

## **Canopy Cover Analysis Instructions**

The instructions in this document indicate the process to be used when conducting the canopy cover analysis using i-Tree Canopy for projects developed under the Reforestation Forecast Methodology. Guidance provided here is applicable for analyses performed to estimate either shrub cover or tree cover. Specific guidance for how to conduct the analysis using historical imagery is provided at the end. An ESRI Shapefile of the area(s) of analysis (e.g., project area, stratum, site preparation area) is required to conduct the analysis.

- 1. Navigate to the i-tree Canopy website: <u>https://canopy.itreetools.org/</u>
- 2. Click the blue [Get Started] button on the right-hand side of the page (Figure 1).

Flice	Canopy A tree canopy assessment tool	Home	Project *	Menu *
		Home Project*	Welcome to i-Tree Canopy! Use this tool to classify land and tree cover across a given area using random sampling of aerial imagery. See tree canopy benefits in terms of <b>carbon dioxide</b> , air pollution, and stormwater impacts. Event from exiting geographic boundaries, draw your own project area boundaries onto Google Maps, or load an ESRI shapefile. • Use a use multiple, non-overlapping boundaries at the same time. • Tree Canopy usendaries sample points and zooms to each one so you can choose from your pre-defined list of cover types for that. • With Tree Canopy, you review Google Maps aerial photography at random points to conduct a cover assessment within a defined project area	
				<ul> <li>Over-tood survey points are suggesting, the mole points you complete, the better your cover estimate for your survey area.</li> <li>If estimating the cover, the benefits can also be estimated.</li> <li>Learn how I-Tree Canopy works.</li> <li>Video Learning Resources</li> </ul>

Figure 1. i-Tree Canopy homepage

**3.** Upload a Shapefile of the appropriate area of analysis (project area, area of a given forest type, site preparation area) by selecting the [Load Shapefile Boundary] button (Figure 2). In

the "Select a Shapefile" dialog that pops up, browse to the location of the Shapefile and select the .shp file for the Shapefile and .prj file for the corresponding projection.



Figure 2. Area of analysis selection

- **4.** After loading the boundaries for the area of analysis, click the [Next] button below the map frame.
- 5. On the Cover Class Configuration screen, click the [Tree / Non-Tree] button above the Cover Class Table. If needed, modify the attributes of each cover class by clicking the cover class to edit, clicking on the pencil icon below the left side of the table, editing the attributes, and clicking the [Update] button after completing the edits for each class to save the modifications (Figure 3). If performing the shrub cover analysis, change the 'Tree' cover class to 'Shrub' to represent shrub cover (and any residual tree cover also assumed to be removed during site preparation); change the 'Non-Tree' cover class to 'Non-Shrub' to represent all other cover. Click [Next].

i-Tree Cano	py <sub>v7.1</sub> Home Project → Menu → i-Tree		
Configuration step 2 of 3: On evergreen.	this page, please configure the land cover classes yo	bu wish to su	× ter, impervious, grassland, etc., as v
Save Load Tree / Non-	Tree Basic Land Cover	Cover Class Shrub	
Cover Class	Description	Description	e Cover?
Tree	Tree, non-shrub	Shrub	
Non-Tree	All other surfaces	Abbreviation	
+ @ *		Tree Cover: O No @ Yes Color #1BCA00CC	Update Cancel

Figure 3. Cover class configuration screen

6. Skip through the Tree Benefit Valuation screen by clicking [Next] at the bottom of the page.

7. On the "Conduct your survey" screen, add sample points using the [+] button at the bottom of the "View Results" table on the righthand side of the window (Figure 4).

