GLOBAL BIODIVERSITY INFORMATION FACILITY

GBits Science Supplement

No. 3, June-July 2012

Welcome to this third edition of the GBits Science Supplement.

In the following pages, you will find a summary of research published during June and July 2012 for which the Global Biodiversity Information Facility (GBIF) has been identified as a source of data. The idea is to keep data publishers, policy makers, funding bodies, scientists and other interested readers informed about the variety of uses to which data accessed through GBIF are being put.

We group the research papers according to their relevance to the 20 Aichi Biodiversity Targets and strategic goals agreed by governments in 2010, as part of the Strategic Plan for Biodiversity 2011-2020. This emphasizes the value of data made accessible through GBIF in supporting the scientific needs associated with meeting those targets, thus helping to address the great challenges of biodiversity conservation and sustainable use.

Supplementing the standard citations (including links) for all the papers identified, the boxes highlight some especially significant cases to illustrate how scientists are making use of GBIF. A wider selection of papers including those discussing and mentioning GBIF can be found in the GBIF Public Library in the Mendeley academic social network platform.

The supplement is published alongside the bimonthly GBits newsletter, which provides a range of news about biodiversity data publishing from around the GBIF community. If you are not already a subscriber, you can access GBits here and follow the instructions if you would like to sign up.

The GBIF secretariat communications team hopes you find this science supplement interesting and useful, and we would greatly appreciate feedback.

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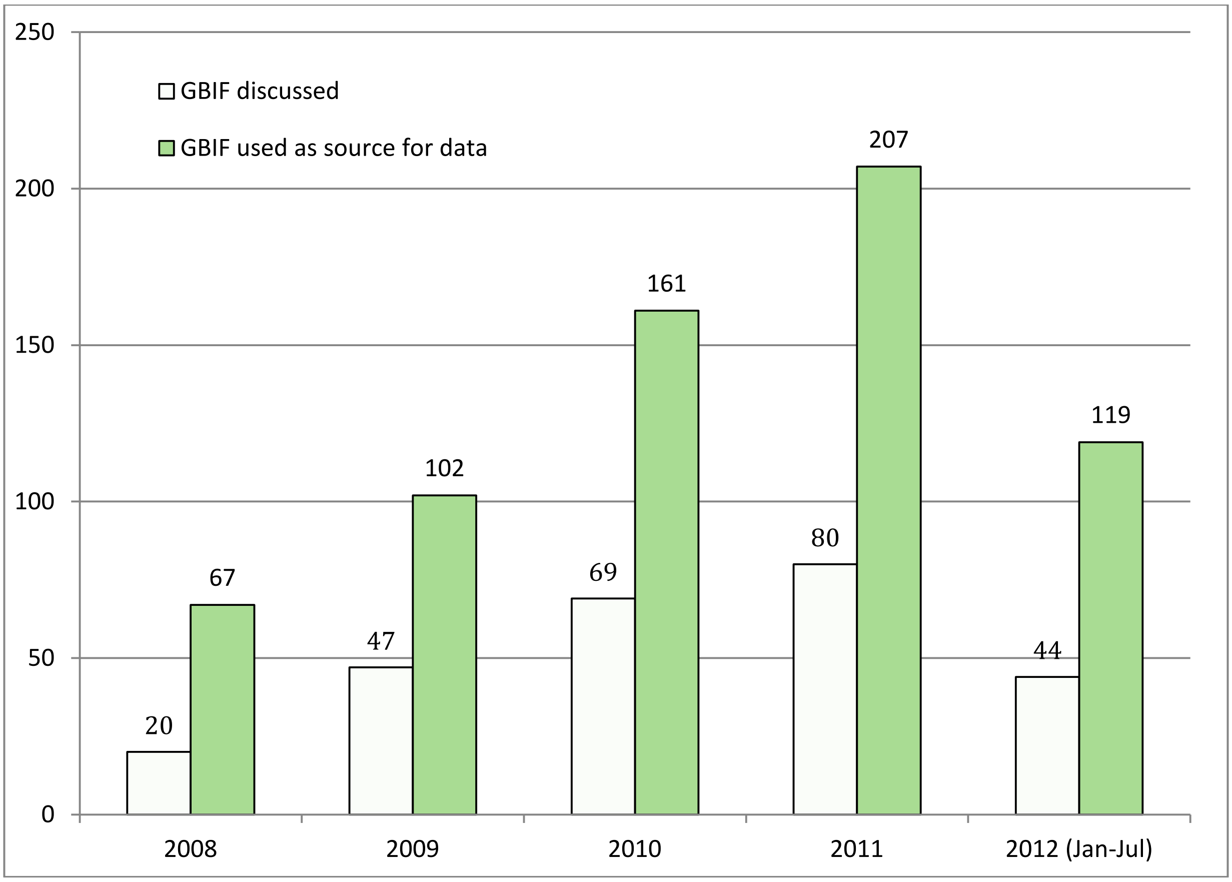

