



GLOBAL
BIODIVERSITY
INFORMATION
FACILITY

Annual Report **2011**

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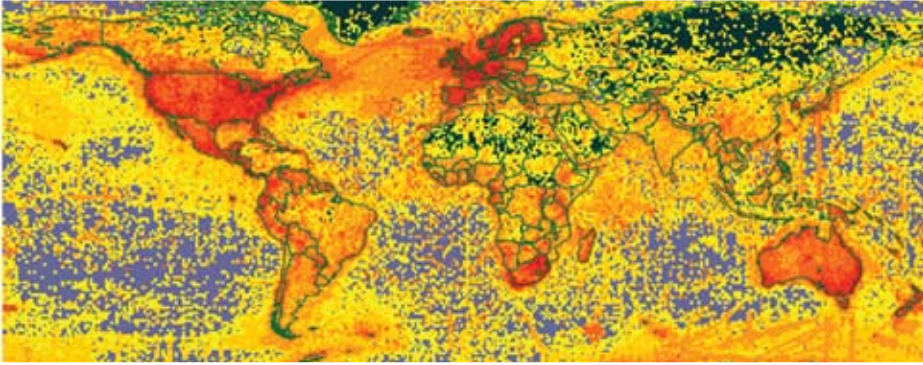
GBIF's vision

A world in which biodiversity information is freely and universally available for science, society and a sustainable future.

GBIF's mission

To be the foremost global resource for biodiversity information, and engender smart solutions for environmental and human well-being.

GBIF Annual Report 2011



Foreword



Joanne Daly

Joanne Daly
Chair of the Governing Board

We are very pleased to present the GBIF Annual Report for 2011, covering GBIF's tenth year and concluding GBIF's second phase, which ran from 2007 to 2011. This report shows how much has been achieved, and reminds us how the entire field of biodiversity informatics has been transformed over the last decade.

Donald Hobern

Donald Hobern
Executive Secretary

GBIF has successfully established an effective global data-publishing network and by the close of 2011 GBIF was mobilizing more than 300 million records documenting the distribution of the world's biodiversity. This is evidence of the work of countless scientists and amateurs collecting specimens and recording their observations, but it also demonstrates the commitment of GBIF's Participants around the world to presenting this information in the digital forms needed to support 21st century science and policy.

The mobilization of these data is a result of many important developments since 2001. From a technical standpoint, the global community has established flexible data standards for biodiversity data and efficient approaches to data publishing, supported by freely-available software tools and centralized indexes. In addition, we have seen an ever-increasing number of institutions, organizations and individuals embracing open-access principles and freely contributing their data for the common good. All of this has been supported and reinforced through training and mentoring activities involving most of GBIF's Participants.

During 2011, there was significant growth in the number and variety of published research articles referencing the use of data sourced through GBIF. Similarly, GBIF-mediated data are now an important component in many web tools, aiding decision making in support of international conventions. GBIF is increasingly providing the research infrastructure for which it was established.

All of this places GBIF in an excellent position as it begins to implement its 2012-2016 Strategic Plan. With the global spread of its network and strong connections with many other national, regional and global projects and organizations, GBIF has both the mandate and the capability to deliver biodiversity data to support science everywhere. The efficiency of the network gives confidence that GBIF will be able to respond to technological developments in gene sequencing and remote sensing which are set to increase massively the flow of relevant data. As a consequence, GBIF can underpin international efforts to understand, monitor, conserve and sustainably use global biodiversity.

Much remains to be done. The world's natural history collections still hold vast amounts of critical historical data which have not yet been digitized in an accessible form. Ecological datasets include important and complex information that is difficult to standardize at a global level. Many countries are not yet making their data accessible. Finances to support all of these activities are inadequate for the task. These are the challenges that need to be addressed during GBIF's third phase.

We are excited to be involved in such a dynamic and exciting field and to benefit from such a rich international collaboration. This annual report gives us many reasons to celebrate what GBIF has achieved globally, and to work together to achieve even more in the coming years.

Finally, we would like to acknowledge the contribution to these achievements of Dr Nick King, who completed his term as Executive Secretary of GBIF in December 2011.

Joanne and Donald

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10 years of GBIF

The Global Biodiversity Information Facility came into being as an intergovernmental initiative in March 2001. Two years earlier, science ministers from the Organization for Economic Cooperation and Development (OECD) had endorsed a recommendation from a scientific panel* to set up a body “to coordinate ... the standardization, digitization and global dissemination ... of the world’s biodiversity data.”

A decade into its existence, how far has GBIF fulfilled the original vision of those who proposed it? This table provides a summary.

What was proposed by the 1999 OECD panel	Progress to date	Summary
A facility enabling users “to navigate and put to use vast quantities of biodiversity information, thereby advancing scientific research in areas such as agriculture, biomedicine, biotechnology, environmental management, pest control, health, education, and conservation, among others”.	Achieved	GBIF currently facilitates access to more than 300 million records from nearly 9,000 datasets worldwide. As shown in section 1 of this report, GBIF is cited as the source of data for scientific research in many of the areas specified in the 1999 report. The GBIF Data Portal received more than one million visits in 2011. While ‘vast quantities’ of information have indeed been put to use, great challenges still lie ahead to improve the coverage, scope and quality of data content.
Interoperable biodiversity databases, including development of data standards, linkages with molecular databases.	Major progress towards achieving	Major progress in developing common standards, e.g. with widespread uptake of Darwin Core Archive (see section 3), links with molecular data still work in progress.
Electronic catalogue of names of known organisms, to be reasonably complete within 10 years.	Achieved, in partnership with others	Through collaboration with the Catalogue of Life, containing over 1.3 million species, and other initiatives, this objective has been accomplished. Major achievements include development of the GBIF taxonomic ‘backbone’ and infrastructure for sharing species lists (see section 3), but more work remains for full completion.
Digitization of most natural history collections in 10 years, ‘repatriation’ of data from developed to developing world.	Partially achieved	Great progress in publishing specimen data (see section 2). More than 20 million records from developed-world institutions relating to developing-world biodiversity freely available through GBIF, contributing to ‘repatriation’ of data. However, major collections remain undigitized. Promising technical advances and innovative approaches to digitization being adopted by GBIF Participants.
‘Species bank’ to provide rich, searchable information about all species.	Major progress by others	Programme taken up by Encyclopedia of Life (EOL), a GBIF Associate Participant.
Digital biodiversity literature resources to be captured in GBIF information content.	Major progress by others	Programme taken up by Biodiversity Heritage Library (BHL).
Training to advance skills in biodiversity informatics, including in developing countries.	Achieved	Active programme to provide training in GBIF Participant countries, both face to face and through online resources. Eleven training events in five continents in 2011 involved over 370 professionals (see section 4).

* FINAL REPORT OF THE OECD MEGASCIENCE FORUM WORKING GROUP ON BIOLOGICAL INFORMATICS. JANUARY, 1999.

2011 highlights

A TOOL FOR SCIENCE AND SOCIETY (P 6)

- ▶ GBIF was cited as the source of data for more than 200 peer-reviewed scientific papers in 2011. It helped to advance knowledge of the impacts of climate change on biodiversity, the spread of invasive alien species and agricultural pests, and links between biodiversity and human health, among other research areas.
- ▶ Better decisions on siting industrial installations with minimum impact on biodiversity may result from a new tool made possible through access to data worldwide via GBIF.

A TOOL FOR SCIENCE AND SOCIETY

DATA PUBLISHING IN 2011 (P 12)

- ▶ The volume of data made accessible online through GBIF continued to grow, passing 300 million individual records in 2011.
- ▶ An innovative system for publishing peer-reviewed 'data papers' provided new incentives and academic recognition for those who publish and describe biodiversity datasets.
- ▶ GBIF joined forces with professionals carrying out environmental impact assessments around the world, to help preserve and publish vital biodiversity data.

DATA PUBLISHING IN 2011

AN INFORMATICS INFRASTRUCTURE (P 17)

- ▶ A new software package (IPT v2) made it simpler to publish data through GBIF, lowering the technical threshold for owners of datasets to make them globally accessible.
- ▶ Improvements in processing and organization of species names led to better performance for users of the GBIF Data Portal.
- ▶ A new scalable computing platform will enable future expansion of data processing power and volume.
- ▶ GBIF started to support publication and registration of species checklists.

AN INFORMATICS INFRASTRUCTURE

A CONNECTED COMMUNITY (P 20)

- ▶ A new steering group with representatives from six regions enhanced collaboration between GBIF national nodes at regional level.
- ▶ Regional training events supported from core GBIF funds involved 179 people from 25 countries.
- ▶ Mentoring grants and capacity enhancement projects enabled the publication of several biodiversity datasets, portals and decision-making tools in African countries.
- ▶ An information package released in 2011 will help new managers of GBIF nodes to take the first steps towards setting up a biodiversity information facility.

A CONNECTED COMMUNITY

COLLABORATION AND COMMUNICATION (P 28)

- ▶ A workshop convened at the GBIF Secretariat led to a joint programme for the Convention on Biological Diversity (CBD), which will give decision makers more consistent and comprehensive information about invasive alien species.
- ▶ A technical collaboration with the Encyclopedia of Life (EOL) enabled more streamlined publishing and integrated data visualization between the two initiatives.
- ▶ Participation in the Group on Earth Observations Biodiversity Observation Network (GEO-BON) helped set out the information requirements and capabilities for achieving the 2011-2020 Strategic Plan for Biodiversity.
- ▶ A new GBIF Online Resource Centre provided a searchable repository for manuals and other documents useful for the whole biodiversity publishing community.

COLLABORATION AND COMMUNICATION

A tool for science and society

A clear indication of GBIF's progress is the extent to which its services are being used and cited by scientists and policy makers. Monitoring of scientific literature during 2011 has revealed an increasing level of use of GBIF-mediated data, in subject areas critical to meeting policy objectives such as the Aichi Biodiversity Targets for 2020.

In summary, during 2011:

- ▶ more than 200 research papers were identified as using data accessed via GBIF, most commonly through ecological niche modelling;
 - ▶ areas of scientific study making use of GBIF-mediated data included conservation, species distributions, impacts of climate change, invasive alien species spread, agriculture and human health;
 - ▶ a new tool used GBIF-mediated data worldwide to help estimate ecological values at fine scales, aiming to minimize the impact of industrial installations through better siting decisions;
 - ▶ GBIF-mediated data were used in the compilation of a Red List of Rhododendrons; and
 - ▶ Jens-Christian Svenning, the Danish winner of the 2011 Ebbe Nielsen Prize, used GBIF-mediated data to study large-scale relationships between climate and species distributions.
-

GBIF cited in scientific literature

During 2011, the GBIF Secretariat stepped up monitoring and analysis of the discussion and use of GBIF services in scientific literature. Using the **Mendeley academic social network**, articles since 2008 mentioning GBIF were retrieved, interpreted and tagged.

The headline results of this monitoring are shown in Figure 1. Of the studies traced for 2011, 206 used GBIF-mediated data in their methodology. This compares with 157 'GBIF-used' papers for 2010, and 101 for 2009.

Figure 2 shows a geographical breakdown, in terms of the affiliations of the authors of those papers using GBIF-mediated data. The **United States, United Kingdom and Australia** contributed the largest number of studies, but the top ten countries also included four GBIF Participants from emerging economies: **Mexico, Argentina, South Africa and Colombia**. It should be noted that some studies from non-English language publications may not show up in this survey, so the scientific use of GBIF in some countries may be under-represented.

To search the publications mentioning and using GBIF, tagged by country and subject, readers can directly browse the **GBIF Public Library**.

A selection of significant 2011 papers in key subject areas is shown on the following pages.

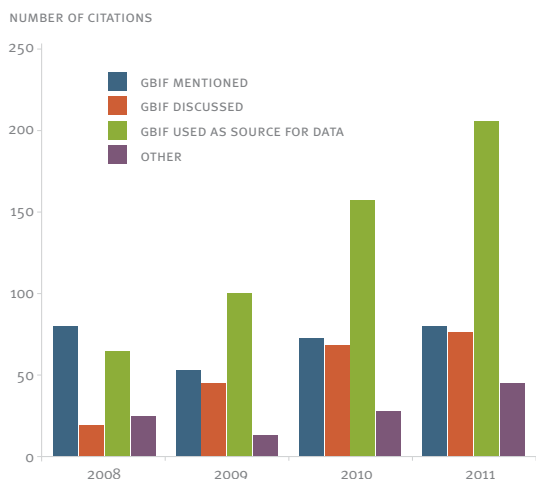


FIGURE 1. A SUMMARY OF GBIF CITATION IN MONITORED SCIENTIFIC PUBLICATIONS, 2008-2011.

