GLOBAL BIODIVERSITY INFORMATION FACILITY

# GBits Science Supplement

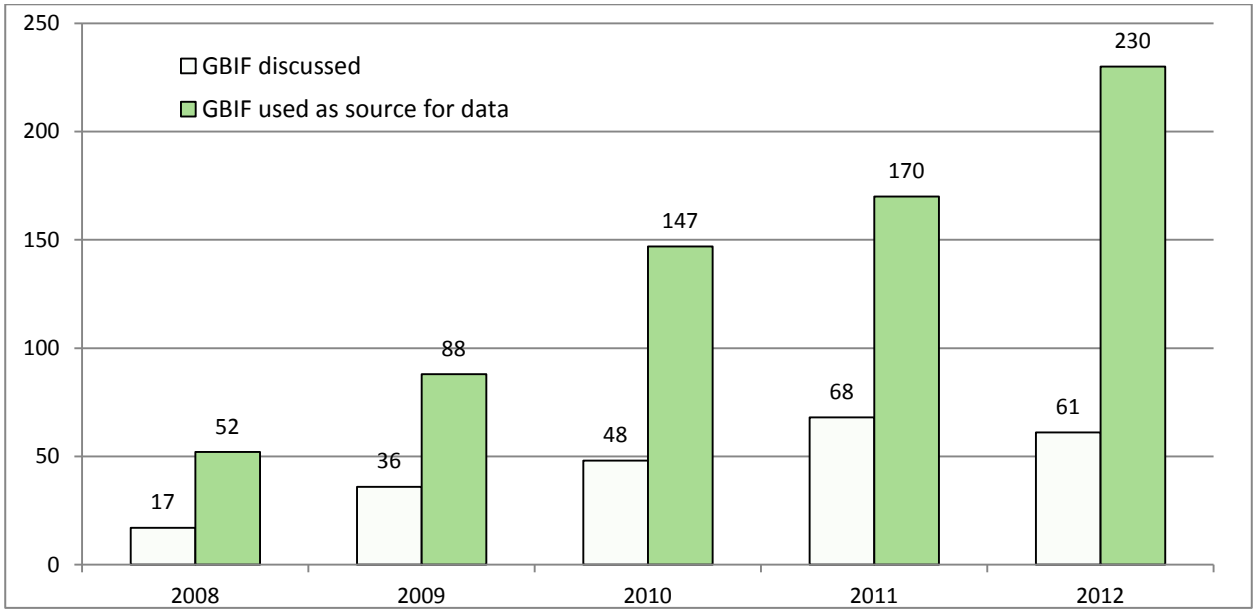
**No. 6, December 2012-January 2013**

Welcome to this sixth edition of the GBits Science Supplement. It provides a summary of research published during December 2012 and January 2013 for which the Global Biodiversity Information Facility (GBIF) has been cited as a source of data.

The supplement opens with summaries of some illustrative examples of recent uses of the data accessible through GBIF. This edition also highlights some recent journal articles discussing GBIF's role, and the latest peer-reviewed 'data paper' derived from metadata describing a dataset published via the GBIF network.

The highlighted examples are followed by references and links to all the studies identified during the two months, grouped around their relevance to the Aichi Biodiversity Targets.[1] 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.




*Use and discussion of GBIF in scientific literature, 2008-12 (number of peer-reviewed, published research papers)*[2]

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

[2] Figures in this chart have been revised from previous versions due to exclusion of theses, conference proceedings and official reports that have not undergone standard peer review, and to re-assigning of articles previously 'in press' to the year of print publication.

## Threatened species and protected areas

**IDENTIFYING KEY AREAS FOR BIRDS IN A BIODIVERSITY HOTSPOT**

**Example:** Ríos-Muñoz, C.A. & Navarro-Sigüenza, A.G., 2012. Patterns of species richness and biogeographic regionalization of the avifaunas of the seasonally dry tropical forest in Mesoamerica. *Studies on Neotropical Fauna and Environment*, (November 2012), pp.1–12. Available at: http://www.tandfonline.com/doi/abs/10.1080/01650521.2012.734175

**Summary:** In this study, César Antonio Ríos-Muñoz, winner of the 2011 GBIF Young Researchers Award, and Adolfo G. Navarro-Sigüenza from the National Autonomous University of Mexico (UNAM), looked at the patterns of bird distributions in a specific ecosystem in Mesoamerica.

