![CLIMATE FORWARD]

Canopy Cover Analysis Instructions
(Updated October 4, 2023)

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: https://canopy.itreetools.org/

2. Click the blue [Get Started] button on the right-hand side of the page (Figure 1).
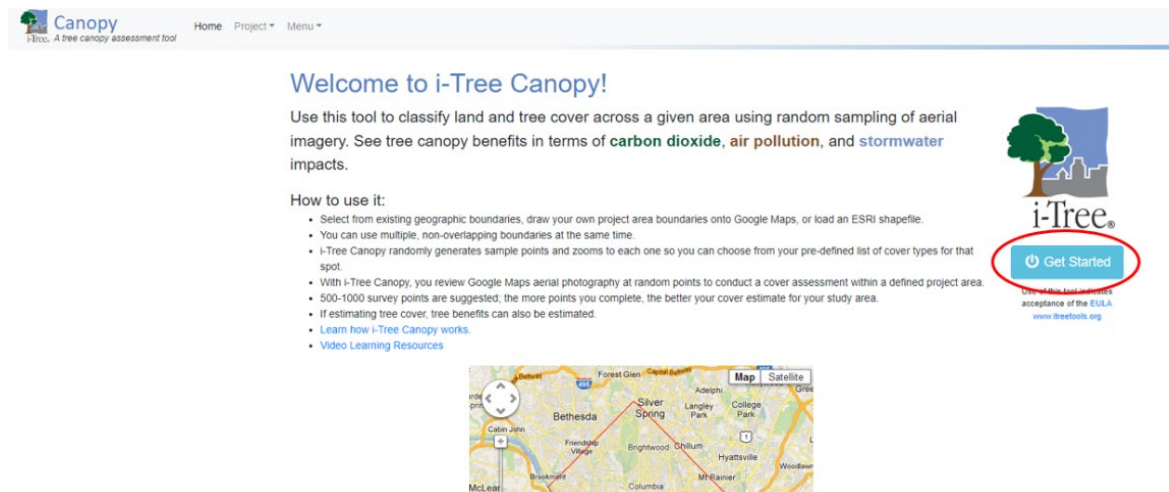

Figure 1. i-Tree Canopy homepage

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.
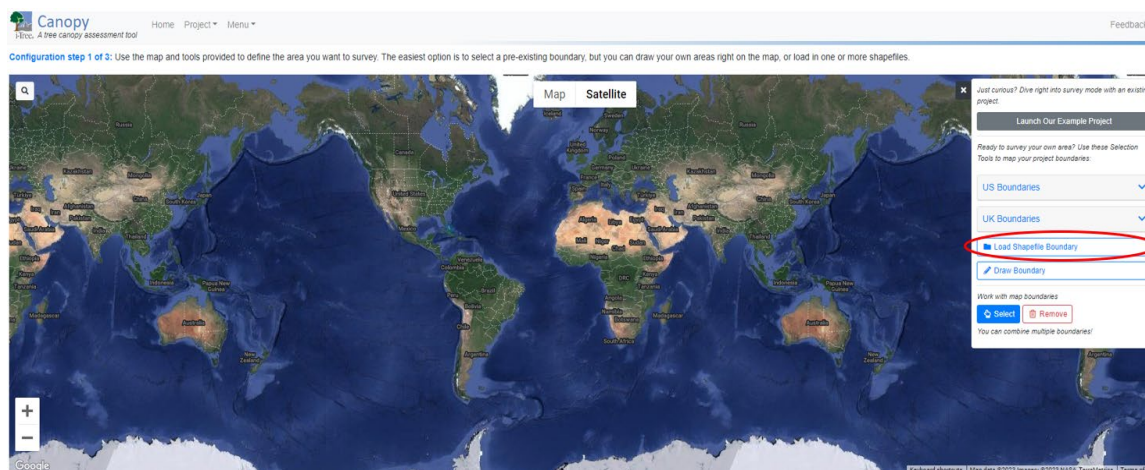