Use and discussion of GBIF in scientific literature, 2008-12 (number of peer-reviewed, published research papers)

Research citing GBIF as a source of data, Jun-Jul 2012

Grouped by relevance to Aichi Biodiversity Targets[1]:

Strategic Goal B – Reduce direct pressures and promote sustainable use

Example: Yañez-Arenas, C. et al., 2012. Modelling geographic patterns of population density of the white-tailed deer in central Mexico by implementing ecological niche theory. *Oikos*, online (March). Available at: http://doi.wiley.com/10.1111/j.1600-0706.2012.20350.x .

Summary: In this paper, a team from Mexico proposed and tested a new system of estimating the relative abundance of a species based only on data about where it occurs, combined with models of the ecological niche it occupies. Field research in two regions of Central Mexico on the white-tailed deer, a popular game species, were combined with occurrence records of the species obtained through GBIF and its Mexican partner Conabio. The researchers used these data to generate a model of the predicted range of the deer based on a set of nine environmental variables (an ecological niche model). For each pixel within the area of environmental suitability for the species, the 'distance to the niche centroid' (DNC) was calculated – a multi-dimensional value representing how close any location is to the optimal set of conditions for the deer. This value was used to predict the density of deer across the two regions, and was found to correlate

[1] http://www.cbd.int/sp/targets/

significantly with measures of actual density from the field studies. The authors suggest this could be a valuable tool for sustainable management and conservation of white-tailed deer and other species by estimating relative population density even when records of abundance are not available.

Target 9. Invasive alien species

Example: Rago, A., While, G.M. & Uller, T., 2012. Introduction pathway and climate trump ecology and life history as predictors of establishment success in alien frogs and toads. *Ecology and Evolution*, online. Available at: http://doi.wiley.com/10.1002/ece3.261 .

Summary: What determines whether an alien species will successfully establish itself in the new environment where it is introduced? A team of researchers from the Oxford University Zoology Department's Edward Grey Institute investigated this question in relation to frogs and toads that were introduced either deliberately or accidentally to various locations around the world. The study used 408 occurrence records of 99 amphibian species downloaded via GBIF, to determine how similar the climate was in areas of introduction to the climate in the range where the species occurs naturally. The study also took a number of other factors into account, including the circumstances of introducing the frogs and toads, characteristics such as body size and reproduction habits, the size of their native range and the type of location where they were introduced. The research concluded that alien frogs and toads were most likely to become established if the climate in the area of introduction was similar to that in the native range, if they were introduced deliberately rather than accidentally, and if they were introduced on islands rather than continental environments. Other studies have found that some species traits, such as how many offspring are produced and whether tadpoles live independently of adults, influence the risk of amphibians becoming extinct, but this research found little evidence such traits are important in determining whether they survive as alien species.

Macfadyen, S. & Kriticos, D.J., 2012. Modelling the Geographical Range of a Species with Variable Life-History D. Q. Fuller, ed. *PLoS ONE*, 7(7), p.e40313. Available at: http://dx.plos.org/10.1371/journal.pone.0040313.

Zengeya, T. A. et al., 2012. A qualitative ecological risk assessment of the invasive Nile tilapia, *Oreochromis niloticus* in a sub-tropical African river system (Limpopo River, South Africa). *Aquatic Conservation: Marine and Freshwater Ecosystems*, online. Available at: http://doi.wiley.com/10.1002/aqc.2258.