The researchers analysed biogeographic relationships of 650 resident bird species of the seasonally dry lowland tropical forests of Mexico and Central America, among the most endangered ecosystems in the world. These forests are rich in species, many of which are endemic. About 40 per cent of the bird species in the area are restricted to this habitat.

Occurrence data for the 650 species of birds studied came from scientific literature, museum specimens, field guides and online scientific collection databases including GBIF. Based on these, the researchers employed modelling techniques to produce maps of species richness and areas of endemism (clusters of unique species), to help identify key locations for the conservation of birds in the region.

## Impacts of climate change

**MODELLING THE IMPACT OF CLIMATE CHANGE ON ARCTIC AND SUBARCTIC SPECIES**

**Example**: Hof, A.R., Jansson, R. & Nilsson, C., 2012. Future climate change will favour non-specialist mammals in the (sub)arctics. *PloS one*, 7(12), p.e52574. Available at: http://www.ncbi.nlm.nih.gov/pubmed/23285098

**Summary**: This paper, by researchers from Umeå University in Sweden, suggests that climate change will favour most mammals currently occupying Arctic and subarctic Europe, so long as they are able to disperse to suitable areas. The conclusion runs contrary to the expectation that species in high latitudes will be especially susceptible to a warming climate.

Anouschka Hof, one of the presenters at the 2012 GBIF science symposium and lead author of this paper, together with Roland Jansson and Christer Nilsson, modelled future distributions for mammal species currently resident in the far North of Europe, as well as some potential colonizers from further South. Occurrence records for 61 species were gathered from national databases in Norway, Sweden and Finland, and from the GBIF data portal.

The results, based on climate scenarios for 2080, indicated that 43 out of the 61 species studied would expand and shift their ranges, mainly to the north-east, assuming they were fully able to disperse to suitable areas. Nevertheless, species specializing in alpine habitats, such as Arctic fox, Norway lemming and wolverine, would likely see their ranges contract. If the ability to disperse is

severely limited, for example due to roads or industrial developments, most mammal species would lose range, but none is projected to become extinct due to climate change.

The study also predicts that the climate in Arctic and subarctic Europe will become suitable for ten more mammalian species, including eight bat species, and that the region is thus likely to become richer in mammal species. This may have unexpected consequences, such as a the coexistence of large predators threatening populations of prey species – for example, both the grey wolf and brown bear are projected to expand their range and affect the population of European roe deer.

The authors suggest that the reason for the relative stability of mammal species presence under projected climate might be that Arctic regions have experienced large climatic shifts in the past, filtering out sensitive and range-restricted species.

## Improving availability of high-quality biodiversity data

### ANALYSING THE DATA PUBLISHED THROUGH A GBIF NATIONAL NODE

**Example**: Otegui, J. et al., 2013. Assessing the Primary Data Hosted by the Spanish Node of the Global Biodiversity Information Facility (GBIF) G. P. S. Raghava, ed. *PLoS ONE*, 8(1), p.e55144. Available at: http://dx.plos.org/10.1371/journal.pone.0055144

This study, carried out with the support of the GBIF Secretariat and co-authored by researchers from the University of Navarra and GBIF Spain, presents a comprehensive analysis of the biodiversity data hosted by the Spanish node of GBIF on behalf of several institutions in the country. The authors argue that having sufficiently large datasets that are fit for use in science is necessary to effectively understand and cope with the current biodiversity crisis. Assessing the primary biodiversity records served through GBIF Spain, the study concludes that the error level is generally low, and that the available data have the potential to enhance biodiversity research, both locally and globally. However, it notes that many records lack data elements such as georeferencing or taxonomic levels, and that although the remaining information is ample and fit for many uses, improving the completeness of the records would likely increase their usability for science and decision-making.