Figure 2. Area of analysis selection

4. After loading the boundaries for the area of analysis, click the [Next] button below the map.

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].
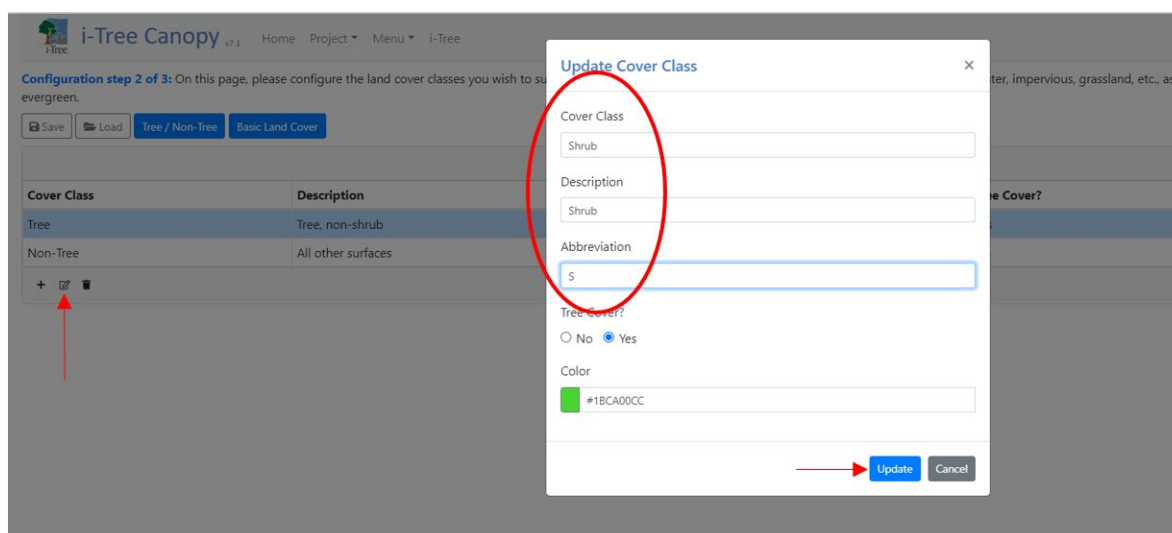

Figure 3. Cover class configuration screen

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).
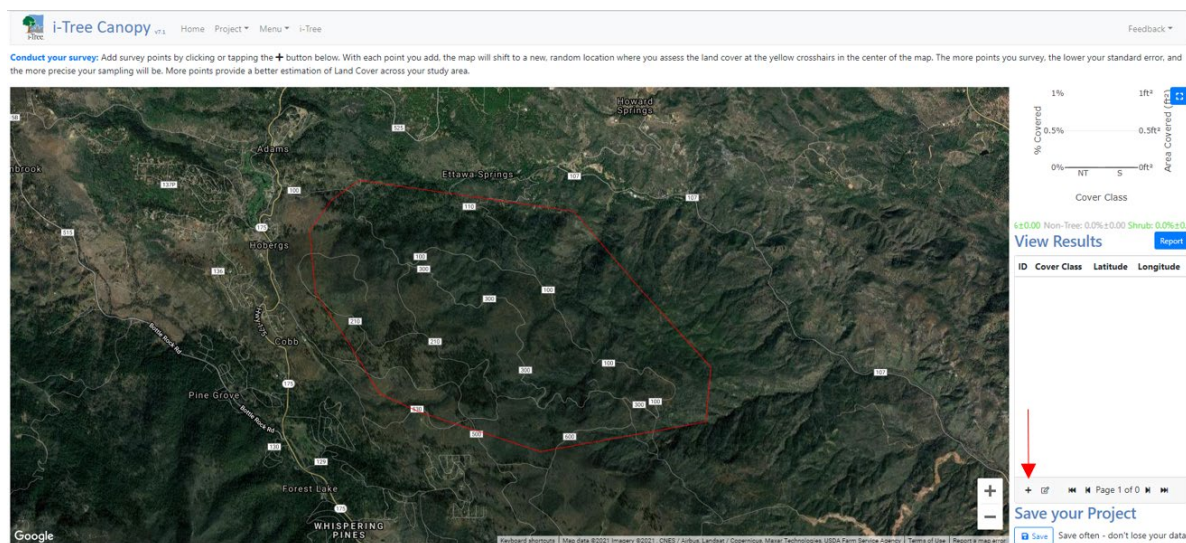

