**Session 1: Individual projects**

Each participant will undertake an individual project on a topic/species/region of interest. New techniques introduced in each class will be applied to individual projects as between-class assignments, so projects will progressively build over the duration of the course. Projects should adhere to the following general progression:

1. Obtain and import species’ occurrence records (session 1)
2. Obtain and manipulate environmental layers (sessions 2, 3)
3. Run and evaluate species distribution models (sessions 4, 5)
4. Apply the models and discuss applications (sessions 6, 7)
5. Prepare final report (sessions 8, 9) and present to the class (session 10)

The focus of individual projects can be developed during class discussions. Possible topics include, for example, predicting species occurrences from limited museum records, estimating species distributions for conservation planning, or identifying areas of high risk for species invasions.

Tasks for session 1 are as follows:

1. Identify a species (or number of species) and region of interest. For example, you might be interested in lemurs in Madagascar, or salamanders in the Eastern U.S.
2. Obtain species occurrence records for these species. Possible sources include GBIF and taxon-specific distributed databases (e.g., VertNET, HerpNET, FishNET, eBird, ORNIS, Map of Life, TRY, iDigBio, FIA, iNaturalist, Neotoma, VegBank, BIEN, Dryad). Also search for any additional records, for example from museum collections that are not linked in to distributed databases, or from published papers. You might also have data collected from your own fieldwork. If it’s very hard for you to find suitable data, see below under additional resources a tool to create a virtual species.
3. Import occurrence records into a GIS and produce a map of the distribution (the session 1 lab exercise). Before turning it in, you should edit this map using powerpoint or an image editor to make sure you have appropriate and clear labels including a map legend, italicized species names, and appropriate units.
4. Prepare a short (up to ~300 words) project proposal explaining your choice of species/region and outlining any questions relating to the conservation and/or evolutionary biology of the study system that might be addressed using GIS. You will get ideas for questions that might be addressed from the session 1 reading: Graham et al. 2004 *TREE* 19: 497-503.

Please email your project proposal to Mary (mblair1@amnh.org) by 6 pm before next session.

Please also email Pete ([pgalante@amnh.org](mailto:pgalante@amnh.org)) a single presentation slide (PDF or powerpoint file) before the beginning of the next class session (before 9am) with your distribution map, and come to the next session prepared to very briefly describe your choice to the group. Please remember to limit the file size for your slide when emailing (e.g., <1MB).

*A note on evaluation*

As set out in the course syllabus, each participant will submit a final paper and present to the class on their individual project. This makes up 80% (50% paper, 30% presentation) of the overall course grade. Steps to completing the project – including the initial proposal – are not individually assessed; thus, please see this as part of the process of planning a project, with the opportunity to change/modify in later weeks, rather than as a final proposal that you will be held to!

*Finally, a note on how to obtain class materials*

We have set up a web site from which you can download materials for the class:

<https://pgalante.github.io/RGGS_GIS/>

Password is “password”

We will post all materials for the course here, including large datasets for use during the labs. Materials for each session will be available by the evening preceding each class.

Additional Resources for this week, on occurrence records and georeferencing:

Biogeo: An R Package for assessing and improving data quality of occurrence record datasets

<https://onlinelibrary.wiley.com/doi/full/10.1111/ecog.02118?campaign=woletoc>

ScrubR – Automated locality data cleaning

<https://cran.r-project.org/web/packages/scrubr/index.html>

Velasquez-Tibata, et al. 2015. Using measurement error models to account for georeferencing error in species distribution models. Ecography 39(3):305-316. [**https://doi.org/10.1111/ecog.01205**](https://doi.org/10.1111/ecog.01205)

Having trouble thinking of a project or finding the data you need? Create a virtual species!

<http://cran.r-project.org/web/packages/sdmvspecies/>

Duan, R.-Y., Kong, X.-Q., Huang, M.-Y., Wu, G.-L. and Wang, Z.-G. (2015), SDMvspecies: a software for creating virtual species for species distribution modelling. Ecography, 38: 108–110. doi: 10.1111/ecog.01080

<https://cran.r-project.org/web/packages/virtualspecies/index.html>

Leroy B., Meynard, C.N., Bellard C. & Courchamp F. 2015. virtualspecies: an R package to generate virtual species distributions. Ecography, In Press.