## Discussion of GBIF

### CLOSING THE TAXONOMIC GAP

Costello, M.J., May, R.M. & Stork, N.E., 2013. Can We Name Earth's Species Before They Go Extinct? *Science*, 339(6118), pp.413–416. Available at: http://www.sciencemag.org/cgi/doi/10.1126/science.1230318

This review article, whose lead author Mark Costello is vice-chair of the GBIF Science Committee, challenges the despairing view that most species will inevitably go extinct before they are described. The authors argue that such worries result from overestimates of how many species may exist, beliefs that the expertise to describe species is decreasing, and alarmist estimates of

extinction rates. They suggest that the number of species on Earth is between two and eight million, of which 1.5 million are named. Noting that conservation efforts are at least delaying extinctions and that there are more taxonomists describing species than ever before, the article proposes practical actions to improve taxonomic productivity and associated understanding and conservation of biodiversity. To help achieve this, the authors note that infrastructures for publishing taxonomic information and data exist and can continue to improve – for example., standardized species distribution data can be published and integrated through GBIF, the Ocean Biogeographic Information System (OBIS) and associated databases. The article notes: "The bottleneck in making progress is not technology; it is having enough people involved and their activities coordinated, and historic knowledge captured in open-access online data-bases."

## Other selected journal articles discussing or mentioning GBIF

Appeltans, W. et al., 2012. The Magnitude of Global Marine Species Diversity. *Current Biology*, pp.1–14. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0960982212011384

Costello, M.J. et al., 2013. Global Coordination and Standardisation in Marine Biodiversity through the World Register of Marine Species (WoRMS) and Related Databases H. Browman, ed. *PLoS ONE*, 8(1), p.e51629. Available at: http://dx.plos.org/10.1371/journal.pone.0051629

Pereira, H.M. et al., 2013. Essential Biodiversity Variables. *Science*, 339(6117), pp.277–278. Available at: http://www.sciencemag.org/cgi/doi/10.1126/science.1229931

Pardo, I. et al., 2013. A Novel Method to Handle the Effect of Uneven Sampling Effort in Biodiversity Databases D. L. Roberts, ed. *PLoS ONE*, 8(1), p.e52786. Available at: http://dx.plos.org/10.1371/journal.pone.0052786

Triebel, D., Hagedorn, G. & Rambold, G., 2012. An appraisal of megascience platforms for biodiversity information. *MycoKeys*, 5, pp.45–63. Available at: http://www.pensoft.net/journals/mycokeys/article/4302/abstract/an-appraisal-of-megascience-platforms-for

## Data paper

Huang, C.W., Hsiung, T.W., Lin, S.M. & Wu, W.L., 2013. Molluscan fauna of Gueishan Island, Taiwan. *ZooKeys*, 261, pp.1-13. Available at: http://dx.doi.org/10.3897/zookeys.261.4197

**Summary:** This paper describes a dataset recording the occurrence and inventory of molluscs on the volcanic Gueishan Island, 10km off the coast of Taiwan. It is based on a survey of literature published from 1934 to 2003, and field observations carried out between 2011 and 2012. In total, these researches recorded 126 mollusc species from 71 genera and 45 families. The field investigation found 14 species not previously identified on the island. The biogeography of the island is especially interesting as its species are thought to have gone through several waves of extinction due to volcanic eruptions, followed by recolonization from neighbouring regions. The manuscript for the peer-reviewed paper was generated from a metadata document through the Integrated Publishing Toolkit (IPT) operated by Taibif, the GBIF node for Chinese Taipei (http://taibif.org.tw/ipt/resource.do?r=gueishan_island). The full dataset will shortly be accessible via the GBIF data portal.