Figure 4. Adding sample points

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].
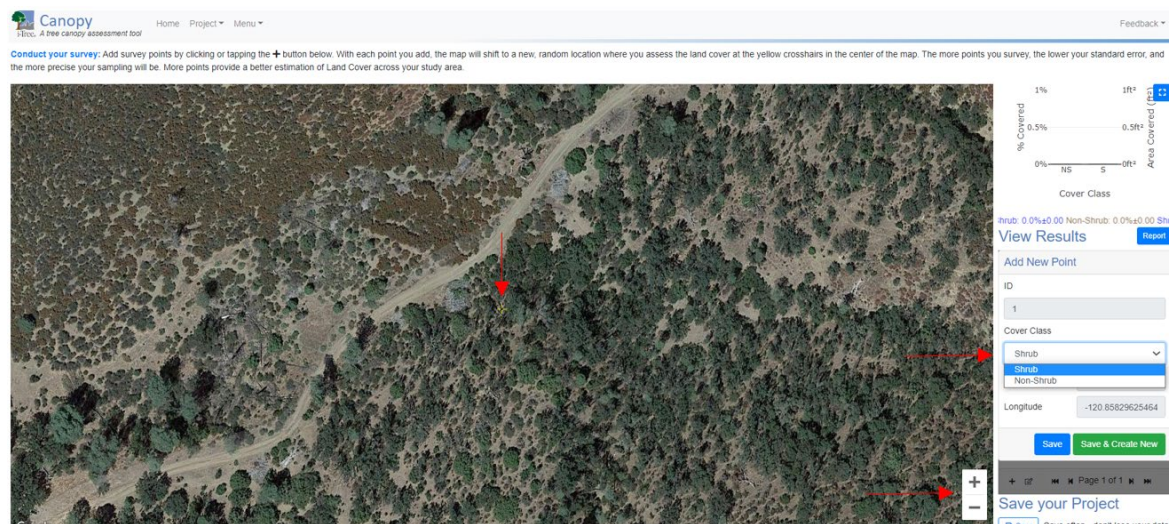

Figure 5. Identifying the cover class

9. Sampling, whether for pre-existing tree canopy cover or for shrub cover, must meet each of the following three criteria:

    ▪ Achieve a standard error that is +/- 10 percent or less of the estimate of percent cover for either the presence (tree or shrub) or absence (non-tree or nonshrub) category. For example, if percent tree canopy cover is estimated as 35 percent, with a corresponding non-tree cover estimate of 65 percent, sampling may be halted once a standard error of either 3.5 percent for the tree cover category or 6.5 percent for the non-tree cover category is achieved.

    ▪ Assign a minimum of 10 points to each category. For example, if you are classifying points as either "tree" or "non-tree," then the analysis must continue until at least 10 points have been classified as "tree" and 10 as "nontree."

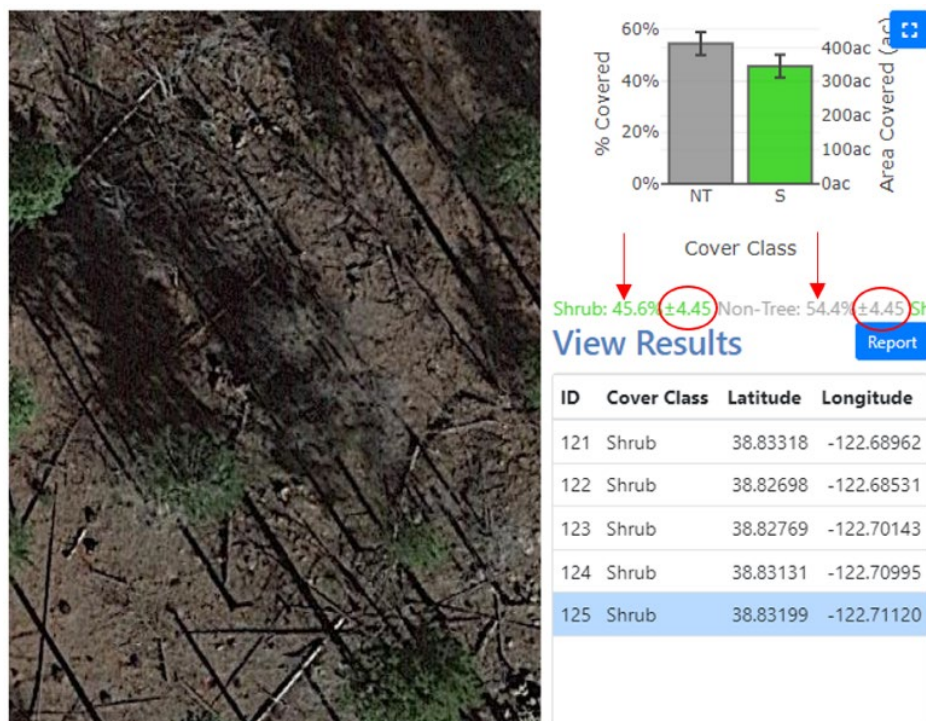   ▪ Analyze a minimum of 100 sample points in total.

