

Golf tees survey

In this exercise we will try to estimate the density of golf tees on the lawns. You will need *DISTANCE* installed on your computer as well as a spreadsheet program such as MS Excel.

Several transect lines have been marked out on the lawn; each is labelled with a letter. Golf tees are scattered over the lawn.

The survey in the field

Your job is to do a survey using distance sampling to estimate the density of golf tees. Work in teams of three or four:

- one person (the spotter) walks along the line and looks for golf tees,
- two people (the measurers) measure the perpendicular distance from the line to each golf tee that the spotter points out; the measurers must not point out golf tees to the spotter!
- one person (the clerk) writes down the distances measured; if there are only 3 in your team, the spotter can also act as the clerk.

You should also measure the length of each transect.

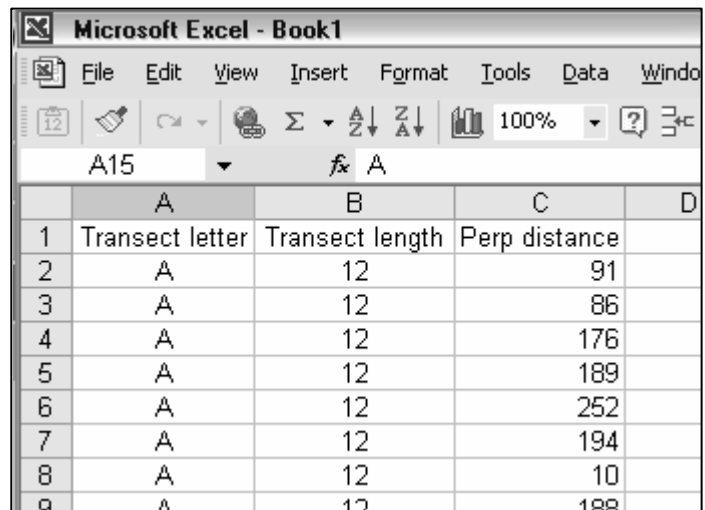
Do at least three or four transect lines, so that each person has a chance to act as spotter.

Remember that for distance sampling you do not need to spot every golf tee, though you must record every one which is actually on the transect line.

Data analysis

Put the data into an Excel spreadsheet, with columns for the transect letter, the transect length, and the perpendicular distances to the golf tees you spotted.

The screen shot on the right shows the first few rows of data.



	A	B	C	D
1	Transect letter	Transect length	Perp distance	
2	A	12	91	
3	A	12	86	
4	A	12	176	
5	A	12	189	
6	A	12	252	
7	A	12	194	
8	A	12	10	
9	A	12	188	

Importing the data into *DISTANCE*

Save the Excel file as a .csv file: go to File > Save as... In the "Save as Type:" box at the bottom of the window, select "CSV (comma delimited) (*.csv)". Give the file a suitable name and save it. Click "Yes" to keep the CSV format.

Now close the file without saving it again.

Start *DISTANCE*, go to 'File > New project...' and select the folder where you want to save your file and name it something like "Golf tees".

The New Project Setup Wizard will start immediately.

Step 1 : Select 'Analyze a survey that has been completed' and click 'Next'

Step 2 : This is an information page; read through it then click on 'Next'

Step 3 : The next survey was a Line transect survey with a Single observer, where Perpendicular distances were measured to Single objects.

Step 4 : Select the appropriate units for the distances from the transect and the transect length. We want the density of golf tees per hectare.

Step 5 : We don't need to use any Multipliers: all these check boxes should be blank.

Step 6 : Select 'Proceed to Data Import Wizard' and click on 'Finish'.

DISTANCE will create the necessary file structure, and then the Data Import Wizard will start.

Step 1 : This is an information page; check through it then click 'Next'.

Step 2 : In the 'File containing data to import' box, browse to the file with the golf tees data and click 'Open'.

DISTANCE uses a hierarchical structure with

- a Global layer = study area or topic (in our case Batang Ai nests), containing...
 - Regions (our 3 Zones, West, Centre and South), containing...
 - Transects, containing...
 - Observations.

Step 3 : The 'Lowest data layer' in our data file is Observation and the 'Highest data layer' is Line transect. We want to Add all new records under the first record in the data layer and to Create one new record for each line of the import file.

You may see a "Problem assigning fields to columns" message; this is because the default file format is .txt not .csv. Just click OK.

