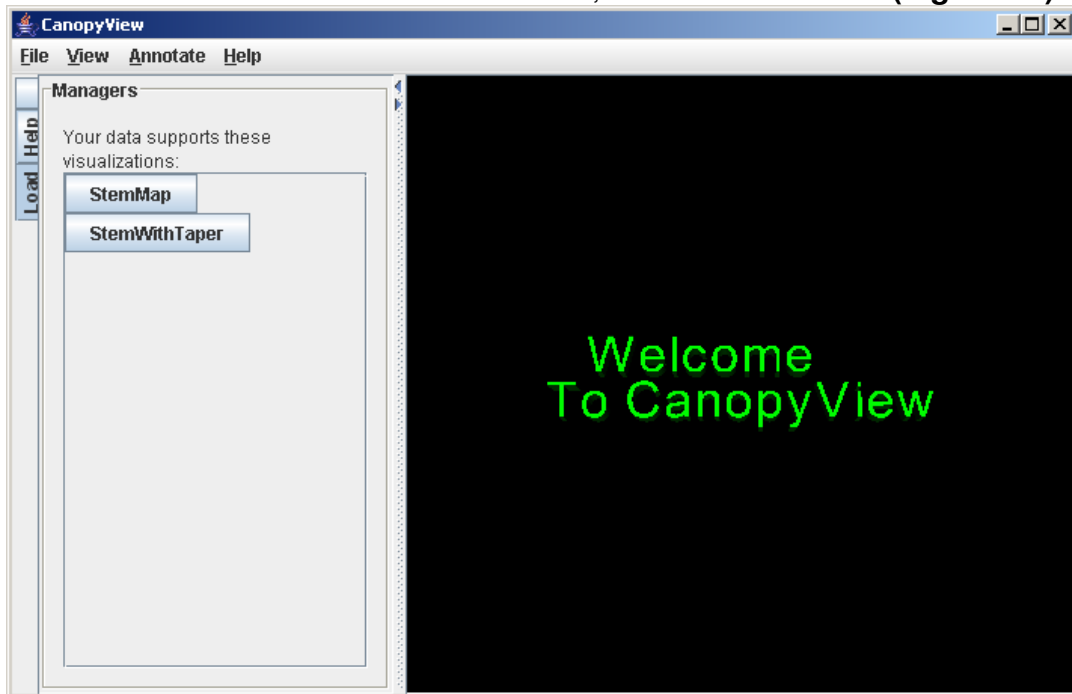


Figure 5a. The new features available after the .CVstate file has been loaded.