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.
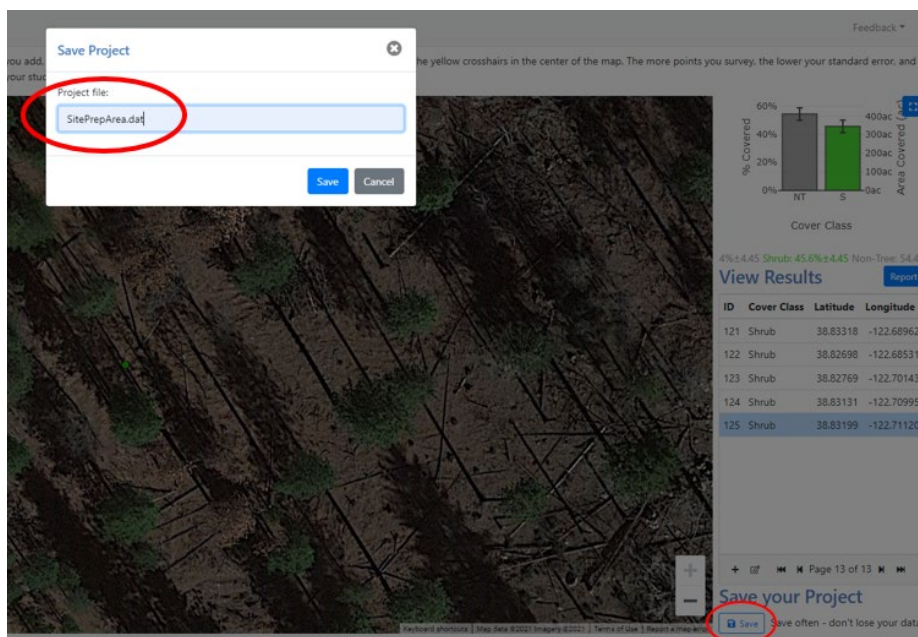

Figure 7. Saving data in i-Tree Canopy

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.
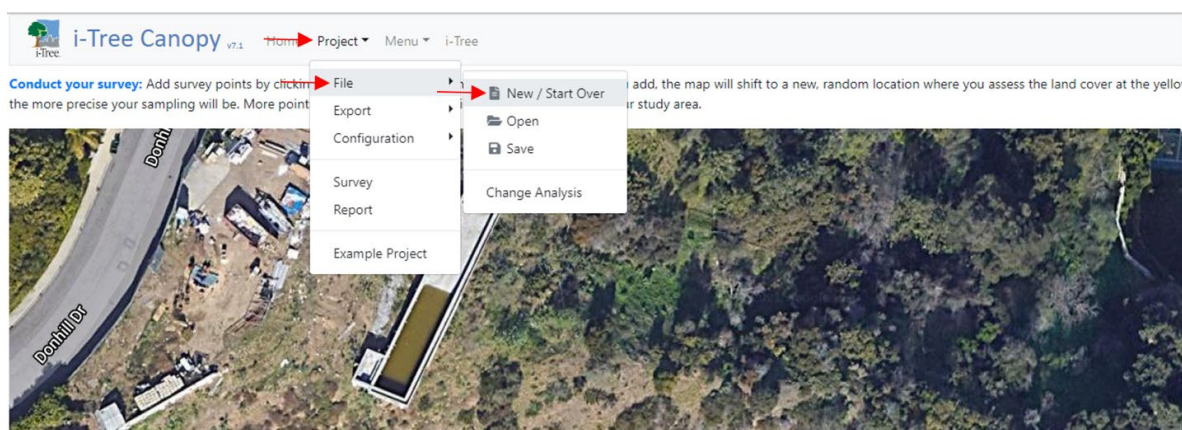