Target 10. Climate change impacts

Example: Sunday, J.M., Bates, A.E. & Dulvy, N.K., 2012. Thermal tolerance and the global redistribution of animals. *Nature Climate Change*, 2(6), pp.1-5. Available at: http://www.nature.com/doifinder/10.1038/nclimate1539

Description: A team from Canada and Australia analysed the way in which the distribution ranges of ectotherms (cold-blooded animals) were likely to be affected by climate change. It found significant differences between the response of marine and terrestrial species, with animals in the ocean shifting much more predictably towards the poles as temperatures warmed. The research compared tolerance of animals to extremes of heat and cold, as revealed by experiments, with actual geographic distributions of 142 species based on primary literature and online occurrence data accessed mainly via GBIF. It found that marine species tended to occupy the full range of latitudes predicted by the limits of 'tolerable' temperature – and thus shifted away from the Equator at both the colder and warmer edges of their range as the climate warmed. Terrestrial ectotherms, on the other hand, tended not to occupy the whole of the warmest part of their range as predicted purely by temperature tolerance. The study suggested that climate change impacts on land would be less predictable, with range boundaries remaining more stagnant closer the equator while they would expand towards the poles at their colder limits. The resulting 'stretching' of terrestrial species distributions could lead to unpredictable impacts due to new combinations of species, shifting connectivity and ecological surprises.

Strategic Goal C: Improve status of biodiversity by safeguarding ecosystems, species and genetic diversity

Target 11. Improve coverage and management of protected areas

Zimbres, B.Q.C. et al., 2012. Range shifts under climate change and the role of protected areas for armadillos and anteaters. *Biological Conservation*, 152, p.53-61. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0006320712001929.

Target 12. Threatened species and extinctions

Delfín-Alfonso, C.A., López-González, C.A. & Equihua, M., 2012. Potential distribution of American black bears in northwest Mexico and implications for their conservation. *Ursus*, 23(1), p.65-77. Available at: http://www.bioone.org/doi/abs/10.2192/URSUS-D-11-00007.1.

Jalonen, R. et al., 2012. Identifying Tree Populations for Conservation Action through Geospatial Analyses. In S. Heok-Choh, S. A. Hamid, & L. Mei, eds. *Asia and the Pacific Workshop Multinational and Transboundary Conservation of Valuable and Endangered Forest Tree Species*. IUFRO Headquarters, Vienna, Austria, pp. 98-101. Available at: http://www.apafri.org/publications/GuangZhou.pdf#page=105.

Molenda, O., Reid, A. & Lortie, C.J., 2012. The Alpine Cushion Plant *Silene acaulis* as Foundation Species: A Bug's-Eye View to Facilitation and Microclimate C. Rixen, ed. *PLoS ONE*, 7(5), p.e37223. Available at: http://dx.plos.org/10.1371/journal.pone.0037223.

Strategic Goal E – enhancing implementation

Target 19. Improve the science base

Bartoli, A. & Tortosa, R.D., 2012. Revision of the North American Species of *Grindelia* (Asteraceae). *Annals of the Missouri Botanical Garden*, 98(4), p.447-513. Available at: http://www.bioone.org/doi/abs/10.3417/2008125.

Butcher, R., 2012. Three new species allied to the '*Mirbelia* viminalis group' (Fabaceae: Mirbelieae), from Western Australia. *Nuytsia*, 5(2), p.75-92. Available at: http://florabase.dec.wa.gov.au/science/nuytsia/636.pdf.

District, V. & Pradesh, A., 2012. First record of the blue sea slug (*Glaucus atlanticus*) from Andhra Pradesh – India. *Taprobanica*, 04(01), p.52-53. Available at: http://www.sljol.info/index.php/TAPRO/article/viewFile/4386/3545.

Du Toit, N. et al., 2012. Biome specificity of distinct genetic lineages within the four-striped mouse Rhabdomys pumilio (Rodentia: Muridae) from southern Africa with implications for taxonomy. *Molecular Phylogenetics and Evolution*, online (June). Available at: http://www.ncbi.nlm.nih.gov/pubmed/22728170.

Edwards, E.J. & Ogburn, R.M., 2012. Angiosperm Responses to a Low-CO2 World: CAM and C4 Photosynthesis as Parallel Evolutionary Trajectories. *International Journal of Plant Sciences*, 173(6), p.724-733. Available at: http://www.jstor.org/stable/10.1086/666098.