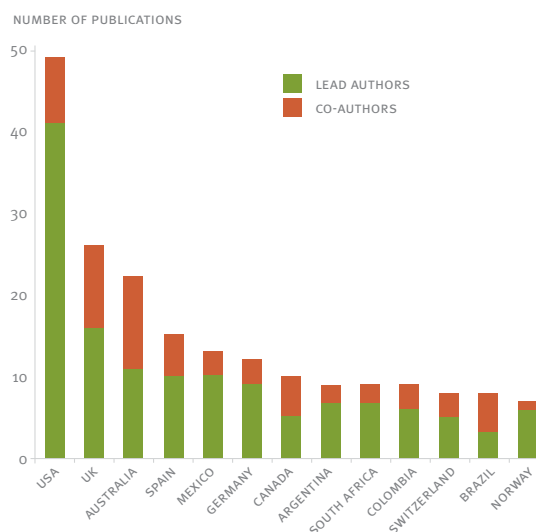


FIGURE 2. NUMBER OF SCIENTIFIC PUBLICATIONS IN 2011 CITING USE OF GBIF-MEDIATED DATA, RANKED BY COUNTRY ACCORDING TO AFFILIATION OF LEAD AUTHOR (GREEN BARS) OR AT LEAST ONE CO-AUTHOR (ORANGE BARS). TOP 13 COUNTRIES ONLY SHOWN.

Data use case examples

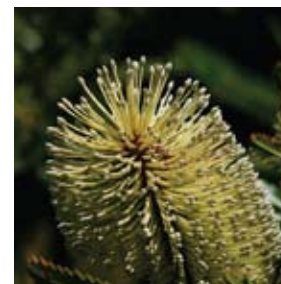
Cultural values of biodiversity, human health

Title: Ecological niche modelling of customary medicinal plant species used by Australian Aborigines to identify species-rich and culturally valuable areas for conservation.

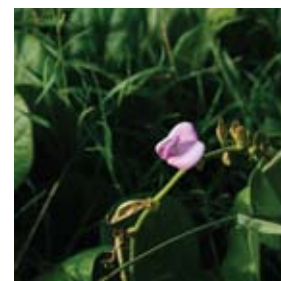
Publication: Ecological Modelling¹

Lead author: Jitendra Gaikwad, Customary Medicinal Knowledgebase (CMKb), Macquarie University, Australia.

Summary: Modelled suitable ecological niches for more than 400 medicinal plant species, using global and national occurrence records from GBIF and Australia's Virtual Herbarium. Results used to identify potential 'bio-cultural diversity hotspots' for priority conservation.



COAST BANKSIA (*BANKSIA INTEGRIFOLIA*)
© J. GAIKWAD



CANAVALIA ROSEA © J. GAIKWAD

Species composition

Title: Multiscale analyses of mammal species composition – environment relationship in the contiguous USA.

Publication: PLoS ONE²

Lead author: Rafi Kent, Technion Institute, Haifa, Israel.

Summary: Used all georeferenced mammal data for the 'lower 48' United States available through GBIF, more than 300,000 records of 284 species, to quantify link between the number and identity of species in a given area, and environmental factors such as climate and land use. Found that climate was most influential at larger scales, with land use and land cover increasingly important at finer resolution.



BOBCAT (*LYNX RUFUS*) © L. BLUMIN



MOUNTAIN LION (*PUMA CONCOLOR*)
© PHOTODISC

“The study would not be possible if we did not have such free access to the data as provided by the GBIF portal.”

– Rafi Kent, Technion Institute.



IVORY GULL (*PAGOPHILA EBURNEA*)
© JOMILO75

Climate change impacts, conservation

Title: Predictions of 27 Arctic pelagic seabird distributions using public environmental variables, assessed with colony data: a first digital IPY and GBIF open access synthesis platform.

Publication: Marine Biodiversity³

Lead author: Falk Huettmann, Institute of Arctic Biology, University of Alaska, USA.

Summary: Used presence records obtained through GBIF on 27 seabird species from north of the Arctic Circle to build predictive models on a scale never attempted before for Arctic bird species. Concluded that sea surface temperature was by far the most important factor influencing distributions, leaving these species vulnerable to climate change as well as a range of other human-related impacts.



ATLANTIC PUFFIN (*FRATERCULA ARCTICA*)
© A. TREPTE

Agriculture

Title: Threats to cassava production: known and potential geographic distribution of four key biotic constraints.

Publication: Food Security⁴

Lead author: Beatriz Campo, International Center for Tropical Agriculture, Cali, Colombia.

Summary: Records published through GBIF of occurrence locations for two pests and two viruses affecting cassava production were used, along with other evidence, to model their potential distribution. Hotspots for potential pest and disease outbreaks were identified in northern Brazil, the African Rift Valley, southern India and southeast Asia.



WOMEN SPREADING CASSAVA CHIPS TO DRY,
DEMOCRATIC REPUBLIC OF CONGO
© K. WIEGAND

Human health

Title: Using remote sensing to map the risk of Human Monkeypox Virus in the Congo Basin.

Publication: EcoHealth⁵

Lead author: Trevon Fuller, Center for Tropical Research, UCLA, USA.

Summary: Established that the presence of rope squirrels (*Funisciurus* sp.) was the best predictor of outbreaks of Human Monkeypox Virus. Used occurrence data for the squirrel published through GBIF to help model risk areas for the disease in a region of the Democratic Republic of Congo, and thus concentrate surveillance efforts.

Invasive alien species, climate change impacts

Title: Climate change and American Bullfrog invasion: what could we expect in South America?

Publication: PLoS ONE⁶

Lead author: Javier Nori, Centro de Zoologica Aplicada, Universidad Nacional de Córdoba, Argentina.

Summary: Used occurrence data for American Bullfrog (*Lithobates catesbeianus*) from GBIF and associated databases including HerpNet and CONABIO, to model its potential spread in South America according to different climate models for 2050 and 2080. Confirmed the vulnerability of the Atlantic Forest biodiversity hotspot to bullfrog invasion, and warned of likely future invasions in the Andean-Patagonian forest, eastern Paraguay and northwestern Bolivia, where invasive populations have not been found yet.

NORTH AMERICAN BULLFROG
(*LITHOBATES CATESBEIANUS*) © C.D. HOWE



“ GBIF provides the most comprehensive data site that we use to support our Red List assessment process. It also provides a very straightforward and easy download process, enabling us to quickly upload the data into our own databases and begin cleaning and processing the data prior to mapping.”

— Douglas Gibbs, Conservation Initiatives Manager, Botanic Gardens Conservation International.

Local Ecological Footprint Tool (LEFT)

During 2011, a team from the Oxford Biodiversity Institute in the United Kingdom developed a tool to help corporations make smarter decisions on siting their installations, making extensive use of the data available through GBIF.⁷

The **Local Ecological Footprint Tool (LEFT)** project is funded by the Norwegian energy company Statoil. It responds to the demand from businesses that have a concession area for extraction or mining, and want to know at a very fine scale which part of the area they can impact with the least ecological risk.

To provide that planning guidance, LEFT generates detailed maps for any land area of the world, showing the distribution of ecological features across the landscape at a resolution of 300 metres. Each grid cell is assigned an ecological value, based on biodiversity, vulnerability (threatened species), fragmentation, connectivity and resilience – helping companies to decide which areas to avoid.

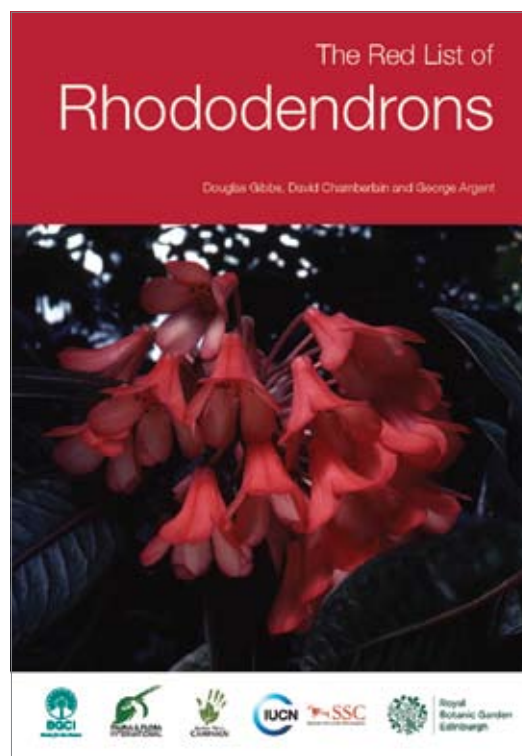
The biodiversity component is calculated by modelling the expected occurrence of species, **based on records found through GBIF within the same ecological region**. Local conditions of climate, soils, etc. are used to map suitable habitats across the wider landscape.

The reports generated by the LEFT tool automatically include reference to each of the institutions whose data published through GBIF contributed to the analysis.

Testing the tool in areas with years of intensive species surveys in Madagascar, Honduras, South Africa and the Canary Islands, the team found a close match between the predictions using GBIF-mediated data and the diversity of habitats as observed in the field.

“ GBIF was absolutely essential for developing this tool, we could not have managed without it... The beauty of GBIF is how simple and straightforward it is to use.”

— Kathy Willis, Oxford Biodiversity Institute.



The Red List of Rhododendrons

An assessment of more than a thousand taxa of rhododendrons, over 300 of them threatened with extinction in the wild, was published in 2011 by the Global Tree Specialist Group of the IUCN Species Survival Commission (SSC). The Red List of Rhododendrons⁸ used data accessed through GBIF to help map the occurrence of the species in their native ranges, mainly in Asia.

More than 130 separate datasets are cited from institutions all over the world, including herbaria, natural history museums, surveys and even field notes published through the GBIF network and accessed via the GBIF Data Portal.

The rhododendron assessment is part of a long-term project to assess the major taxonomic groups of tree species, led by **Botanic Gardens Conservation International (BGCi)**, a GBIF Associate Participant, in collaboration with Fauna and Flora International, the Global Trees Campaign, Royal Botanic Garden Edinburgh and IUCN/SSC.

2011 AWARDS FOR INNOVATIVE USE OF GBIF-MEDIATED DATA



JENS-CHRISTIAN SVENNING

A Danish scientist whose research may help to predict the response of biodiversity to future climate change was the 2011 winner of the **Ebbe Nielsen Prize**, awarded annually by GBIF to recognize novel use of biosystematics and biodiversity informatics.⁹

Jens-Christian Svenning, professor of ecoinformatics and biodiversity at Aarhus University, was selected for his work in the field of macroecology, which deals with the relationship between organisms and their environment at a large scale.

Svenning intends to use the €30,000 prize to fund studies on integrating biodiversity informatics, ecology, climate modelling and phylogenetics (the study of evolutionary relatedness among species) to gain a better understanding of what determines species diversity, abundance and distribution.

The award was presented at the 18th GBIF Governing Board meeting in Buenos Aires, Argentina (see facing page).

“ We cannot study the impacts of climate change on biodiversity without access to large amounts of spatial data on occurrence of species.... GBIF offers a portal where a large amount of such data can be accessed.”

– Jens-Christian Svenning, 2011 GBIF Ebbe Nielsen Prize winner.



CÉSAR ANTONIO RÍOS-MUÑOZ

An ornithologist from Mexico and a marine biologist from Ireland were the 2011 winners of the **Young Researcher Award**.¹⁰

César Antonio Ríos-Muñoz and **Conor Ryan**, both PhD students, each received **€4,000** to help fund research proposals making innovative use of data made available through the GBIF network.