# Research citing GBIF as a source of data, Dec 2012-Jan 2013

## Grouped by relevance to Aichi Biodiversity Targets

### Strategic Goal B – Reduce direct pressures and promote sustainable use

***Target 7. Sustainable management of areas under human use***

Köster, N. et al., 2012. Range size and climatic niche correlate with the vulnerability of epiphytes to human land use in the tropics W. Jetz, ed. *Journal of Biogeography*, online. Available at: http://doi.wiley.com/10.1111/jbi.12050

***Target 9. Invasive alien species***

Capinha, C., Brotons, L. & Anastácio, P., 2012. Geographical variability in propagule pressure and climatic suitability explain the European distribution of two highly invasive crayfish M. McGeoch, ed. *Journal of Biogeography*, online. Available at: http://doi.wiley.com/10.1111/jbi.12025

Lindgren, C.J. et al., 2013. The Biology of Invasive Alien Plants in Canada. 12. Pueraria montana var. lobata (Willd.) Sanjappa & Predeep. *Canadian Journal of Plant Science*, 93(1), pp.71–95. Available at: http://pubs.aic.ca/doi/abs/10.4141/cjps2012-128

Ouvrard, D. & Burckhardt, D., 2012. First record of the onion psyllid Bactericera tremblayi (Wagner, 1961) in France (Insecta: Hemiptera: Sternorrhyncha: Psylloidea), new symptoms on leek crops and reassessment of the B. nigricornis -group distribution. *EPPO Bulletin*, 42(3), pp.585–590. Available at: http://doi.wiley.com/10.1111/epp.12005

Wearne, L.J. et al., 2013. Potential Distribution and Risk Assessment of an Invasive Plant Species: A Case Study of Hymenachne amplexicaulis in Australia. *Human and Ecological Risk Assessment: An International Journal*, 19(1), pp.53–79. Available at: http://www.tandfonline.com/doi/abs/10.1080/10807039.2012.632293

***Target 10. Climate change impacts***

Domisch, S. et al., 2012. Modelling distribution in European stream macroinvertebrates under future climates. *Global Change Biology*, p.n/a–n/a. Available at: http://doi.wiley.com/10.1111/gcb.12107

Fagundez, J., 2012. Heathlands confronting global change: drivers of biodiversity loss from past to future scenarios. *Annals of Botany*. Available at: http://aob.oxfordjournals.org/cgi/doi/10.1093/aob/mcs257

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

### *Target 11: Improve coverage and management of protected areas*

Bosso, L. et al., 2012. Modelling geographic distribution and detecting conservation gaps in Italy for the threatened beetle Rosalia alpina. *Journal for Nature Conservation*, online. Available at: http://linkinghub.elsevier.com/retrieve/pii/S1617138112001021

Cuervo-Robayo, A.P. & Monroy-Vilchis, O., 2012. Distribución potencial del jaguar Panthera onca (Carnivora: Felidae) en Guerrero, México: persistencia de zonas para su conservación. *Revista de biologia tropical*, 60(3), pp.1357–1367. Available at: http://www.scielo.sa.cr/pdf/rbt/v60n3/a33v60n3.pdf

### *Target 12. Threatened species and extinctions*

García-Rangel, S. & Pettorelli, N., 2012. Thinking spatially: The importance of geospatial techniques for carnivore conservation. *Ecological Informatics*. Available at: http://linkinghub.elsevier.com/retrieve/pii/S157495411200115X

Wu, T. et al., 2012. Modeling the Distribution of Rare or Cryptic Bird Species of Taiwan. *Taiwania*, 57(4), pp.342–358. Available at: http://tai2.ntu.edu.tw/taiwania/pdf/tai.2012.57.4.342.pdf

### *Target 19. Improve the science base*

Alcorn, D. & Stone, R., 2012. First Records of the Genus Lepidion (Gadiformes: Moridae) from Alaska. *Northwestern Naturalist*, 93(3), pp.228–232. Available at: http://www.bioone.org/doi/abs/10.1898/12-05.1

Chiang, Y.-C., Huang, B.-H. & Liao, P.-C., 2012. Diversification, Biogeographic Pattern, and Demographic History of Taiwanese Scutellaria Species Inferred from Nuclear and Chloroplast DNA K. A. Crandall, ed. *PLoS ONE*, 7(11), p.e50844. Available at: http://dx.plos.org/10.1371/journal.pone.0050844

Collevatti, R.G. et al., 2012. Drawbacks to palaeodistribution modelling: the case of South American seasonally dry forests R. Pearson, ed. *Journal of Biogeography*, online. Available at: http://doi.wiley.com/10.1111/jbi.12005

