BIODIVERSITY X ECOSYSTEM FUNCTION META-ANALYSIS PROTOCOL

NOTES:

1. Each study should have its own row in the first tab, 'study description'. If in one study the data is separated by more than one location or taxon then there should be more than one row in the first tab. You can look at Lucy's spreadsheet for examples.
2. If the data are separated by other factors then you can use one row in the study description tab and separate the data using rows G or O in the 'data' tab. This could mean that one study measured different metrics of ecosystem function (common) or used treatments (temperature, altitude- in this case you can write something like, "aboveground biomass – 500m altitude" to separate out the treatments within an ecosystem function.
3. Make sure that the x-axis (bottom) is always biodiversity, even if shown the other way around in the publication - you should swap these for data entry.
4. Make sure the first three rows in the 'data' tab are linked to the 'study description' tab, these are matched in R, so they need to be exactly the same.
5. If a paper looks promising, but you can't see any good figures make sure to check the supplementary and data avail statement (usually shown online).
6. Use a GPS centre value for the 'study description', if you have more detailed information but the data are grouped in the study you can add the detail into the notes area.
7. % cover of one species is not an ecosystem function. Biomass (turnover) is!

STUDY DESCRIPTION SHEET

Step 1: In the "Study_description" tab, add the personal details described below to the google doc.

A*. Initials:* Enter the initials of your first and last name (i.e., Emma Moffett = EM)
B*. Date_data_entered*: Enter the date you entered data into the spreadsheet.

Step 2: Select the first paper. First, check that the reading is relevant by reading the ABSTRACT ONLY before entering any data. If a paper looks promising, but you can't see any good figures make sure to check the supplementary and data avail statement (usually shown online).

We are only interested in data from experimental or observational studies. You can disregard any papers based on models.

C*. DOI:* Enter the studies DOI (if you can't find this add a hyperlink to the article).
D*. Study_common_taxon*: The Kingdom, Phylum, Class, Order, Family, Genus or Species or name common to all taxa within this study. If multiple kingdoms, please describe these.

***E**. Location description (locale, city/state, country):* Where was the study carried out? Be as specific as you can here, and include the country also.
***F**. GPS_centre_latitude:* In decimal degrees format. If the GPS data are not in the correct format, you can search the given GPS coordinates in google maps and right-click "what's here" to get degree decimal format. If only a written description of the study site is given, use google maps to get an approximate GPS location by entering the location in the search bar, then right-clicking and clicking "what's here".
***G**. GPS_centre_longitude:* In decimal degrees format, instructions as in "**F**" above.
H. *Spatial_extent_m2:* area of the study site (or sites if data-point is averaged across sites), convert to meters squared.
I. *Spatial_grain:* The size of the unit of measurement (i.e. quadrat size of 1m^2).
J. *Experiment_or_Observation:* Was the data collected as part of an experiment (i.,e seedling plots, experimental forest) or via observation (i.e., across a natural gradient)?
***K**. Sample_start_earliest:* When did the study begin? To the day, month, or year given in-text.
***L**. Sample_end_latest:* When did the study begin? To the day, month, or year given in-text.
***M** Sample_date_resolution:* is the sample date listed rounded to day, month, or year?
***N**. Experimental_duration_days:* How many days did the experiment run for?
***O**. Biome_general:* Where do the study species live?
***P**. Predominant_landuse*: What is the predominant land use where the study was done?
***Q.** Predominant_landuse_intensity:* Use the table below to categorise the land use as Minimal, light, intense, or unknown if you aren't sure.