CONOR RYAN

Studying at the Universidad Nacional Autónoma de México, Ríos-Muñoz has been investigating the evolutionary processes leading to the current distribution of species in Mesoamerican lowland tropical forests. Using species occurrence data published through GBIF, he analyses current geographic distributions employing niche modelling techniques, and projects them backwards to climate conditions thought to have existed during the Pleistocene era.

Conor Ryan, a specialist in marine mammals at the Galway-Mayo Institute of Technology, investigates methods of identifying the prey of cetaceans and other marine predators, using otoliths (calcareous particles found in the inner ear). A database available through GBIF provides an online catalogue of otolith images from nearly 700 fish species, and a shape recognition tool.¹¹ Ryan's research tests whether this tool is effective in identifying the prey species even when the otoliths have passed through various stages of digestion.

“The idea that birthed GBIF ten years ago remains as simple and powerful now as it was then: to make the world's biodiversity information freely and universally available for science, society and a sustainable future.”

– Leonard Krishtalka, Chair, GBIF Science Committee, opening the 2011 GBIF Science Symposium.

THE 18TH MEETING OF THE GBIF GOVERNING BOARD (GB18), BUENOS AIRES

The 18th meeting of the Governing Board (GB18) and associated events were held in Buenos Aires, Argentina, from 28 September to 7 October, 2011.

Participants at the board meeting, held on 4 and 6 October, included representatives from 30 countries, 12 international organizations and observers. Meetings of the advisory committees, the Nodes' Global Meeting, a training event in three different languages, and the annual GBIF Science Symposium were organized as associated events.

Key Governing Board outcomes

- ▶ The GBIF Governing Board approved the appointment of Donald Hobern as its new Executive Secretary (see Secretariat changes on p 31).
- ▶ Joanne Daly was re-elected as Chair of GBIF.
- ▶ The GBIF Work Programme for 2012-2013 was approved.¹²
- ▶ A revised budget for 2012 was approved.
- ▶ The Nodes Steering Group was given official status through an addendum to the terms of reference of the Participant Node Managers Committee.¹³
- ▶ The Welcome Box for GBIF nodes was presented (see p 21).
- ▶ The Online Resource Centre was presented (see p 30).



GBIF SCIENCE SYMPOSIUM 2011 © J.L. CAMPOS

Nodes' Global Meeting

A meeting of GBIF nodes was held at the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" (MACN), which is also the host institution of Argentina's GBIF node.

Priorities were identified by the nodes on a number of themes from the work programme. Sixty people participated in the event, representing 33 countries and five organizations. Topics discussed included demand-driven data mobilization, analysis of data gaps, data citation, improving data quality and the GBIF portal, metadata, developing applications, funding, training, regional coordination and others. Recommendations from the meeting were ratified by the Governing Board.

Training course on biodiversity data publishing

A three-day training course for nodes was held at the MACN, in the days before the Nodes' Global Meeting.

The event provided node managers with information on new biodiversity data publishing options, building data discovery and publishing strategies and on data quality and fitness for use.

The course, held in parallel sessions in English, French and Spanish, attracted 43 participants from 36 countries and organizations. It was led by trainers from around the GBIF community, supported by a wider group that helped with preparing and translating materials.

In their evaluation of the event, node managers noted particular interest in the sessions on the handling of metadata and the use of the Darwin Core Archive format. There was also an enthusiastic response to having the sessions and resources in different languages.

2011 Science Symposium

The 2011 GBIF Science Symposium, *GBIF at 10: Reaping Benefits for Science and Society*, was organized on 5 October as an associated event of GB18.¹⁴

The symposium was opened by the GBIF Science Committee Chair Leonard Krishtalka, and by Marta Rovira, President of Argentina's National Council of Science and Technological Research (CONICET).

Dr Rovira recalled that Charles Darwin himself was one of the pioneer naturalists to record Argentina's biological diversity, and said the country was now striving to improve data availability in the light of technological advances. She highlighted how GBIF helped Argentina put in place a national network of biodiversity information, supporting conservation.

Jens-Christian Svenning, winner of the 2011 Ebbe Nielsen Prize (see p 10), outlined his work at the symposium in a presentation entitled *On climate and Earth's biodiversity – insights fromecoinformatics studies*.

The other presentations highlighted GBIF's work and impact in its first decade, from the point of view of eight national and thematic Participant nodes. They summarized the experiences of Argentina, India, South Africa, Australia, Spain, GBIF partners Sud Expert Plantes (SEP) on the Capacity Enhancement Programme for Developing Countries (CEPDEC), VertNet and the Scientific Committee on Antarctic Research (SCAR).

The symposium ended with a lively panel discussion on expectations for GBIF's next decade.

Data publishing in 2011

GBIF's tenth year included some important milestones in the continuing effort to mobilize biodiversity data worldwide, and to make them freely available via the Internet to science and society.

In summary, during 2011:

- ▶ the total number of indexed records passed 300 million;
- ▶ more than 50 additional institutions began publishing data through GBIF;
- ▶ metadata describing a biodiversity dataset was for the first time published as a peer-reviewed 'data paper' in an academic journal; and
- ▶ publishing of biodiversity data from environmental impact assessments via GBIF was endorsed as best practice by the relevant global professional body.

Records indexed by GBIF – some facts and figures

GBIF's core business is to facilitate the sharing of **primary biodiversity records**, each representing the occurrence of a single organism in a particular place at a particular time. Institutions endorsed as **data publishers** by GBIF Participants (countries, organizations or economies¹⁵) make the records in their datasets available to be 'harvested' into a central index. This enables the data to be discovered and accessed, for example using the search and download functions of the **GBIF Data Portal**.

Mobilization of biodiversity data through GBIF is work in progress, and the figures on these pages present a snapshot of the state of those efforts by the end of 2011.

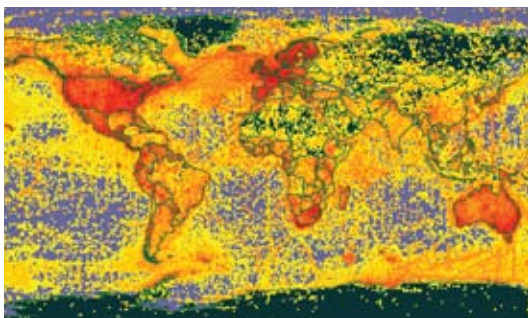


FIGURE 3. DISTRIBUTION OF GEOREFERENCED OCCURRENCE RECORDS INDEXED BY GBIF AT END 2011.

The darker, redder colours on this map represent areas with higher density of records. While it confirms wide geographical coverage of the species records, it shows also that the concentration of data does not reflect the true distribution of biodiversity – with some of the most biodiverse, tropical regions still relatively sparse in the number of records published.

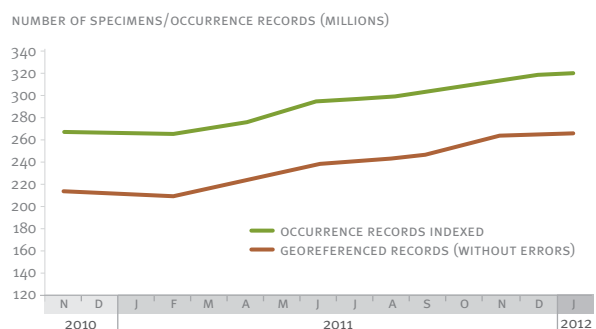


FIGURE 4. TOTAL NUMBER OF RECORDS INDEXED DURING 2011.

The number of records indexed by GBIF passed 300 million in August. The lower line represents records with coordinates not flagged as suspicious. These figures are the best estimates, but identifying and removing duplicate records referring to the same actual occurrence is always a challenge.

DATA RECORDS BREAKDOWN BY KINGDOM/TYPE

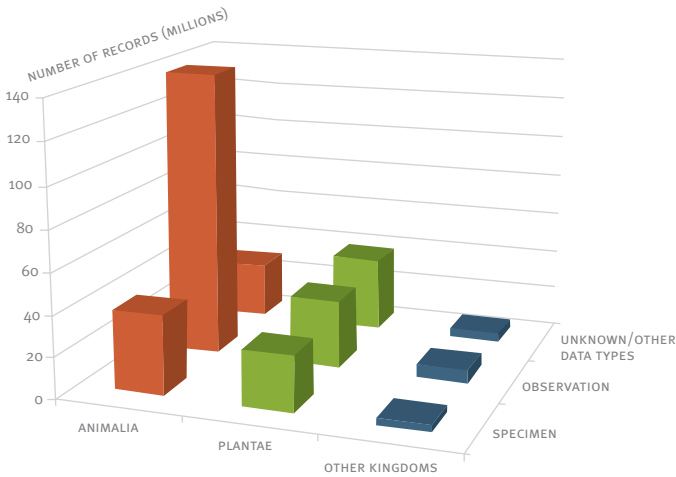


FIGURE 5. PRIMARY BIODIVERSITY RECORDS BY KINGDOM AND RECORD TYPE, AT END 2011.

In terms of sheer numbers, observations of animals dominate the records indexed by GBIF, while for plants there is a more even split between observations and specimens. Where the basis of records is not clearly defined, they appear as ‘unknown’, and a smaller number are based on other types of record including cultures, fossils, germplasm (e.g. seeds), animals in zoos and living plants in botanical gardens.

BY HOST PUBLISHER

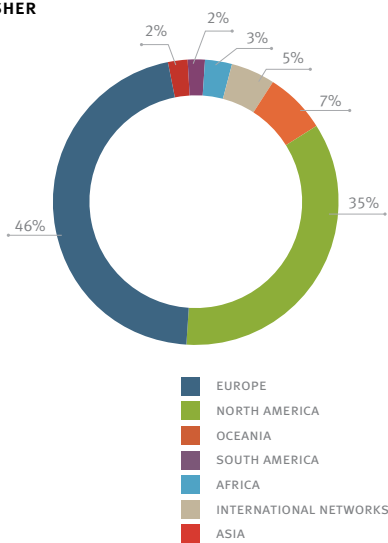


FIGURE 6. PUBLISHED RECORDS BY LOCATION OF HOST INSTITUTION.

North American and European institutions continue to host the great majority of records indexed by GBIF. However, the specimens and observations they represent include biodiversity from many other regions.

BY ORIGIN OF BIODIVERSITY

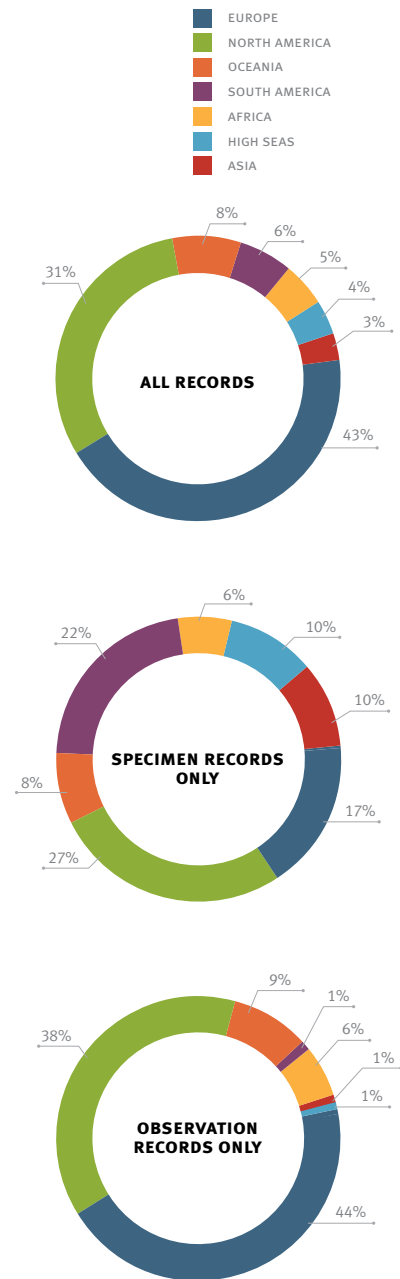


FIGURE 7. LOCATION OF SPECIES OCCURRENCES.

North America and Europe also account for the great majority of records in terms of the location of all species occurrences. However, the geographical spread is much more even for specimen records (middle chart). Observation records (lower chart), especially of North American and European birds, overwhelm the numbers. Records labelled as ‘high seas’¹⁶ here are those occurring outside Exclusive Economic Zones (EEZs), i.e. more than 200 nautical miles (370 kilometres) from land.