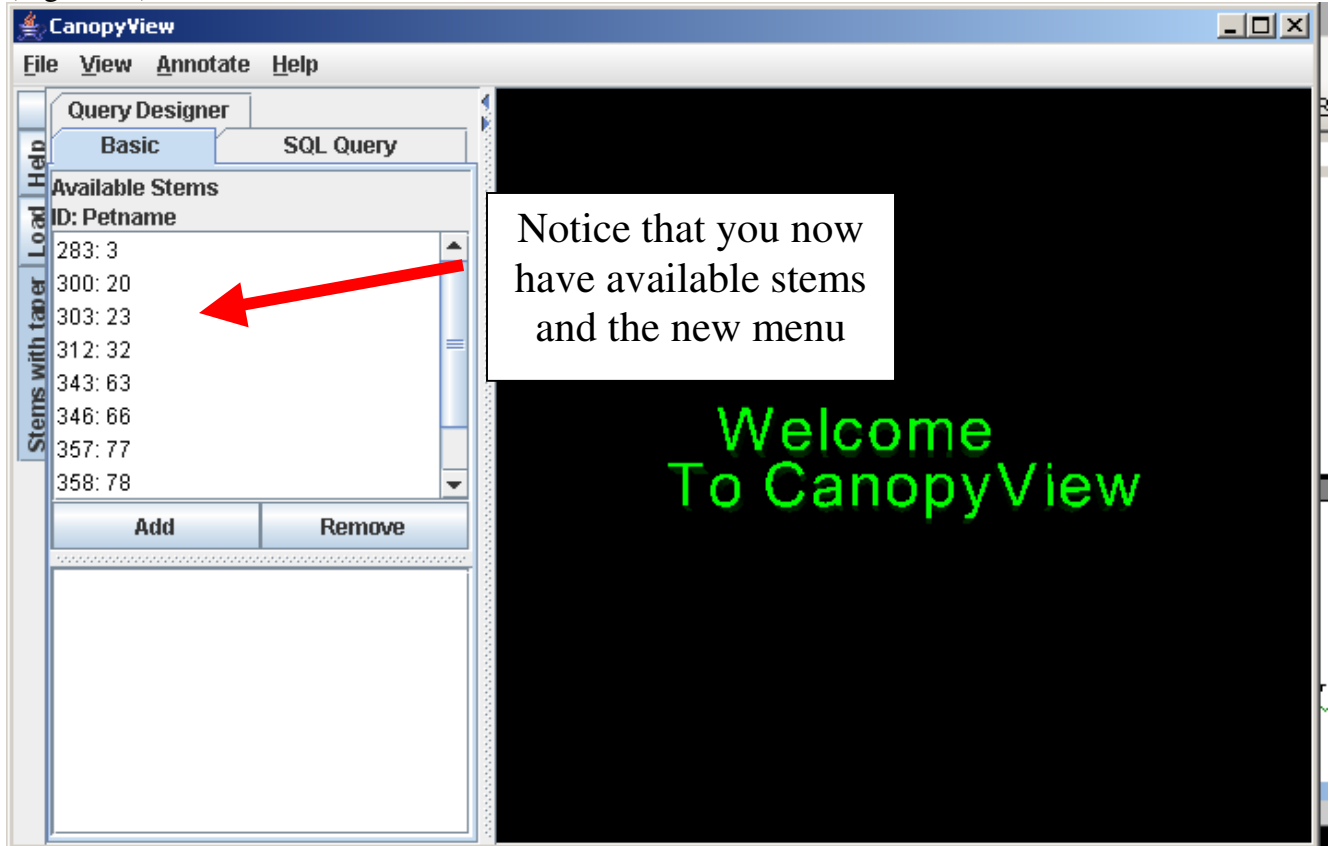If you .open up the **STEM WITH TAPER** you will see a third button "Stem With Taper" (Figure 5b).



Figure 5b:The new visualization that you just loaded.  (You won't see any new visualizations from your dataset until you add them to the scene  - then they will replace the "Welcome to CanopyView" visualization).

## 3.3     Creating a Visualization

Click on the button on the left labeled **Stem with taper**.  Select a stem from the list that appears and either double click on it or click the **Add** button directly below the list box. Try adding another stem to the scene, and notice how the two models on the screen are positioned relative to each other according to the location information recorded in the database.  After adding two stems to the scene (and rotating the view from overhead to side view) the sample visualization should look something like Figure 6.
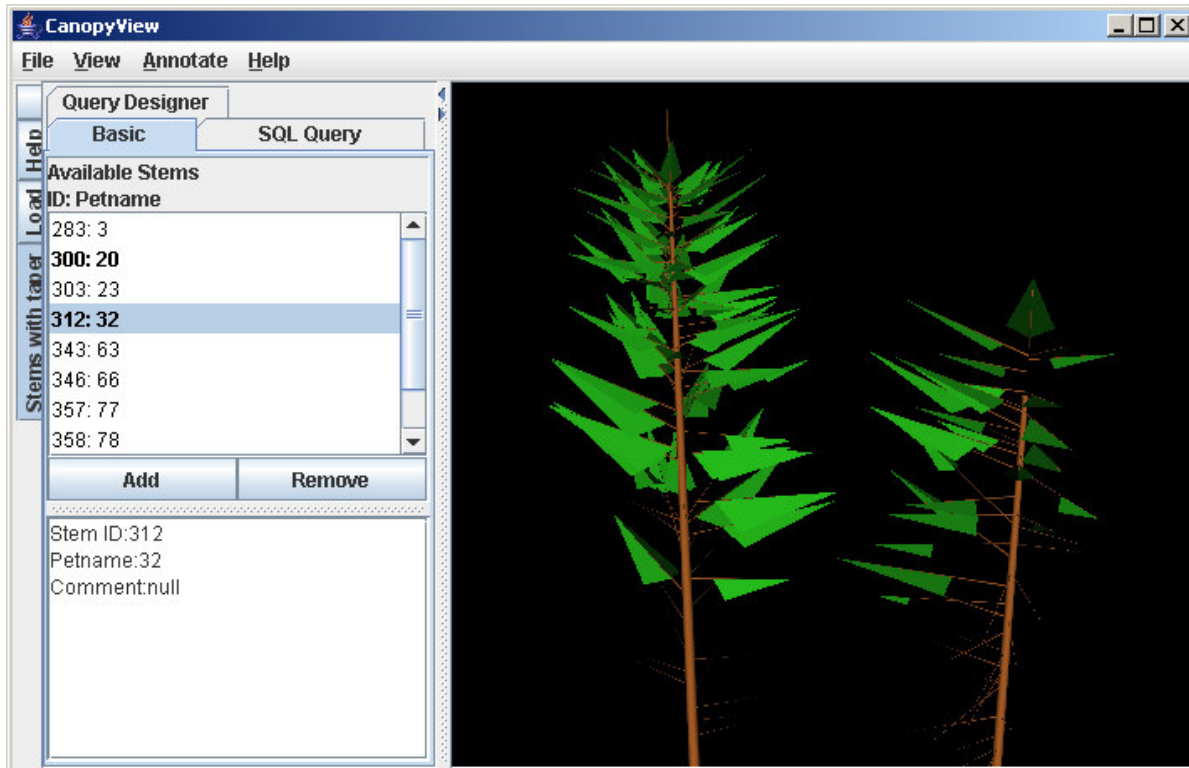
Figure 6: The scene after adding two stems and rotating the view window