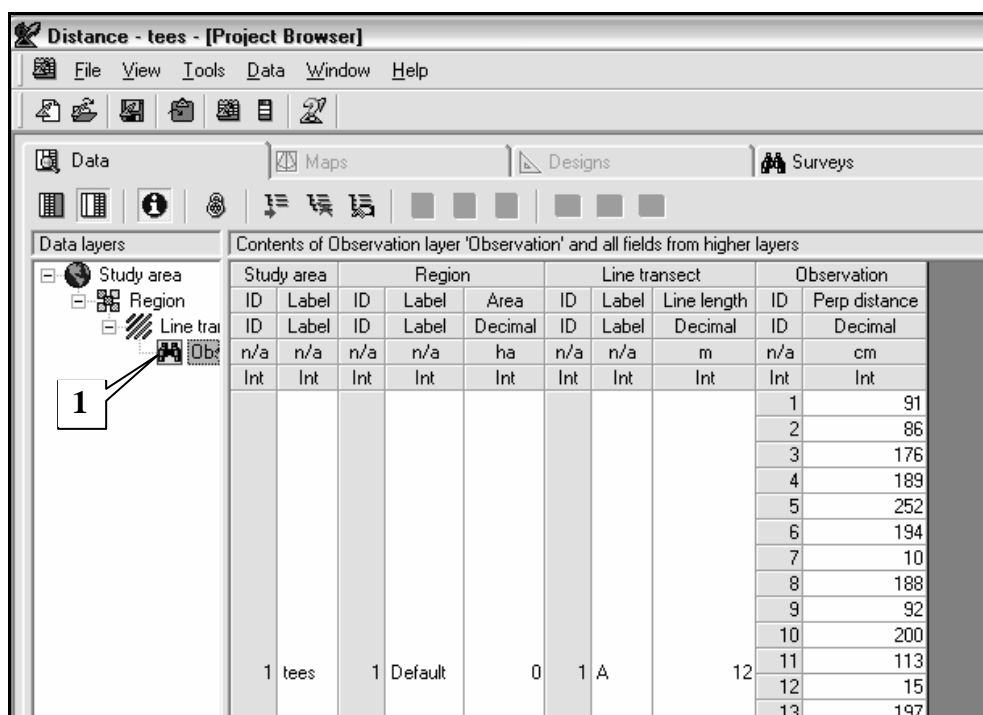
Step 4 : In our file, the Delimiter is Comma, and we do not want to import the first row, as that is just the column titles.

Step 5 : In our case, the columns are in the same order as they will appear in the data sheet in DISTANCE, so just check the box next to this option.

Step 6 : Select Overwrite existing data and click 'Finish'!

DISTANCE will take a little while to read your data file and get the data into its own database format, then the Data browser will appear (see screen shot below).

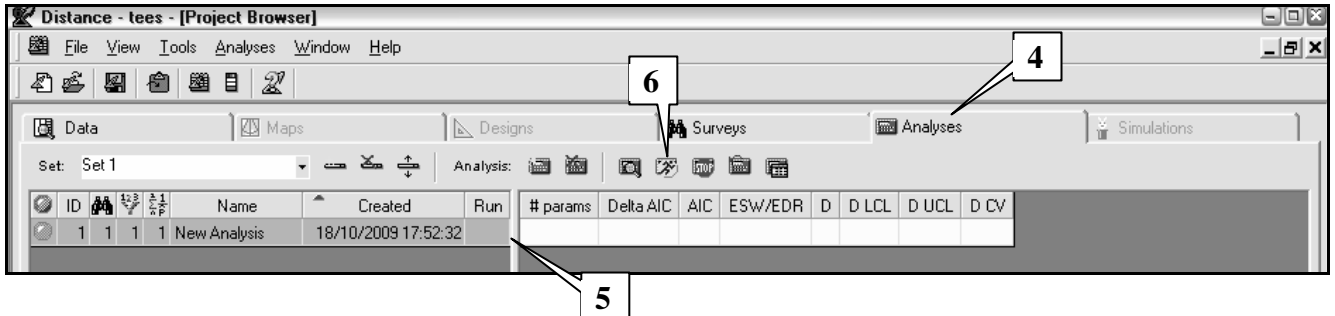
Click on "Observations" **1** in the left-hand window to display all the data and scroll down to check the contents.



A first run through an analysis

We'll run through a complete analysis with the default settings, to get an overview of how it works.

Click on the "Analyses" tab **4** to open the Analysis Browser window. You may have to drag the divider between the windows **5** to the right to see the full names. DISTANCE has already created a "New Analysis" with the default settings, and we can run that by clicking on the 'runner' icon **6**.



A summary of the results appears in the Analyses browser; compare the estimates from your data with those for the other teams. Check:

ESW/EDR : the Effective Strip (half-) Width (EDR is the equivalent for point surveys)

D : the estimate of density

D LCL and D UCL : 95% confidence limits for density

D CV : coefficient of variation for the estimate of density.

AIC and DeltaAIC are not relevant at this stage, as we only have one model.