DATA RECORDS BREAKDOWN BY GBIF PARTICIPANT

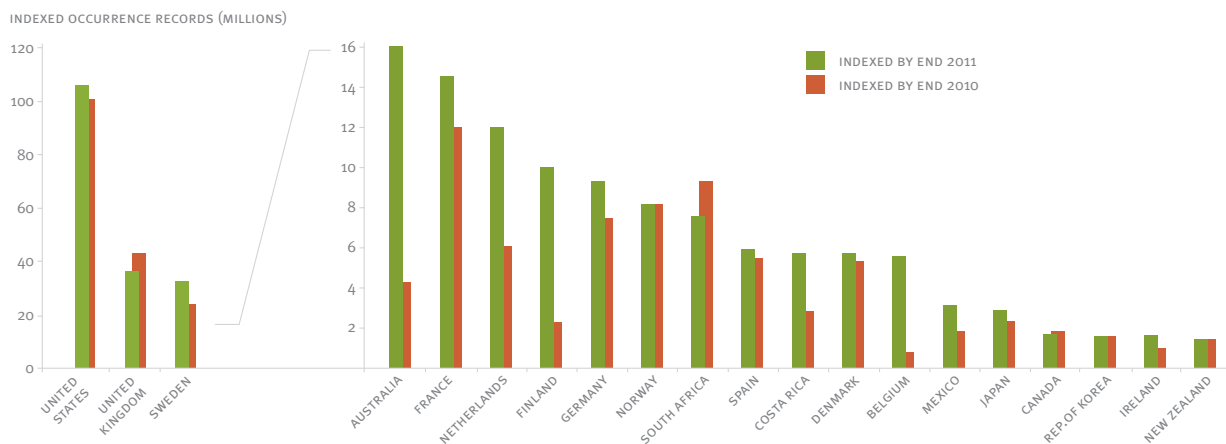


FIGURE 8A. NUMBER OF RECORDS PUBLISHED BY GBIF VOTING PARTICIPANT COUNTRIES (TOP 20). NOTE THAT THE THREE HIGHEST-PUBLISHING COUNTRIES TO THE LEFT ARE SHOWN ON A DIFFERENT SCALE.

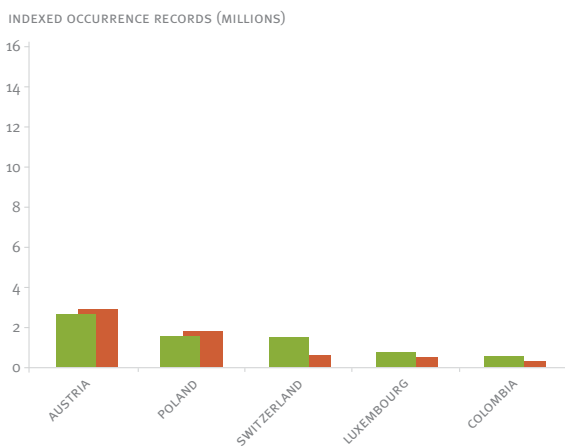


FIGURE 8B. NUMBER OF RECORDS PUBLISHED BY GBIF ASSOCIATE PARTICIPANT COUNTRIES (TOP FIVE).

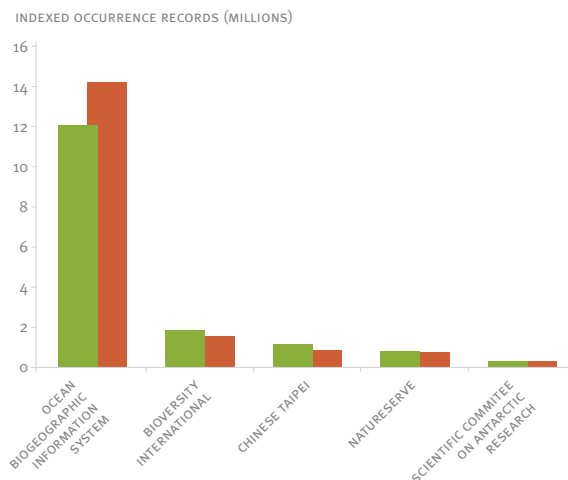


FIGURE 8C. NUMBER OF RECORDS PUBLISHED BY OTHER GBIF ASSOCIATE PARTICIPANTS (TOP FIVE).

Institutions from the United States, United Kingdom and Sweden led the way in terms of the number of records published through GBIF. Australia, Finland, Costa Rica, Belgium and Mexico showed especially sharp increases during 2011. Apparent drops for some countries and networks do not reflect a decline in data publishing, but result from removing duplicate records found in the 2010 index total.

TOTAL NUMBER OF SPECIES	995,520	
NUMBER OF SPECIES WITH NO GEOREFERENCED OCCURRENCES	404,618	41%
NUMBER OF SPECIES WITH AT LEAST ONE GEOREFERENCED OCCURRENCE	590,902	59%
NUMBER OF SPECIES WITH AT LEAST 10 GEOREFERENCED OCCURRENCES	227,648	23%
NUMBER OF SPECIES WITH AT LEAST 100 GEOREFERENCED OCCURRENCES	62,095	6%

TABLE 1. SPECIES REPRESENTED IN THE GBIF INDEX

Nearly one million species are currently included in occurrence records indexed by GBIF. For comparison, some 1.3 million species appeared in the 2011 Catalogue of Life. The table shows that well over half the species (59%) have at least one record with geographical coordinates, and nearly one-quarter (23%) have ten or more georeferenced occurrences.

New publishers and datasets

During 2011, 53 institutions were endorsed as new data publishers by GBIF Participants, bringing the total number of publishers to 370. Together, these new publishers shared 74 datasets containing a total of nearly 27 million records. A full list of the new publishers can be found in Appendix 3, but some highlights of the year's data publishing activity are shown on this page.

New publishers

In **Estonia**, the **Natural History Museum of the University of Tartu** published three datasets including some 90,000 records of animal, plant and fungus specimens. They are from collections in the museum itself, the Estonian University of Life Sciences and Tallinn Botanical Garden. It is the first time non-fossil biodiversity data hosted in Estonia have been published since the country became a GBIF Participant. More information: <http://natmuseum.ut.ee>

In **Cameroon**, the **Institut de Recherche Agronomique pour le Développement Cameroun (IRAD Cameroun)** published 1,249 records of 60 species from the insect collection of the International Institute of Tropical Agriculture, Cameroon Station (see photo, top right). The specimens were collected mainly in the humid forest area of Cameroon using various methods such as light traps, bait traps, lure traps and incubation of infested plant material. The records were published as a result of the collaboration between the GBIF Capacity Enhancement Programme for Developing Countries (CEPDEC) and the French programme Sud Expert Plantes (SEP) (see p 23). More information: <http://data.gbif.org/datasets/resource/12992>

In **Australia**, the **Birds Australia** organization (from 2012 known as Birdlife Australia) began sharing its huge Birdata dataset through GBIF, adding more than seven million records to the network. The dataset is the gateway to the Atlas of Australian Birds, compiled by more than 7,000 volunteers since 1998, covering nearly 800 species from across the country, coastal waters and associated islands, and including repeat surveys to help track changes over time. More information: <http://www.birdlife.org.au/projects/atlas-and-birdata>

In **Tanzania**, The **Institute of Traditional Medicine** at the Muhimbili University of Health and Allied Sciences published more than 4,000 records from its herbarium collections. These include medicinal plant species recorded by local healers in various parts of the country, collected and researched at the Institute for possible use as drugs in Tanzania's health care system. The dataset was digitized and published through the GBIF node (TanBIF) as a result of the CEPDEC Tanzania pilot project (see p 23). More information: <http://www.muchs.ac.tz/itm/index.htm>

In **Belgium**, the Flemish government's **Research Institute for Nature and Forest (INBO)** published a dataset known as Florabank1, with more than three million plant records, now accessible through the GBIF network. It brings together distribution data for vascular plants in Flanders and the Brussels Capital Region, dating back to the 19th century. The database is an initiative of INBO, the Flo. Wer NGO, and the National Botanic Garden. More information: www.inbo.be

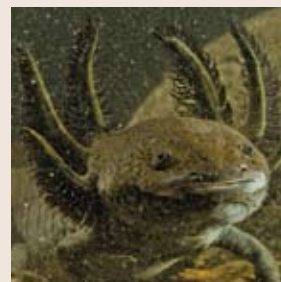
New datasets

In **Mexico**, the **Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO)** added 267 new datasets to the GBIF index during 2011, comprising a total of more than a million records and nearly doubling the amount of data so far published by the institution, which hosts the GBIF national node. Among the most extraordinary species recorded in CONABIO's datasets is the Axolotl (*Ambystoma mexicanum*), a critically endangered salamander (see photo, middle right), threatened with extinction by pollution and invasive fish species. More information: www.conabio.gob.mx

In **Denmark**, Copenhagen University's Zoological Museum, part of the **Natural History Museum of Denmark** published nearly ten thousand records from the Aves Tanzanian collection, one of the world's largest collections of bird material from Tanzania, including specimens from the country dating back to the 1940s. The records cover 18 orders, 64 families, 283 genera and 621 species. The dataset includes 1,475 image links, made available through a multimedia server operated by DanBIF, the GBIF national node in Denmark (see photo, bottom right). More information: <http://www.multimedia.danbif.dk/>



PART OF THE INSECT COLLECTION OF THE INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE, CAMEROON STATION © M. TINDO



THE CRITICALLY ENDANGERED AXOLOTL SALAMANDER (*AMBYSTOMA MEXICANUM*) © M.Á. SICILIA MANZ



SPECIMEN OF A PURPLE-CRESTED TURACO (*TAURACO PORPHYREOLOPHA CHLOROCHLAMYS*) IN THE COPENHAGEN ZOOLOGICAL MUSEUM © N. IOANNOU



Promoting a data publishing culture

A number of initiatives aimed at providing incentives and guidance to encourage the publication of biodiversity data came to fruition in 2011.

Data papers

A partnership between the GBIF Secretariat and **Pensoft Publishers**, supported by the European Union's Virtual Biodiversity Research and Access Network for Taxonomy (ViBRANT), developed a workflow to publish **biodiversity data papers**. These are peer-reviewed papers derived directly from a metadata document, the description of a biodiversity dataset published through GBIF.

The data paper manuscript is generated automatically when metadata are compiled using the GBIF Integrated Publishing Toolkit (IPT). The paper and the associated dataset then goes through a rigorous review process prior to publication.

The aim of the data paper concept is to provide incentives and due recognition for those publishing data and enriched metadata. By facilitating subsequent citation of datasets in other, more conventional publications, it will also help build a clearer picture of how and where biodiversity data are being used. Finally, the peer review process can help to add quality to the dataset itself (see separate panel on this page).

EIA data publishing

A **best practice guide on publishing primary biodiversity data from environmental impact assessment (EIA)**¹⁷ was produced by GBIF, in collaboration with the International Association for Impact Assessment (IAIA). The publication responds to concern that vital data gathered in the preparation of EIAs, relating to occurrence of species at and around a proposed project site, are often discarded and lost at the end of the project planning process.

The guide provides information for environmental assessment professionals on preparing datasets and publishing them using global standards and protocols. Pilot projects in South Africa and India have helped to develop tools to facilitate the publication of biodiversity data from EIA through the GBIF network.

A similar publication for **mobilizing biodiversity data from local government bodies** is being prepared in 2012, in collaboration with Local Governments for Sustainability (ICLEI) and the Convention on Biological Diversity (CBD).

Data publishing framework

A comprehensive framework to encourage and facilitate the sharing of biodiversity data was published in a **special supplement of the peer-reviewed journal BMC Bioinformatics**.¹⁸ The papers included in the supplement built on the recommendations of the GBIF Data Publishing Framework Task Group, detailed in the 2010 Annual Report.

Some of the 24 recommendations of the Task Group have already been taken up by GBIF and others, including the publication of **data papers** as described on this page, and the first version of a **biodiversity informatics potential index**, aiming to prioritize investment in filling data gaps. Others are in the pipeline, including a **data usage index** to monitor the use of data shared through GBIF; new **data citation guidelines** to ensure all those involved in collecting, adding value to and publishing data are acknowledged in a single citation; and proposals for a **data hosting infrastructure** to help find publishing institutions for 'orphan' datasets.