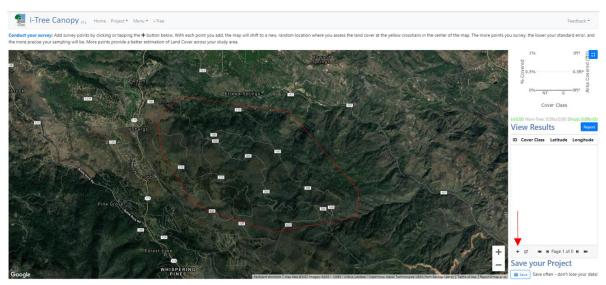


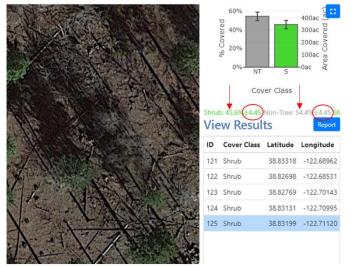
Figure 4. Adding sample points

8. After clicking on the [+] button, the map will zoom in to a newly established sample point, indicated by a yellow crosshair. Classify each point as either 'Tree'/'Non-Tree' or 'Shrub'/'Non-Shrub' based on the presence of canopy or no canopy at the point displayed (Figure 5). Positive identification of canopy is based on the presence of tree/shrub cover at the center of the yellow crosshair on the aerial image. Once the cover class is determined, select the corresponding cover class name from the cover class attribute dropdown menu for the current sample point. Zoom in and out on the aerial image by using the [+] and [-] buttons on the bottom right corner of the image as needed to more easily identify the cover class for each point. Click [Save] or, if adding more sample points, [Save & Create New].



Figure 5. Identifying the cover class

9. Continue adding points until a confidence estimate for average canopy cover meets or exceeds a standard error of +/- 10 percent of the percent cover estimate for the cover ('Tree' or 'Shrub') class. For example, the project proponent would stop adding points for the project in Figure 6 since the standard error (SE) for the 'Shrub' cover class is +/- 10 percent (or lower) of the percent shrub cover—the SE is less than +/-4.56 (10 percent of 45.6) for the 'Shrub' cover class.



**Figure 6.** Adding sample points until standard error of less than +/- 10 percent achieved

**10.** Save analysis data as you go along (**Figure 7**). Upon clicking the [Save] button for the first time, specify the file name of choice and save to the location of choice.

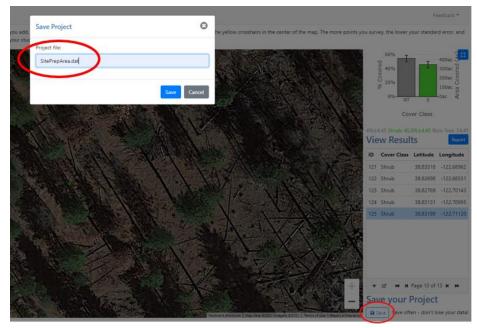


Figure 7. Saving data in i-Tree Canopy

11. Once the target standard error is achieved or the target number of sample points have been taken, save the data and click on the [Project] button, then the [File] button, then the [New / Start Over] button (Figure 8), confirming in the pop-up window that appears that you want to clear data and start over. Starting over ensures that the sample points cannot be unintentionally changed.

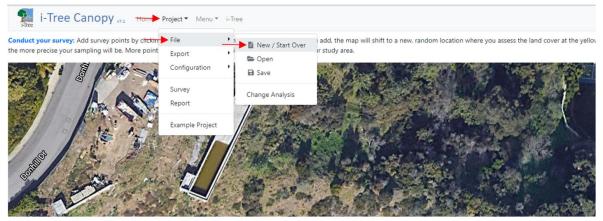


Figure 8. Starting over with i-Tree Canopy

**12.** To begin the process to use historical imagery to update sample point values, click the [Project] menu, then [File], then [Change Analysis] (Figure 9).

Hrcc, A tree canopy assessment tool	Project      Menu      File	New / Start Over	
	Export Configuration	Open     Save     Change Analysis	e Canopy! and tree cover across a given area using random sar penefits in terms of carbon dioxide, air pollution, and
	Survey Report		
	Example Project	JSE it: ect from existing geographic	: boundaries, draw your own project area boundaries onto Google Maps, or load an E
	• You	i can use multiple, non-over ee Canopy randomly genera	lapping boundaries at the same time. ates sample points and zooms to each one so you can choose from your pre-defined I
	<ul><li> 500</li><li> If es</li><li> Lea</li></ul>	-1000 survey points are sug	r Google Maps aerial photography at random points to conduct a cover assessment wi ggested; the more points you complete, the better your cover estimate for your study a neffts can also be estimated. S.

Figure 9. Loading sample point locations for comparison to historical imagery

**13.** Select the project file that was created in Step 10 above.

**14.** Once opened, click on the [Project], then [Export], then [KMZ] button (**Figure 10**) to save the file as a KMZ version (requires a separate <u>download</u>). Alternatively, the project may be exported as a KML file.