Figure 8. Starting over with i-Tree Canopy

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**).
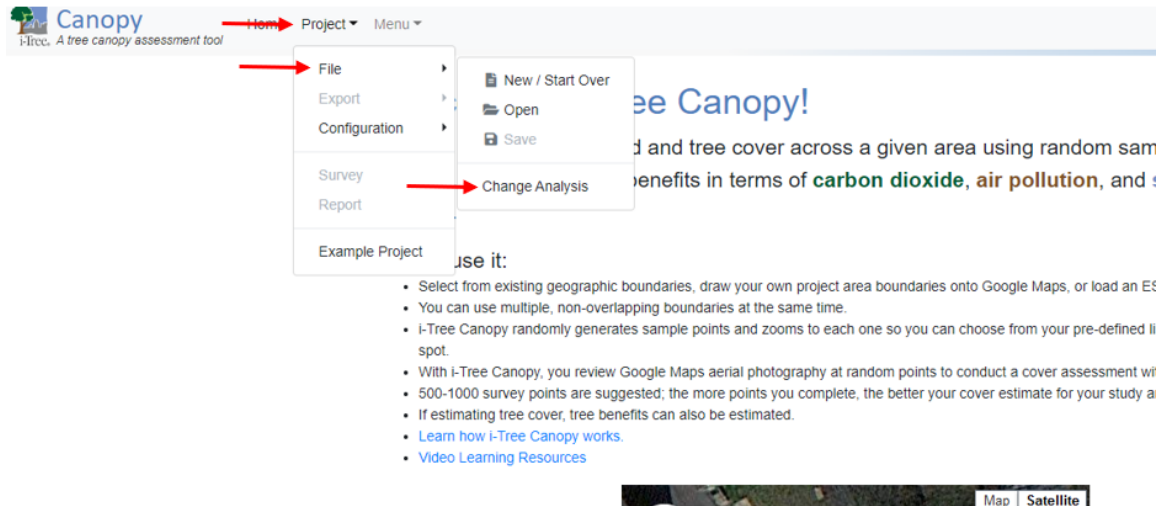

Figure 9. Loading sample point locations for comparison to historical imagery

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

14. Once opened, click on the [Project], then [Export], then [KMZ] or [KML] button (**Figure 10**) to save the file as a KMZ or KML file.
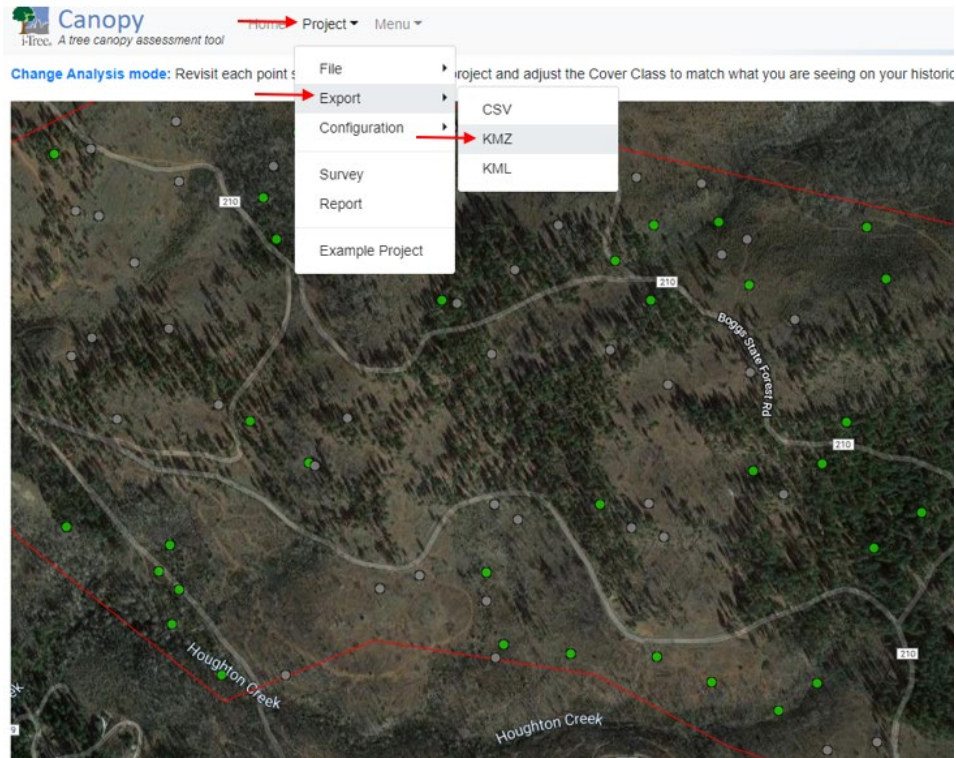