A century of Indian bird records described in first GBIF 'data paper'

The first-ever peer-reviewed data paper based on biodiversity metadata was published by Pensoft in the 150th issue of the open-access ZooKeys journal, in November 2011¹⁹. It was derived from a literature-based dataset of more than 2,400 bird records from northeast India, published through GBIF, and was developed through a project under the GBIF mentoring programme.

A team led by Sujit Narwade of the Bombay Natural History Society (BNHS) described bird observations in eleven Indian states between 1909 and 2008, centred on the Himalayan biodiversity hotspot. They were drawn mainly from the Journal of the Bombay Natural History Society (JBNHS).

The paper, entitled *Literature based species occurrence data of birds of northeast India* describes which bird families are included in the dataset, as well as the range of dates, coordinates and altitudes of the occurrences, among other information.

The data paper underwent a rigorous review process lasting nearly three months before being accepted for publication in ZooKeys. The reviewers not only addressed the metadata description, but also suggested improvements to the dataset itself, adding a layer of quality control to the data available to users of GBIF web services.

TOP PHOTO: RUFIOUS-BELLIED NILTAVA
(NILTAVA SUNDARA) © UMESHSRINIVASAN

An informatics infrastructure

A fundamental part of GBIF's work is to build, improve and sustain a stable and well-functioning informatics infrastructure. Challenges include: the complexity of creating unambiguous, unique records in the face of constantly-changing taxonomy and multiple data aggregators; reconciling the need for data quality control with operating a highly-distributed system of data publishing; and accommodating ever-growing volumes and types of data, including genomic and ecological information.

Substantial progress was made in informatics during 2011, including:

- ▶ rolling out the second version of GBIF's Integrated Publishing Toolkit (IPT v2), widely recognized as greatly simplifying the data sharing process;
- ▶ a range of processing improvements to reduce delay between the updating of datasets and the appearance of those changes in the GBIF Data Portal; and to flag suspect geographical locations of species occurrences;
- ▶ substantial improvements to the GBIF taxonomic backbone, helping to return more consistent results from species searches;
- ▶ the ability to publish and register species checklists, enabling their subsequent indexing and discovery through the GBIF Data Portal; and
- ▶ adopting a scalable platform, using a cluster of computers working in parallel that can be expanded according to need, enabling GBIF to accommodate future growth in the volume of data processing.

Improving GBIF's Integrated Publishing Toolkit

The **GBIF Integrated Publishing Toolkit (IPT)**, a software platform to simplify data publishing on the Internet, underwent a major overhaul in 2011. It is now much more stable, efficient and easy to use.

The IPT is the recommended platform for institutions to make their data available for harvesting into the GBIF index, using the Darwin Core Archive (DwC-A) standard, although other protocols (e.g. DiGIR, BioCASE, TAPIR) continue to be supported.

Among the major innovations introduced in IPT v2 are:

- ▶ standard **metadata documents** (data about datasets, using the GBIF Metadata Profile) can be submitted as **data papers** to scholarly journals (see p 16);
- ▶ support has been added for publishing **taxonomic checklists**, regional species lists, red lists and other species lists using the DwC-A standard (see p 19);
- ▶ IPT installations can be **shared by several data publishing institutions** while keeping clear attribution for each dataset (see side panel on the following page); and
- ▶ **extensions to the Darwin Core Archive**, giving additional information not currently indexed centrally by GBIF, can be added to local IPT installations – and included in metadata descriptions recorded in the GBIF Registry.



HOW BIODIVERSITY DATA ARE PUBLISHED THROUGH GBIF

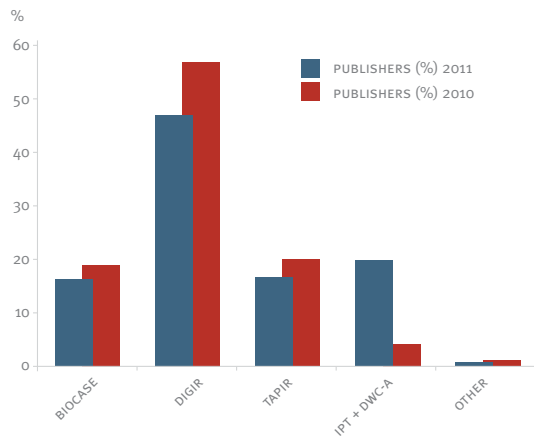


FIGURE 9. USAGE OF DATA PUBLISHING PROTOCOLS, BY PERCENTAGE OF PUBLISHERS

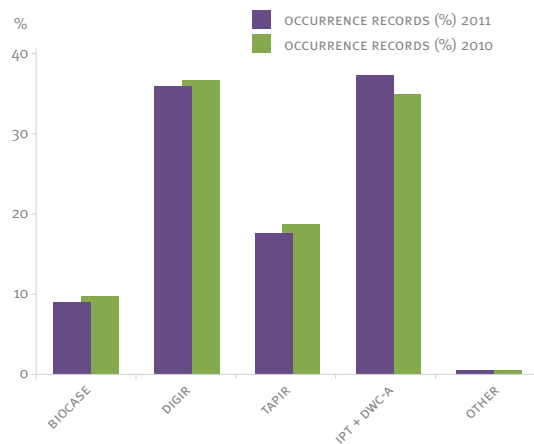


FIGURE 10. USE OF DATA PUBLISHING PROTOCOLS, BY PERCENTAGE OF OCCURRENCE RECORDS

The availability of the DwC-A standard and compliant tools such as IPT v2 has resulted in significant growth in the volume of data published via GBIF. For example, this was instrumental in enabling Australia to increase the number of records published from five million to 20 million in 2011 (see figure 8a, p 14).

By the end of 2011, 43 instances of the new IPT version had been registered with GBIF. This helped to increase substantially the proportion of publishers using DwC-A, either through IPT v2 or other software (see figure 9). For the first time in 2011, DwC-A accounted for the largest number of occurrence records indexed by GBIF (see figure 10).

IPT v2 – notes from a user

A couple of months ago, Canadensys [a Canadian network dedicated to sharing data from biological collections] was contacted by Wildlife Sightings, a citizen science organization based in Nova Scotia. They were interested in publishing their data to the GBIF network. We have had similar requests before, but until now we always had to decline them because we didn't have the time or technical resources to support them. Publishing data was challenging and the different components involved didn't really interact.

With the arrival of IPT v2, this has changed completely. We finally have a complete publication workflow, where all the components are working together. The technical threshold for publishing data has decreased considerably: our hosted IPT allowed Wildlife Sightings to publish their data to the GBIF portal in less than two months and it has enabled other Canadian biodiversity data publishers to publish more quickly as well. In addition, the registration process ensures that all credit goes to the data publishers (and not Canadensys), so the social threshold of publishing on a hosted service has decreased as well.

The complete publication workflow is what I have dreamed about since I first started working with GBIF in 2006.

I would like to thank the GBIF development team for creating such an easily customizable tool."

–Peter Desmet, Biodiversity Informatics Manager, Canadensys.

TOP PHOTO: CECROPIA CATERPILLAR (*HYALOPHORA CECROPIA*)
© P. LINDGREEN, WWW.JUNPONLINE.COM

Data processing improvements

During 2011, improvements in workflow reduced the average processing time for data published via GBIF from five or six days to two days. This has enabled more frequent publication cycles, so there is a shorter delay between a host institution adding or changing data and a user being able to see those changes in the GBIF Data Portal.

Smarter interpretation of geographical coordinates has enabled the Data Portal to present much cleaner results for user searches. New processing introduced in 2011 excluded many errors which previously showed up when searching for records from a particular country (see panel on following page).

The 'taxonomic backbone' used by GBIF to organize species records has been redeveloped to provide more consistent results when users search for species in the portal. This backbone is based on authoritative checklist sources, including the Catalogue of Life 2011 and the Integrated Taxonomic Information System (ITIS).

Publishing checklists through GBIF

The Indexing for Life (i4Life) project aims to link and harmonize the various species catalogues used by six major biodiversity programmes: GBIF, the European Bioinformatics Institute (EBI), LifeWatch, the IUCN Red List, Encyclopedia of Life (EOL) and the Consortium for the Barcode of Life (CBOL). GBIF's major contribution to this activity has been to develop and promote the **Global Names Architecture (GNA)** profile, a data standard allowing species checklists to be published using DwC-A.

GBIF issued a number of awards in 2010 to assist with mobilization of species checklists. This contributed to the publication of more than 70 checklists in 2011. They include the IUCN Red List of Endangered Species, the Global Invasive Species Database, International Plant Names Index and World Register of Marine Species, as well as a variety of more specific regional and taxonomic lists (for a full list, see Appendix 2).

During 2011, the major benefits that came from publishing checklists were improved organization of data and better performance for users of GBIF services. The checklist data will be more clearly visible from 2012/13 as the revised Data Portal begins to deliver much richer species information than is currently available.

Accommodating data growth

In 2011, GBIF adopted a technology based on the Hadoop platform to accommodate future data growth. It allows the addition of more machines to the processing infrastructure, as an alternative to acquiring bigger and bigger servers. The resulting cluster of machines, distributed in different locations, can support increases in processing speed and in volumes of data handled.

This framework has also allowed the standardization of the processing for other initiatives, such as a collaboration with the Encyclopedia of Life (EOL) to serve data published through GBIF to maps on the EOL species pages (for details see p 29).

Knowledge organization systems project begun

The various informatics standards developed for biodiversity data publishing often use different terms to describe similar or identical concepts. This can create barriers to integrating datasets across different systems. To help address the issue, GBIF began a project in 2011 to develop a new Knowledge Organization System, for managing the terms and concepts used to describe biodiversity information resources. The project is led by knowledge systems engineer Dag Endresen, recruited with funding support from the European Union's Virtual Biodiversity Research and Access Network for Taxonomy (ViBRANT).

HOW GBIF 'CLEANED UP' MAP OF US BIODIVERSITY RECORDS



The first map shows an uncorrected view of all records published to the GBIF network with the United States specified as the country of occurrence. Among many other errors, notice there is a 'shadow' or mirror image of the US in east Asia. This is because records where longitude values are wrongly given as positive instead of negative are 'flipped' to the other side of the world.

The second map shows how a US search actually appeared before 2011: the 'shadow' has been partially removed, because interpretation excludes those records where the coordinates lie outside the borders of the named country. However, errors remain due to continuing bugs, and records from US territorial waters are excluded.

The third map shows the search result following the 2011 processing improvements. All geospatial errors have been removed, and marine records within the Exclusive Economic Zone (EEZ) of the United States, i.e. within 200 nautical miles off the coast, are interpreted as US records, giving a much clearer picture of the biodiversity resources of the country.

A connected community

GBIF is, above all, a global collaborative effort, depending on a wide range of programmes and structures to ensure its Participants have the capacity and tools to contribute to and benefit from free and open access to biodiversity data.

The tenth year of the organization's existence proved a good moment to reflect on the progress made by the community of Participant nodes, and to set some new priorities for the future, especially in development of regional structures.

In summary, during 2011:

- ▶ the number of GBIF Country Participants grew to 57, and the number of participant organizations and economies grew to 47;
- ▶ a Nodes Steering Group was formally established, with representatives from six regions, and three regional nodes meetings were held;
- ▶ a 'Welcome Box' was released to support new node managers in the first stages of setting up a biodiversity information facility;
- ▶ four mentoring grants were awarded to help GBIF Participants share skills and experience;
- ▶ GBIF-supported capacity enhancement projects led to the publication of several African datasets, as well as development of a GIS-based decision tool in Tanzania;
- ▶ GBIF nodes in Norway and India collaborated in a pilot capacity-building project for the new Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), around the use of camera-trap data in conservation planning;
- ▶ regional training events in South America, Africa and Asia involved 179 people and 25 countries and organizations, under a new programme of regional training support; and
- ▶ two global training events were organized.