Figuerola, B. et al., 2012. Spatial patterns and diversity of bryozoan communities from the Southern Ocean: South Shetland Islands, Bouvet Island and Eastern Weddell Sea. *Systematics and Biodiversity*, 10(1), p.109-123. Available at: http://www.tandfonline.com/doi/abs/10.1080/14772000.2012.668972.

Irwin, N.R. et al., 2012. Complex patterns of host switching in New World arenaviruses. *Molecular Ecology*, online. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22693963.

Leopold, E.B. et al., 2012. Pollen morphology of the three subgenera of *Alnus*. *Palynology*, 36(1), p.131-151. Available at: http://dx.doi.org/10.1080/01916122.2012.657876.

Loera, I., Sosa, V. & Ickert-Bond, S.M., 2012. Diversification in North America arid lands: niche conservatism, divergence and expansion of habitat explain speciation in the genus Ephedra. *Molecular phylogenetics and evolution*, (July). Available at: http://www.ncbi.nlm.nih.gov/pubmed/22776548.

Popiela, A.A. et al., 2012. The distribution of Elatine hydropiper L. (Elatinaceae). *Acta Societatis Botanicorum Poloniae*, 81(2), p.137-143. Available at: https://pbsociety.org.pl/journals/index.php/asbp/article/view/asbp.2012.009.

Pulgarín-R, P.C. & Burg, T.M., 2012. Genetic Signals of Demographic Expansion in Downy Woodpecker (Picoides pubescens) after the Last North American Glacial Maximum. *PloS one*, 7(7), p.e40412. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22792306.

Rodríguez, A. et al., 2012. Geographic distribution, colour variation and molecular diversity of miniature frogs of the *Eleutherodactylus limbatus* group from Cuba. *Salamandra*, 48(2), p.71-91. Available at: http://www.mvences.de/p/p1/Vences_A238.pdf.

Rymer, P.D. et al., 2012. Recent phylogeographic structure in a widespread "weedy" Neotropical tree species, *Cordia alliodora* (Boraginaceae). *Journal of Biogeography*, online, p.no-no. Available at: http://doi.wiley.com/10.1111/j.1365-2699.2012.02727.x

Schmerler, S.B. et al., 2012. Evolution of leaf form correlates with tropical-temperate transitions in Viburnum (Adoxaceae). *Proceedings of the Royal Society Biological Sciences*, online. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22810426.

Thomas, D.C. et al., 2012. Molecular phylogenetics and historical biogeography of the *Meiogyne-Fitzalania* clade (Annonaceae): Generic paraphyly and late Miocene-Pliocene diversification in Australasia and the Pacific. *Taxon*, 61(3), p.559-575. Available at: http://www.ingentaconnect.com/content/iapt/tax/2012/00000061/00000003/art00006?token=003912832c7b76504c48663b256a493e6c243f386f576a333f2576a8d#expand/collapse.

Vandelook, F., Janssens, S.B. & Probert, R.J., 2012. Relative embryo length as an adaptation to habitat and life cycle in Apiaceae. *The New Phytologist*, online. Available at: http://www.ncbi.nlm.nih.gov/pubmed/22621412.

Vieira, R.P. et al., 2012. First record of the deep-water whalefish *Cetichthys indagator* (Actinopterygii: Cetomimidae) in the North Atlantic Ocean. *Journal of Fish Biology*, online. Available at: http://doi.wiley.com/10.1111/j.1095-8649.2012.03378.x.

Zavala, A.M. et al., 2012. Glucose inhibits the shoot bud formation in the moss *Bryum billarderi*. *Central European Journal of Biology*, 7(4), p.648-654. Available at: http://www.springerlink.com/index/10.2478/s11535-012-0056-x.

Data papers published June-July 2012

Pierrat, B., Saucède, T., Festeau. A et al., 2012. Antarctic, Sub-Antarctic and cold temperate echinoid database. ZooKeys 204 (2012): 47-52. Available at: http://www.pensoft.net/journals/zookeys/article/3134/abstract/antarctic-sub-antarctic-and-cold-temperate-echinoid-database