Figure 10. Exporting KMZ File

15. Open Google Earth desktop version (requires a separate <u>download</u>). 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**).
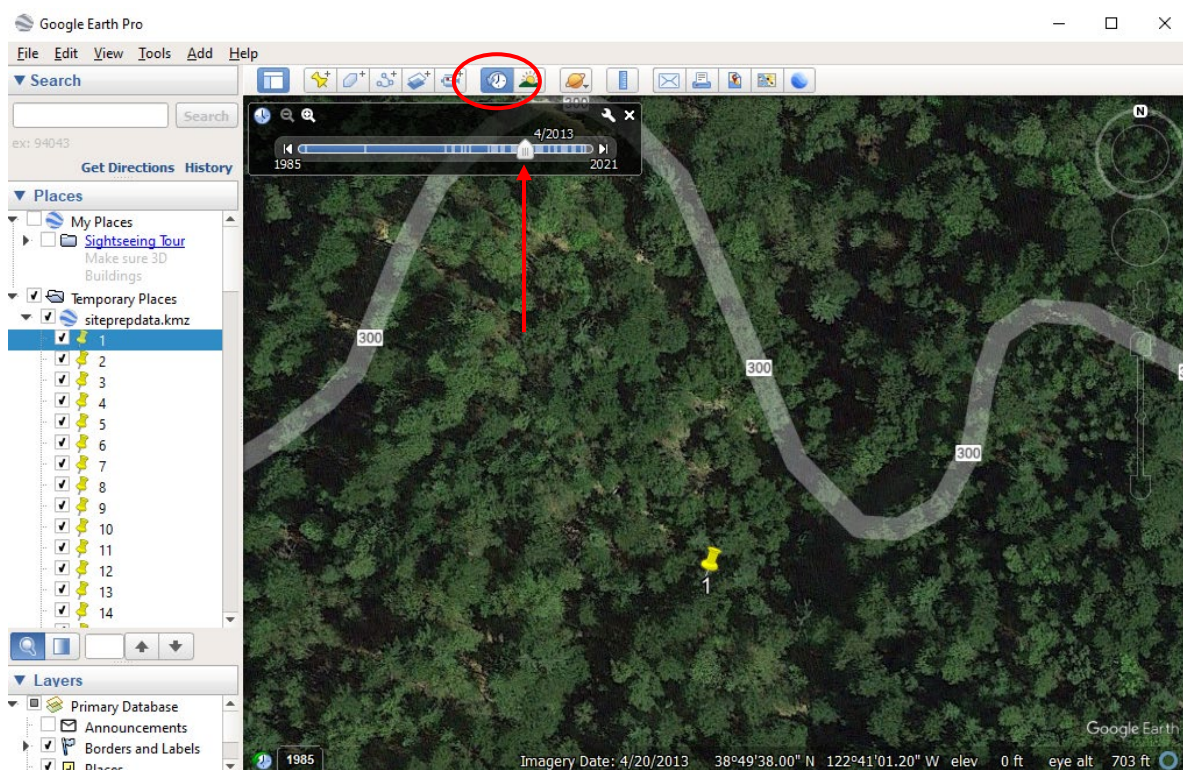