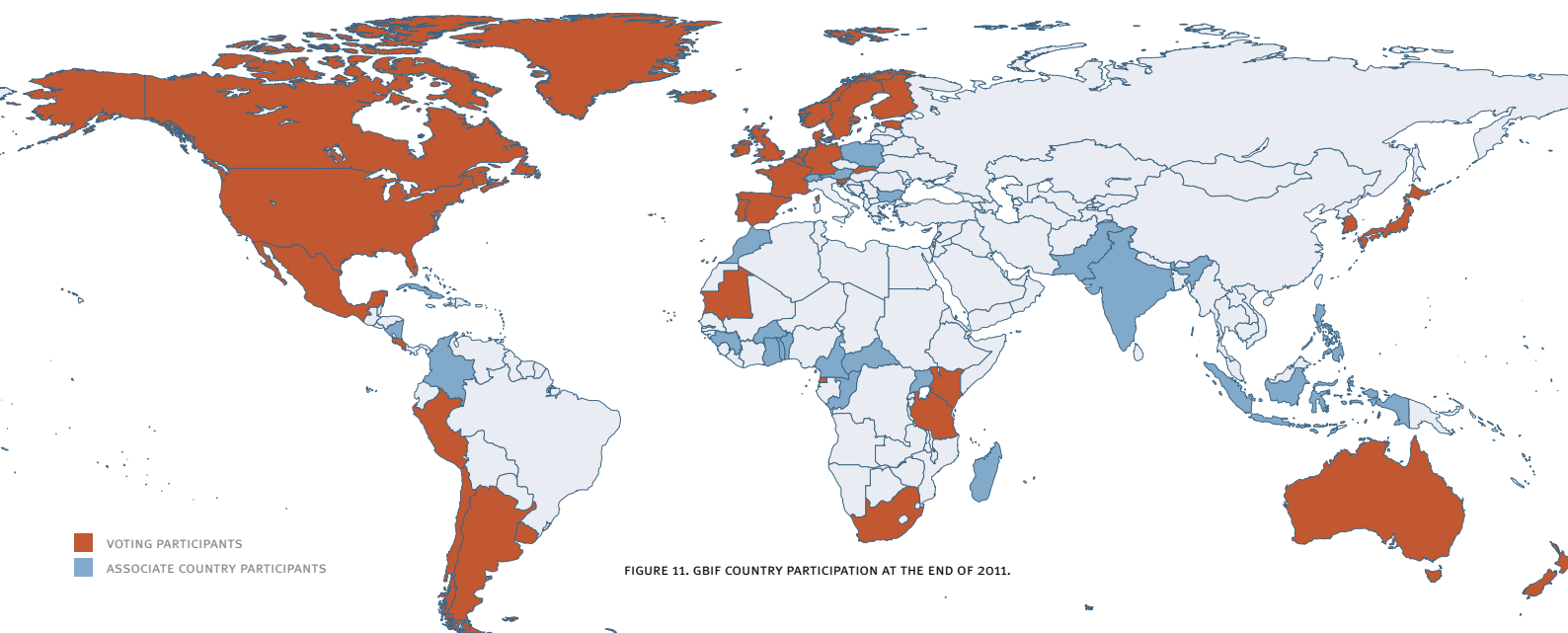


FIGURE 11. GBIF COUNTRY PARTICIPATION AT THE END OF 2011.

GBIF participation in 2011

The year saw a modest further expansion in the network of countries and international organizations making up the community of GBIF Participants. The **Central African Republic** and the **Republic of Congo** joined as Associate Country Participants, and the **International Barcode of Life Consortium (iBOL)** joined as Other Associate (i.e. organizational) Participant.

Kenya moved from Associate Country Participant to Voting Participant in 2011, and five other countries (**Benin, Colombia, Ghana, Madagascar and Uganda**) announced their intention to move from Associate to Voting Participant at the beginning of 2012. This brought the participation totals by the end of 2011 to: 33 Voting Participants (i.e. countries making a financial contribution); 24 Associate Country Participants; and 47 Other Associate Participants (for full list, see Appendix 5).

Regional nodes collaboration

Significant progress was made in 2011 towards better collaboration between GBIF nodes at a regional level. Three independently financed regional nodes meetings were organized in **Africa** (South Africa), **Europe** (France) and **Latin America** (Uruguay). These meetings complement the global-level activities of the GBIF Participant Nodes Committee, and provide a setting for identifying regional priorities and opportunities in relation to the GBIF work programme, based on shared interests and existing regional collaboration processes.

The GBIF Governing Board officially established a Nodes Steering Group with representatives drawn from six regions: **Africa, Asia, Europe, Latin America, North America and Oceania**. This steering group provided significant input to the development of the 2012-2013 Work Programme, organized regional meetings and made a variety of contributions to the work of the Secretariat and the GBIF Science Committee.

Welcome Box and BIF-building package

The Welcome Box is a set of documents and resources to assist new node managers in the first steps of setting up a biodiversity information facility (BIF). The first version of the Welcome Box was launched in 2011 at the Governing Board meeting in Buenos Aires (see separate panel on p 11) and includes information on collaboration opportunities, requirements for establishing a GBIF national node, opportunities for engagement and guidance on available support. All of the resources are provided on a CD-ROM and through the GBIF Online Resource Centre.

At the end of 2011, approximately half of GBIF's Country Participants still did not have a functional national BIF. The Welcome Box is the first of a suite of tools being developed, to help participants to establish a BIF.

SOME OF THE RESOURCES IN THE WELCOME BOX





Mentoring between GBIF Participants

The GBIF mentoring programme helps leverage and enhance capacity across the network by promoting partnerships between nodes for the transfer of expertise. Since its start in 2003, the programme has provided small grants to support 15 projects, involving 24 countries.

Four mentoring project grants were awarded in 2011.

- ▶ A grant was provided for **GhaBIF**, the node for Ghana, to be mentored by **NLBIF** (The Netherlands) in hosting and exporting digitized specimen records to GBIF. The project also has an experimental component, testing the gathering and publishing of citizen science data. In 2011, two staff members from GhaBIF were trained in ecological niche modelling, and data publishing efforts were begun.
- ▶ In a project begun in 2011, a new GBIF Participant, the **Central African Republic**, is being mentored both by **GBIF France** and **Cameroon**. The project aims to contribute to setting up a national BIF, developing a node strategy and training node staff on GBIF tools. It will train holders of collection and observation data in digitization and data publication techniques, and define a data mobilization strategy for the country.
- ▶ **UgaBIF**, the national node for Uganda, was mentored by the GBIF Associate Participant **ETI Bioinformatics** in developing a web portal on the country's biodiversity, and in developing plans for the mobilization of biodiversity data. UgaBIF staff were trained in data management, and the portal launched towards the end of 2011.²⁰
- ▶ The **Instituto Nacional de Biodiversidad (INBio)**, which hosts the node for Costa Rica, mentored Chile, a GBIF Participant since 2009. The focus during 2011 was on supporting a national assessment of databases of biological specimen collections. IT staff and network managers will be trained in data management tools, and infrastructure will be developed to establish a biodiversity information network in Chile.

The year also saw further outputs from mentoring projects funded in 2010.

- ▶ The **Wildlife Institute of India (WII)**, which hosts the Indian national node, was mentored by the **Atlas of Living Australia (ALA)** in building a strategy to mobilize data. An action plan for an Indian BIF was developed, and personnel trained on the IPT v2 during a workshop in Kolkata on mobilization of data from natural history collections (see Regional Training section on p 25). The mentoring project also led to the publication of the first GBIF data paper (see p 16).
- ▶ **Kenya** was mentored by **GBIF Finland** in the setting up of a biodiversity information facility, resulting in the official launch of the national node, **KenBIF**. A stakeholders' meeting was held in Nairobi, at which the nodes from Finland, Spain, South Africa and Tanzania shared their experiences on node governance, data sources and mobilization and data sharing, all of which have helped KenBIF plan their next steps.

Camera trap project showcases capacity building for IPBES

A project involving GBIF nodes in India and Norway, launched in 2011, will demonstrate how digitized data from camera traps can be used to help conservation policy. It is a pilot project initiated by the Norwegian government to address the capacity building component of the new Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).²¹

The project focuses on developing strategies for the conservation of tigers and associated species in India's Rajaji National Park, and snow leopards in Sikkim. A substantial amount of new data and metadata records are expected to be published through GBIF, and national workshops will be organized in India on the digitization of camera-trap photos and data management for scientists and technicians.

The main objective of the pilot project is to build capacity for the sharing of biodiversity data in India to be used in policy and decision-making. It includes a mapping of relevant biodiversity data originating from India and held in Norway's natural history museum collections.

The project is led by the Norwegian Institute for Nature research (NINA) in collaboration with the Wildlife Institute of India (WII), Norwegian Biodiversity Information Centre (NBIC), the University of Oslo (UiO) and the GBIF Secretariat in Copenhagen.

TOP PHOTO: CAMERA TRAP IMAGE OF TIGER FROM RAJAJI NATIONAL PARK, INDIA
© A. HARIHAR & I. HUSSAIN

GBIF capacity enhancement projects

A project to enhance access to and use of data on Tanzania's biodiversity through the **Capacity Enhancement Programme for Developing Countries (CEPDEC)**, financed by the Danish government, continued its activities in 2011.

A major product of the project for 2011 was development of a decision-making tool based on the open-source Quantum-GIS software. The tool uses ecological niche modelling to help users to predict species distributions more easily, and consequently to make more informed decisions (see Training Resources, p 25).

Ninety-five people were trained in the use of the TanBIF GIS tool in two workshops. Some of the trainees will themselves become trainers to help others use the tool. Its use was showcased in a study looking at the habitat suitability for the invasive *Parthenium* plant, also known as feverfew. Native to the Americas, *Parthenium* has had major impacts on crop production in parts of Africa, India and Australia. The results of the study indicated that the most vulnerable areas in Tanzania were those rich in biodiversity, such as the Eastern Arc Mountains, Serengeti National Park and Arusha National Park.²²

The CEPDEC project also supported a workshop on using the GBIF Integrated Publishing Toolkit (IPT v2), in Dar es Salaam in June 2011, and resulted in the publication of nine datasets to the TanBIF portal (for an example see New Publishers on p 15).

The three-year collaboration between the GBIF CEPDEC and the French programme **Sud Expert Plantes (SEP)**, formally concluded in 2010, continued to produce results in 2011. Through support from the project a number of datasets were published, including:

- ▶ records of plants from the **National Herbarium of Benin**, based at the University of Abomey-Calavi;
- ▶ plant records from the **National Herbarium of Cameroon**;
- ▶ insect records from the **International Institute of Tropical Agriculture, Cameroon** (see New Publishers on p 15) ; and
- ▶ records of flowering plants from the Mount Nimba area in **Guinea**.

The SEP-CEPDEC project also facilitated a **regional training** event in Benin, in collaboration with Togo and Burkina Faso (see p 25) .

RHODODENDRON ACROPHILUM, MT. MANTALINGAJAN, PALAWAN, PHILIPPINES. GROWN AT ROYAL BOTANIC GARDEN EDINBURGH © G. ARGENT



SOME NEWS STORIES FROM AROUND THE GBIF COMMUNITY IN 2011

Second version of Ireland's Biodiversity Maps released

Ireland's GBIF Node, the National Biodiversity Data Centre, released the second version of its online data portal Biodiversity Maps.

The system, built on an ESRI platform and using Microsoft Silverlight software, now provides the biodiversity mapping needs for the terrestrial and marine environment of Ireland.

Eighty datasets, comprising two million observations of 12,000 species (one third of all known Irish species) are now mobilized, and feeding automatically into the GBIF data portal.

More information: <http://maps.biodiversityireland.ie>



German research team targets 'at risk' data on biodiversity

A German-based project, launched in 2011, aims to rescue biodiversity data which are not integrated in institutional databases, are kept in outdated digital storage systems, or are not properly documented, and are therefore at risk of being lost.

The reBiND (Biodiversity Needs Data) project, run by the Botanic Garden and Botanical Museum Berlin-Dahlem, started identifying threatened databases for archiving, and will make them accessible via the GBIF network.

Among the first datasets 'rescued' by the project were observations from a private beetle collection in South

Germany, stored on a 1980s Mac computer; and an extensive survey of mosses from the Canary Islands, compiled for a PhD thesis and stored on 3.5 inch floppy discs.