Figure 10. Exporting KMZ File

- **15.** Open Google Earth desktop version. Click on the [File] menu, then [Open], then select your recently created KMZ (or KML) file from its saved location and click [Open].
- **16.** Place i-Tree Canopy and Google Earth windows side-by-side.
- **17.** In i-Tree Canopy click the first survey point in the table record list, on the right side of the screen, to zoom to it.
- **18.** Double click the first survey point in Google Earth to zoom in to it.
- **19.** Use the Google Earth historical imagery slider to view imagery with an appropriate date based on the requirements specified in the Reforestation Forecast Methodology (e.g., corresponding to the date closest to but before the date that site preparation activities were initiated). First click on the clock icon in the toolbar at the top of the window. Then use the

sliding tool that appears at the top left of the page to choose the appropriate imagery date (**Figure 11**).

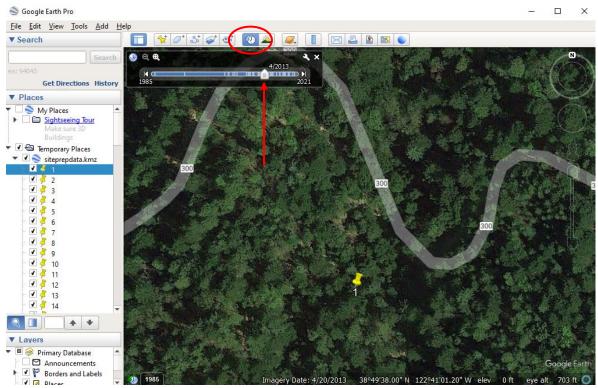


Figure 11. Choosing the imagery date

**20.** Compare the imagery in i-Tree Canopy and Google Earth. In i-Tree Canopy, change the point's classification accordingly as needed by double clicking the ID number in the table and choosing from the drop-down menu (**Figure 12**).

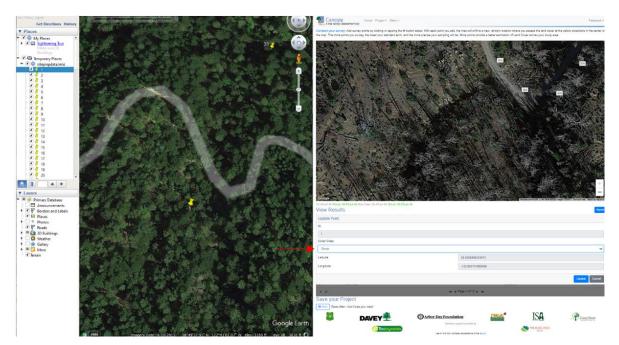


Figure 12. Reclassifying points while viewing Google Earth and i-Tree Canopy side-by-side

- 21. Repeat these steps for your remaining i-Tree Canopy points.
- 22. Periodically save your re-survey project.
- 23. If standard error exceeds +/- 10 percent for either cover class after reclassifying using the historical imagery, additional sample points should be added by saving the re-survey project data, exiting the change survey mode in i-Tree Canopy by clicking on the [Start Over] button, and reloading the re-survey project data from the i-Tree Canopy startup screen by clicking on [Project] menu, then [File], then [Open] (Figure 13).

 File Export Configuration	<ul> <li>New / Start Over</li> <li>Den</li> <li>Save</li> </ul>	e Canopy! d and tree cover across a given area using random s
Survey Report	Change Analysis	penefits in terms of <b>carbon dioxide</b> , <b>air pollution</b> , a
Example Project	use it:	
<ul> <li>You</li> <li>i-Tre spot</li> <li>With</li> <li>500-</li> <li>If esi</li> <li>Lear</li> </ul>	can use multiple, non-overl e Canopy randomly genera i-Tree Canopy, you review 1000 survey points are sug	boundaries, draw your own project area boundaries onto Google Maps, or load apping boundaries at the same time. tes sample points and zooms to each one so you can choose from your pre-defi Google Maps aerial photography at random points to conduct a cover assessme gested; the more points you complete, the better your cover estimate for your str refits can also be estimated.

Figure 13. Loading re-survey project data to add more sample points

- **24.** Add additional sample points as needed and repeat the comparison using Google Earth with the updated KMZ (or KML) file until the target standard error is achieved for both cover classes.
- **25.** Save the analysis results. These results will be reported with the project for review by the confirmation body.
- **26.** If additional analyses are being performed (e.g., pre- and post-treatment shrub cover), repeat steps 17-25, saving the results using a new project file name so that the outcomes from each analysis are retained for reporting and confirmation purposes.