Figure 11. Choosing the imagery date

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**).
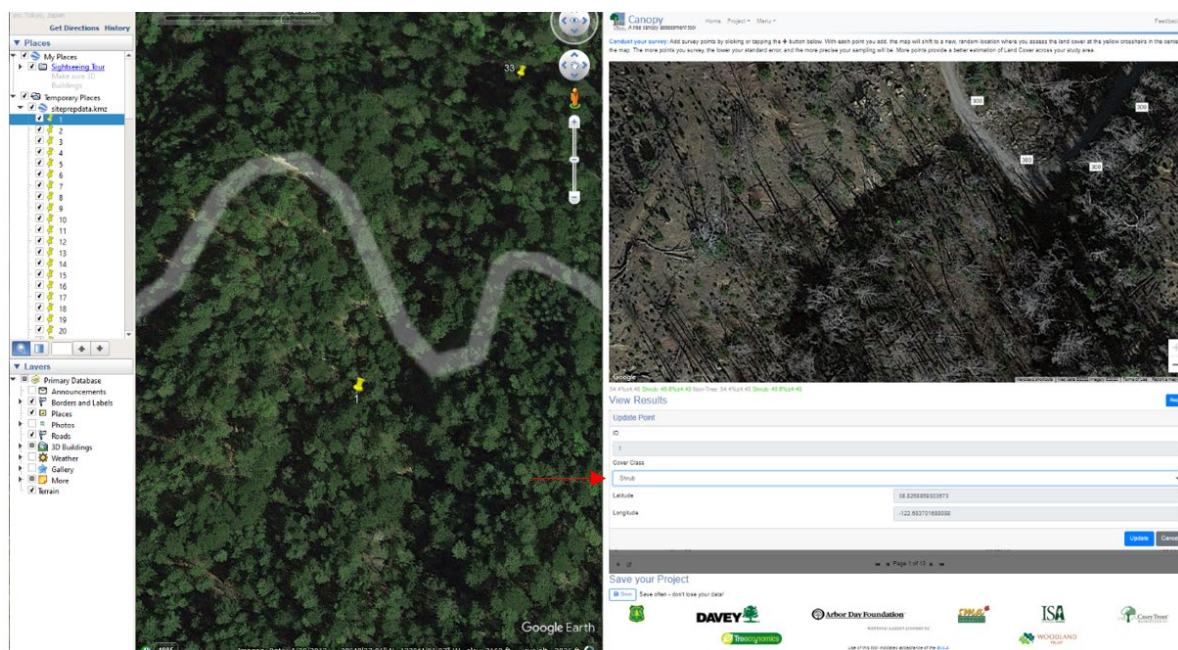

Figure 12. Reclassifying points while viewing Google Earth and i-Tree Canopy side-by-side

21. Repeat these steps for your remaining i-Tree Canopy points, periodically saving your re-survey project.

22. 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**).
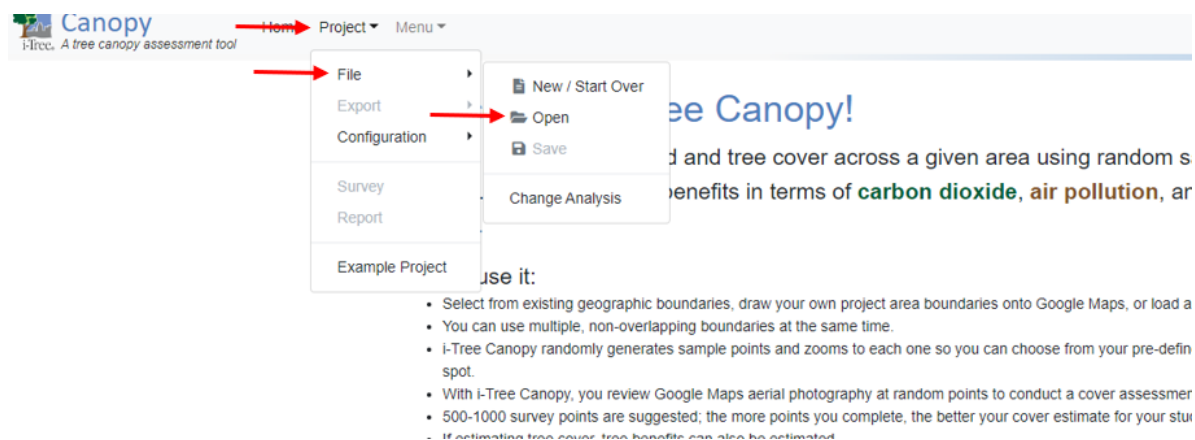

Figure 13. Loading re-survey project data to add more sample points

23. 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.

24. Save the analysis results. These results will be reported with the project for review by the confirmation body.

25. 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.