More information: <http://rebind.bgbm.org/>



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Australia's Volunteer Portal is open for business

The Atlas of Living Australia (ALA), in partnership with the Australian Museum (AM), developed an online volunteer portal for members of the public to help capture non-digital (typed or handwritten) information that describes collection material within Australian museums.

The aim of the project is to encourage volunteers to work on transcribing specimen labels, field notes and expedition diaries from various Australian museums, turning them into digitized records.

By the end of 2011, over 100 volunteers had joined the programme and around 7,000 individual tasks were completed.

More information: <http://volunteer.ala.org.au/>



SPECIMEN LABEL OF HAWK MOTH © ALA

\$10 million grant to coordinate digitization of US collections

The National Science Foundation (NSF) awarded a five-year, US\$ 10 million grant to Florida State University and the University of Florida to coordinate the digitization of the nation's biological collections.

The project, called Integrated Digitized Biocollections or iDigBio, involves 92 institutions in 45 states.

The information in the digitized collections will include field notes, photographs, 3-D images and information on associated organisms, geographic distribution, environmental habitat and specimen DNA samples. The natural history data will be made available to anyone online, and GBIF is collaborating with the project to ensure the data can be published to the network.

White House advisers call for new eco-informatics body

The United States President's Council of Advisors on Science and Technology (PCAST) proposed a new national informatics facilitating body, with the suggested name of EcoINFORMA.

In its report published in July 2011, the advisers argued that the United States should continue to support and provide data and expertise to global data initiatives including GBIF, to strengthen international global-change research focused on ecosystem services and their sustainability.

The report also noted that global observing and informatics systems, such as GEO-BON and GBIF, were required to supply the newly established Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

GBIF training in 2011

During 2011, GBIF continued to place strong emphasis on training to help develop a decentralized, global network of biodiversity information facilities. The approach of ‘training the trainers’ and support for regional training collaborations were reflected in the events organized during the year (for a summary, see map on next page).

Two global training events were organized in 2011. The first was an **experts’ workshop** on the installation and use of the new version of the Integrated Publishing Toolkit (IPT v2, see p 17). Held in Copenhagen in June, the workshop helped specialists from around the GBIF community to become trainers in their regions, or to offer helpdesk support for the community. Twenty-one participants from 19 countries and organizations were trained in the workshop.

The second global training event, associated with the Governing Board meeting in Buenos Aires, was a three-day course for GBIF nodes on biodiversity data publishing and fitness for use. Details are given in the panel on p 11.

Regional training support

In 2011, GBIF moved to a system of public calls for training proposals with a regional dimension. This is part of the GBIF regionalization strategy. The regional component of such events may receive financial support, either for trainers or trainees.

In 2011, four projects were awarded training support, involving 179 individuals and 25 countries and organizations.

- ▶ **Training Workshop on Species Catalogues for Latin America** by GBIF Spain.²³ Montevideo (Uruguay), March 2011. **Partners:** AndinoNET, Argentina, Chile, Colombia, Costa Rica, Cuba, IABIN, Mexico, Nicaragua, Peru and Spain. **Number of participants:** 20
- ▶ **Training Workshop on Biological Georeferencing** by SABIF.²⁴ Cape Town (South Africa), April 2011. **Partners:** Ghana, Kenya, Mauritania, South Africa and Tanzania. **Number of participants:** 23

- ▶ **Strategies for Digitization and Mobilization of Natural History Collections Data** by GBIF India. Kolkata (India), June 2011.²⁵ **Partners:** ACB, Australia, ICIMOD, India, Japan and Republic of Korea. **Number of participants:** 34
- ▶ **Second National Meeting about Biodiversity Data Sharing** by GBIF Benin.²⁶ Cotonou (Benin), August 2011. **Partners:** Benin, Burkina Faso and Togo. **Number of participants:** 102

Training resources

Resources produced by the GBIF network in 2011 to support training included:

- ▶ IPT v2 user manual²⁷, explaining how to install the tool and providing examples of use;
- ▶ presentations and exercises linked to the IPT v2 from the experts’ workshop held in Copenhagen in June²⁸ (see left);
- ▶ presentations and exercises on new data publishing methods for names and occurrence data, and metadata for biodiversity datasets, in English, Spanish and French, from the training event held in Buenos Aires in September²⁹ (see panel on p 11);
- ▶ training DVD about the TanBIF decision-making support tool³⁰ containing training materials, user manuals, Tanzanian datasets, and a customized version of Quantum GIS, which includes an Open Modeller plug-in for ecological niche modelling (see section on CEPDEC, p 23); and
- ▶ the French version of the GBIF training manual on the digitization of natural history collection data consisting of six separate texts and running to 600 pages.

A full list of GBIF publications from 2011 can be found in Appendix 4. The publications are all available via the GBIF Online Resource Centre.

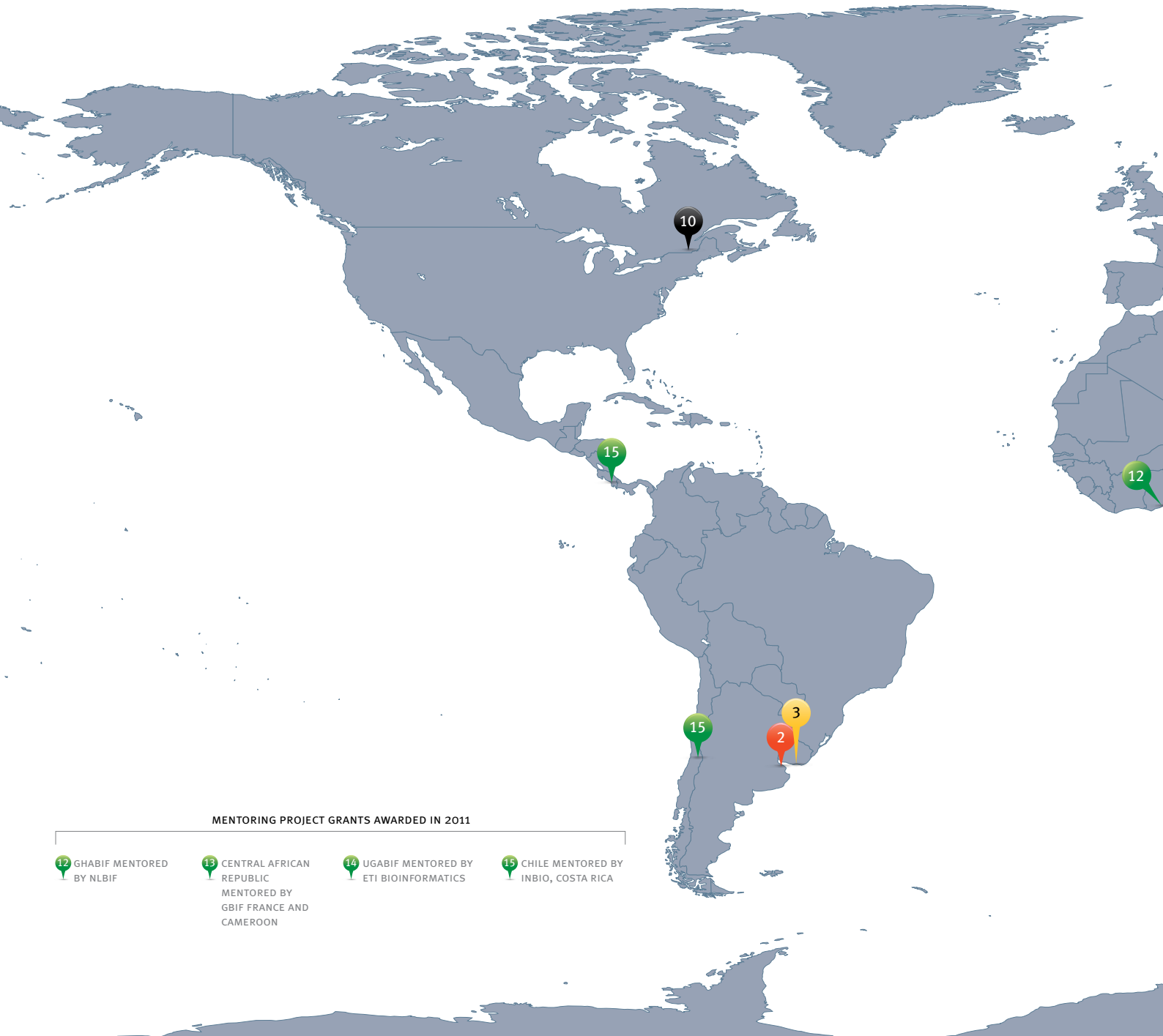
GBIF training, mentoring and capacity enhancement in 2011

TRAINING COURSES ORGANIZED BY THE GBIF SECRETARIAT

- 1 GBIF INTEGRATED PUBLISHING TOOLKIT V2. COPENHAGEN, DENMARK JUNE 2011, 21 PARTICIPANTS
- 2 BIODIVERSITY DATA PUBLISHING AND FITNESS FOR USE IN THE GBIF NETWORK. BUENOS AIRES, ARGENTINA SEPTEMBER 2011, 43 PARTICIPANTS

REGIONAL TRAINING COURSES SUPPORTED BY GBIF CORE FUNDS

- 3 SPECIES CATALOGUES FOR LATIN AMERICA. ORGANIZER: PIIB MONTEVIDEO, URUGUAY MARCH 2011, 20 PARTICIPANTS
- 4 BIOLOGICAL GEOREFERENCING. ORGANIZER: SABIF CAPE TOWN, SOUTH AFRICA APRIL 2011, 23 PARTICIPANTS
- 5 DIGITIZATION OF NATURAL HISTORY COLLECTIONS DATA. ORGANIZER: GBIF INDIA KOLKATA, INDIA JUNE 2011, 34 PARTICIPANTS
- 6 BIODIVERSITY DATA SHARING. ORGANIZER: GBIF BENIN COTONOU, BENIN AUGUST 2011, 102 PARTICIPANTS