Impact	**Extent of site affected**		
	Small fraction	**Large fraction**	**Most/all of site**
No definite ongoing influences to habitat architecture OR no severe ongoing threats to any guild explicitly mentioned.	Minimal	Minimal	Light
Ongoing influences but not fundamental alterations to habitat architecture OR severe ongoing threats to some guilds (but not guilds that define the nature of the ecosystem)	Light	Light	Intensethe
Ongoing fundamental alterations to habitat architecture (but not complete destruction of vegetation) OR ongoing serious threats to keystone guilds OR ongoing serious threats to many guilds	Light	Intense	Intense

***Q.** Manipulation.* If the study was experimental, was any manipulation applied?
***R**. Notes: Note any secondary land-use here or anything else pertinent.*

Step 3: Move to the "data" tab in excel spreadsheet. In this section, you will pull data values from online data repositories/figures/tables/ or supplementary materials.

***A.** DOI_linked:* write "=" and click the DOI of the study you are entering data from in the "study_description" tab. Just do this for the first row of each study.

B. *Location(if_multiple)_linked*: write = and link the study location (if one study uses multiple locations) from the 'data description' sheet. This is only needed where one study uses data from >1 location.

C. *Taxon(if multiple)_linked*: Link study taxon (if one study uses multiple taxa) from the 'data description' sheet.

To get the data, you first need to check where the biodiversity vs ecosystem data are; you can do this by looking for a data availability statement at the end of the reading, which might link you to an online data repository (i.e., dryad).

For older studies, you will have to take data from plots or tables in text or in supplementary materials online.

If you are taking data from a plot,

1) open your snipping tool, take a new snip of the plot of interest, and save it as a .jpg (you can delete these once done or at the end of each day).
2) Load the .jpg into a plot digitising website (WebPlotDigitizer - Copyright 2010-2022 Ankit Rohatgi (automeris.io), or PlotDigitizer Online App).
3) Click two known points on the x axis and two known points on the y-axis and tell the program what the values of these points are. The procedure is something like shown here: https://twitter.com/edelponte/status/1580320409794539520
4) Click all relevant data points. If there are standard deviations (SD) in the plot, please also measure these by clicking the upper limit of the SD bar, then subtracting this value from the mean value ("=max SD-mean value) and adding this to the relevant SD column.
5) If you are using a website, you can copy the data to your clipboard using the clipboard icon, paste it into google docs (use a separate tab), click the clipboard icon shown at the bottom right, and select "split text to columns". This separates your x and y data into two columns that you can now add to columns **B** and **I,** respectively

D. *Biodiversity_value_x:* Enter the biodiversity numeric value using one of the methods described above
E. *Biodiversiy_value_SD:* Enter the biodiversity standard value (if relevant) using one of the methods described above
F. *Biodiversiy_value_N:* Enter the biodiversity count (i.,e how many data points per average) value using one of the methods described above
G. *Biodiversity_x_axis_description:* Copy the x-axis description of the plot/data column used here.
G. *Biodiversity_type:* Is the biodiversity measurement taxonomic (e.g., sp. richness, Shannon's index), functional (dispersion, evenness, richness), genetic, or phylogenetic
I. *Measurement_unit:* How did the study measure biodiversity?
J. *Biodiversity_metric:* What specific metric was used might not be in the list; in that case, select "Other:" and write in the metric used.
K. *Ecosystem_function_value_y:* Enter the ecosystem function numeric value using one of the methods described above
L. *Ecosystem_function_value_SD:* Enter the ecosystem function standard value (if relevant) using one of the methods described above
M. *Ecosystem_function_value_N:* Enter the ecosystem function value count (i.,e how many data points per average) value using one of the methods described above
N. *Ecosystem_function_unit_y_axis:* What is the unit on the y-axis? Take it from the plot or data frame.
O. *Ecosystem_function_y_axis_description:* Copy the y-axis description of the plot/data column used here.

***P**. Ecosystem_function_metric:* What specific metric was used? It might not be in the list; in that case, select "Other:" and write in the metric used.
***Q**. Data_capture_method:* How did you get the data values?
***R.** Table_or_figure_number:* If you took data from a table/figure, which one was it?
***S.** Notes:* Any notes relating to the data point?