You can add multiple stems simultaneously by jointly left clicking on the mouse and clicking on the shift or ctrl keys.

## 3.4    Customizing the scene

You can change some elements of the scene, as you like.  For example, try going to the **View** menu and selecting **Set Background Color**.  Next go to the **Annotate** menu and check **3-D Axis**.  If you have red/blue 3D glasses try **View→Stereo** to create a 3D anaglyph image.

## 3.5    Exporting an image of the visualization scene

To save an image, select **View→Save As Tiff**.

## 4 Advanced features

### 4.1    Direct Manipulation

There are several keyboard shortcuts that can be used in the 3D viewing panel to directly interact with the entities in the visualization.

To get a description of any entity in a scene, including its database id, place the mouse on the object and press **i**.  A small amount of descriptive data will appear in the bottom left of the 3D panel.

**NOTE:** Since the text appears in white, you'll need to have the background color set to something dark in order to read it.

Place the mouse over an entity in the scene and press **o** to clear the informative text. Finally, place the mouse over any entity and press **x** to remove it from the scene.

```
Keyboard Reference

i       Display information about the selected entity

o       Clear the informative text

x       Remove the selected entity from the scene
```

### 4.2    SQL Queries

From the stem panel it is possible to enter the WHERE clause of an SQL query to select a set of stems to add to the scene.  At the top of the stem panel is a tab labeled **SQL Query**.  Click on that tab to display the SQL query text field.  The first part of the query is already filled in, **SELECT * FROM Stem WHERE** …   you then fill in the where clause and all matching stems will be added.

Example1: **SELECT * FROM Stem WHERE**
             **locationXYZ_X > 5 AND**
             **locationXYZ_Y < 5;**

Example 1 would add stems within these boundaries.

Example 2: **SELECT * FROM Stem WHERE
Species_id = 2**

Example 2 would add all the Douglas fir stems to the scene (b/c we know from the database that species ID 2 refers to Douglas-fir (see the species table))

Example 3: **SELECT * FROM Stem WHERE
LiveStatus_status='L'**

Example 3 would add all the Douglas fir stems over 25 meters tall to the scene. Notice that text fields such as PSME need to be in single quotes and numeric fields do not need any quotes.

**NOTE:**
- A query does NOT reset your visualization, it only adds components that were absent that meet the criteria of the query.
- In SQL queries, text values need to be surrounded by SINGLE quotes (see example 3 above)
- If your query with a number doesn't work, try putting single quotes around it – it may be that it is a text field, even though you have a number value. (You can avoid this problem by checking the database directly).


**CAUTION:** These are sample queries and these aren't necessarily going to work with your data They DO work with the default **Stem With Taper** database shipped with CanopyView.