Costion, C.M. & Lorence, D.H., 2012. The Endemic Plants of Micronesia: A Geographical Checklist and Commentary. *Micronesia*, 43(1), pp.51–100. Available at: http://www.uog.edu/up/micronesica/dynamicdata/assetmanager/images/vol43/costion.lorence%20micronesica%2043%281%29.pdf

Dimond, J.L. et al., 2012. A simple temperature-based model predicts the upper latitudinal limit of the temperate coral Astrangia poculata. *Coral Reefs*. Available at: http://www.springerlink.com/index/10.1007/s00338-012-0983-z

Furze, J. et al., 2012. Algorithms for the Characterisation of Plant Strategy Patterns on a Global Scale. *American Journal of Geographic Information System*, 1(3), pp.72–99. Available at: http://article.sapub.org/10.5923.j.ajgis.20120103.05.html

Gérard, P.R. et al., 2012. Chilled but not frosty: understanding the role of climate in the hybridization between the Mediterranean Fraxinus angustifolia Vahl and the temperate Fraxinus excelsior L. (Oleaceae) ash trees P. Ladiges, ed. *Journal of Biogeography*, online. Available at: http://doi.wiley.com/10.1111/jbi.12021

Greve, L. & Andersen, T., 2012. Lacewings (Neuroptera) and Alderflies (Megaloptera) from Finnmark, northern Norway. *Norwegian Journal of Entomology*, 59. Available at: http://biolitt.biofokus.no/rapporter/nje/59-2/nje-vol59-no2-122-132-greve.pdf

Hand, R., Hadjikyriakou, G. & Zetzsche, H., 2012. Scaligeria alziarii (Apiaceae), a new sibling species of S. napiformis from Cyprus. *Willdenowia - Annals of the Botanic Garden and Botanical Museum Berlin-Dahlem*, 42(2), pp.199–207. Available at: http://openurl.ingenta.com/content/xref?genre=article&issn=0511-9618&volume=42&issue=2&spage=199

Kjærstad, G., Webb, J.M. & Ekrem, T., 2012. A review of the Ephemeroptera of Finnmark – DNA barcodes identify Holarctic relations. *Norwegian Journal of Entomology*, 59, pp.182–195. Available at: http://biolitt.biofokus.no/rapporter/nje/59-2/nje-vol59-no2-182-195-kjaerstad.pdf

Nel, H.A., Perissinotto, R. & Taylor, R.H., 2012. Diversity of bivalve molluscs in the St Lucia Estuary, with an annotated and illustrated checklist. *African Invertebrates*, 53(2), pp.503–525. Available at: http://www.africaninvertebrates.org.za/Uploads/183b32fe-fc9d-4e6c-9528-eb07e31d8765/Nel_etal_2012_AfrInvertebr_BivalvesStLucia_LR.pdf

Nelson, P.R. et al., 2012. Parmelina yalungana resurrected and reported from Alaska, China and Russia. *The Bryologist*, 115(4), pp.557–565. Available at: http://www.bioone.org/doi/abs/10.1639/0007-2745-115.4.557

Reinhardt, J. & Hudson, D., 2012. A review of the life history, invasion process, and potential management of Clavelina lepadiformis Müller, 1776: a recent invasion of the northwest Atlantic. *Management of Biological Invasions*, 3(1), pp.1–13. Available at: http://www.reabic.net/journals/mbi/2012/Issue1.aspx

Schidelko, K. et al., 2012. Continental shelf as potential retreat areas for Austral-Asian estrildid finches (Passeriformes: Estrildidae) during the Pleistocene. *Journal of Avian Biology*, online. Available at: http://doi.wiley.com/10.1111/j.1600-048X.2012.05743.x

Töpel, M. et al., 2012. Past Climate Change and Plant Evolution in Western North America: A Case Study in Rosaceae C. Lalueza-Fox, ed. *PLoS ONE*, 7(12), p.e50358. Available at: http://dx.plos.org/10.1371/journal.pone.0050358

Wang, W. et al., 2012. Glacial expansion and diversification of an East Asian montane bird, the green-backed tit (Parus monticolus) M. Patten, ed. *Journal of Biogeography*, p.online. Available at: http://doi.wiley.com/10.1111/jbi.12055

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