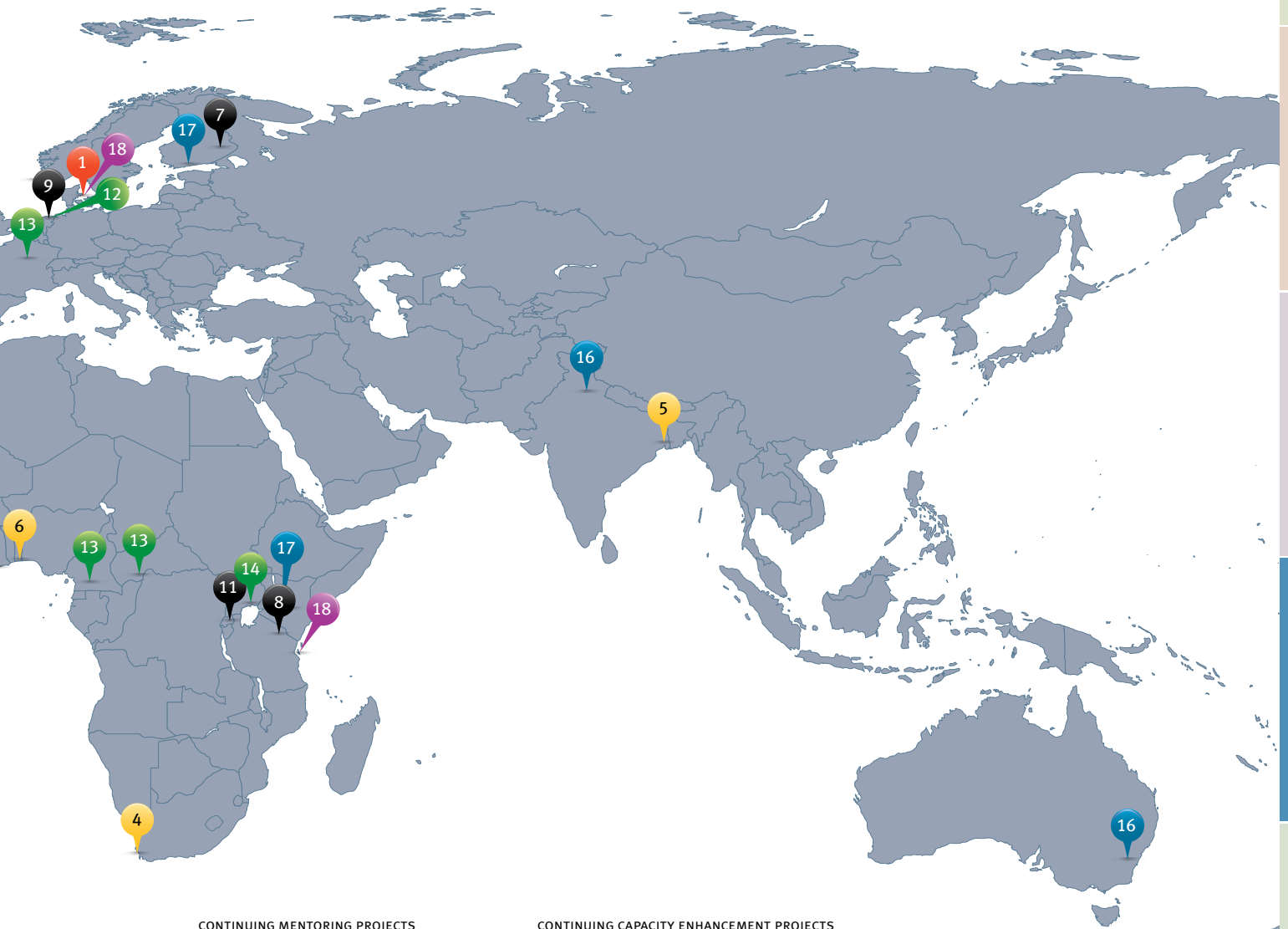


MENTORING PROJECT GRANTS AWARDED IN 2011

- 12 GHABIF MENTORED BY NLBIF
- 13 CENTRAL AFRICAN REPUBLIC MENTORED BY GBIF FRANCE AND CAMEROON
- 14 UGABIF MENTORED BY ETI BIOINFORMATICS
- 15 CHILE MENTORED BY INBIO, COSTA RICA

SOME NATIONAL AND ORGANIZATIONAL TRAINING COURSES HELD DURING 2011

- 7 INTEGRATION OF LARGE BIODIVERSITY DATABASES FOR MACROECOLOGICAL RESEARCH.
ORGANIZER: GBIF FINLAND JOENSUU, FINLAND
MAY 2011, 13 PARTICIPANTS
- 8 TOOLS FOR BIODIVERSITY-RELATED DECISION MAKING.
ORGANIZER: TANBIF ARUSHA, TANZANIA
JUNE 2011, 40 PARTICIPANTS
- 9 MODELLING AND MAPPING SPECIES DISTRIBUTIONS.
ORGANIZER: NLBIF AMSTERDAM, THE NETHERLANDS
JUNE 2011, 35 PARTICIPANTS
- 10 SHARING BIODIVERSITY DATA FOR URBAN AUTHORITIES.
ORGANIZERS: GBIF, ICLEI, CBD MONTREAL, CANADA
AUGUST 2011, 20 PARTICIPANTS
- 11 BIODIVERSITY DATA MANAGEMENT PRINCIPLES.
ORGANIZER: ARCOS KIGALI, RWANDA
DECEMBER 2011, 20 PARTICIPANTS



CONTINUING MENTORING PROJECTS

- 16 WILDLIFE INSTITUTE OF INDIA MENTORED BY THE ATLAS OF LIVING AUSTRALIA
- 17 KENBIF MENTORED BY GBIF FINLAND

CONTINUING CAPACITY ENHANCEMENT PROJECTS

- 18 TANZANIA SUPPORTED THROUGH THE CEPDEC PROGRAMME, FUNDED BY THE DANISH GOVERNMENT

FOR MORE DETAILS, SEE PP 22-23.

Collaboration and communication

Through its Participants and Secretariat, GBIF continued to engage with a wide range of institutions and networks during 2011, both through formal partnerships and a range of ongoing collaborations. A list of GBIF's formal affiliations and accreditations is shown in Appendix 8. Several new communication features were launched during the year, to improve coordination between the Secretariat and the Participants, and to enhance the visibility of data publishing and scientific uses of GBIF-mediated data.

Significant collaborative projects and communication milestones during the year included:

- ▶ the GBIF Secretariat helped to convene a joint work programme under the Convention on Biological Diversity (CBD) to strengthen the information available to decision makers on invasive alien species;
- ▶ technical collaboration with the Encyclopedia of Life (EOL) resulted in automatic harvesting of occurrence data for EOL species maps, and a more streamlined process for publishing data to both EOL and GBIF;
- ▶ a joint workshop with partners in the Group on Earth Observations Biodiversity Observation Network (GEO-BON) helped clarify existing observation capabilities for meeting the CBD's 2020 targets;
- ▶ the GBIF Online Resource Centre (ORC) was launched, acting as a searchable repository for manuals and documents useful to the whole biodiversity data publishing community;
- ▶ GBIF increased its presence on social media and was featured in numerous online and print publications; and
- ▶ the bimonthly newsletter GBits was relaunched with more attractive layout and new content including regular features on new data publishers, science use cases and stories contributed from around the GBIF network.

Action plan for information on invasive alien species

A workshop was held at the GBIF Secretariat in Copenhagen in September bringing together eight organizations managing information on invasive alien species (IAS), to develop a joint work programme. This wide-ranging programme, subsequently approved by the CBD's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA), will improve information access for decision makers by combining and harmonizing data on IAS from a wide range of different databases and networks.³¹

The information services involved are: GBIF; the Invasive Species Specialist Group of the Species Survival Commission of the IUCN; the CABI Invasive Species Compendium; FishBase; Delivering Alien Invasive Species Inventories for Europe; the European Network on Invasive Alien Species; the Global Invasive Species Information Network; and the Inter-American Biodiversity Information Network Invasives Information Network.

The programme identified nearly 50 action points. GBIF is taking the lead on several of these, including:

- ▶ supporting data elements on invasive alien species within the DwC-A formats used by data publishers in the GBIF network;
- ▶ promoting the use of the GBIF Integrated Publishing Toolkit (IPT) to publish data for IAS;
- ▶ 'tagging' species in the GBIF Data Portal to make it easier to extract country lists of invasive alien species, and making the millions of existing records on IAS available to other information systems;
- ▶ promoting the publication of names of invasive alien species within the Global Names Architecture, to facilitate consistent recording and sharing of data on these species; and
- ▶ helping identify gaps in data on IAS and developing strategies to mobilize them.

Technical collaboration with Encyclopedia of Life

Two significant new capabilities resulted from continuing technical collaboration during 2011 between GBIF and the Encyclopedia of Life (EOL), a GBIF Associate Participant, which launched a new version of its website in September (<http://eol.org>).

The interface between the GBIF index and the occurrence maps on EOL's species pages has now been automated, so that the occurrence points seen by EOL users will always reflect the latest update of the data published through the GBIF network.

In addition, EOL can now harvest information from GBIF content partners and others using the DwC-A format and a new EOL 'transfer schema' that can express the complex associations between entities required for its 750,000 species pages, while avoiding duplication with the GBIF publishing workflow. This will streamline data publishing and enable GBIF and EOL to collaborate in supporting data publishers.

The development aims to allow GBIF nodes, for example, to make species-level information accessible to EOL as they publish their occurrence data to the GBIF infrastructure. The Costa Rican GBIF node, Instituto Nacional de Biodiversidad (INBio), has successfully tested this by serving a combination of species information for use by EOL, and occurrence data which have been harvested by GBIF.

GEO-BON engagement and the 2020 Aichi Targets

GBIF continued to be actively involved in the Group on Earth Observations - Biodiversity Observation Network (GEO-BON) in 2011. Among the significant outcomes from this collaboration, a workshop organized by NASA, IUCN, United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC), GBIF, DIVERSITAS and European Biodiversity Observation Network (EBONE) at the University of Wageningen, Netherlands, produced the report *Adequacy of Biodiversity Observation Systems to support the CBD 2020 Targets*.³²

The report was the first attempt to assess the adequacy of global observation systems for the monitoring of biodiversity, specifically in relation to the information needs of the twenty Aichi Targets defined by the Convention on Biological Diversity (CBD) for the period 2011-2020.

The document revealed the relevance of GBIF in providing information for many of the targets, and became one of the principal information documents for the CBD's Ad Hoc Technical Expert Group Meeting on Indicators for the Strategic Plan for Biodiversity 2011-2020, held in High Wycombe, UK in June.

“ I am delighted that our collaboration with GBIF is entering a new phase with the launch of EoLv2. Both organizations strive to make scientific data on species available to users around the world, and our established partnership helps significantly to streamline the dissemination and integration of this data to provide even greater global access to knowledge about life on Earth.”

– Erick Mata, Director, Encyclopedia of Life.

Other collaborations in 2011

GBIF has continued to provide web services for the **European approach to the Global Earth Observation System of Systems (EuroGEOSS)**, in particular to the Digital Observatory for Protected Areas (DOPA).

GBIF became a member of the **Species 2000 network**, which aims to create a validated checklist of all species through the Catalogue of Life. In becoming a member, GBIF contributes to the development and direction of the catalogue.

Continuing collaboration with the **International Union for the Conservation of Nature (IUCN)** resulted, amongst other things, in the installation of the GBIF Integrated Publishing Toolkit (IPT) on the Red List database.

A technical collaboration with the **European Environment Agency (EEA)**, a GBIF Associate Participant, helped in the development of a new citizen-science based platform to help track the spread of invasive alien species. The NatureWatch programme, part of the EEA's Eye on Earth platform, includes a smartphone application enabling users to register occurrences of invasive species.

GBIF served on the framework committee of the **Eye on Earth Summit** which took place in Abu Dhabi, United Arab Emirates in December 2011. The summit resulted in the launch of several special initiatives including a Global Network of Networks (GNoN), in which GBIF is a named stakeholder.



THE GBIF ONLINE RESOURCE CENTRE

Online Resource Centre

The Online Resource Centre was launched at the 18th meeting of the Governing Board (GB18) held in Buenos Aires, Argentina in October 2011. The resource centre is a single, user-friendly access point to documents, tools and links that are of relevance to GBIF and the wider biodiversity informatics community.

The resource centre has a simple, clean interface, supports diverse resource types and has multi-language capability. It has been designed to enable the community to play a central role by rating resources and publishing their opinions as well as sharing them through social platforms.

Communications in 2011

Several additions were made to GBIF's communications resources in 2011. GBIF started to make more active use of social media technologies, including the creation of a new Facebook page. The GBIF Twitter feed (@gbif) is now embedded on the re-designed home page of the website www.gbif.org. The GBIF LinkedIn group also saw renewed activity during 2011, and ended the year with more than 500 members representing a wide cross section of the biodiversity information community worldwide.

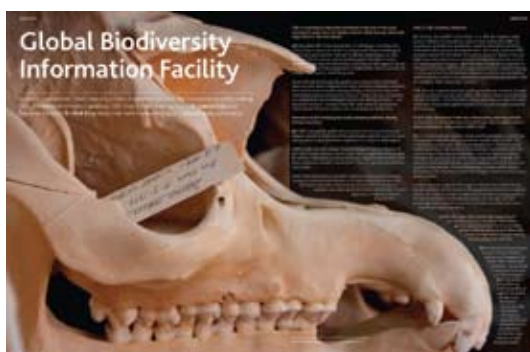


GBIF ON SOCIAL MEDIA SITES

The bimonthly newsletter **GBits** underwent a complete redesign in 2011, aiming to present a more readable and attractively-presented summary of activities across the network. Prominent new features include a description of new institutions publishing data through GBIF, and a greater focus on examples of scientific use of GBIF-mediated data. GBits had more than 2,100 subscribers at the end of 2011. Greater collaboration between the new communications team at the GBIF Secretariat and Participant nodes has resulted in more news being shared around the network.



More proactive promotion of news releases on GBIF's work has resulted in increased coverage in various online science news sites. An interview with the GBIF Chair Joanne Daly and Executive Secretary Nicholas King in the magazine *International Innovation* set out the organization's major activities and priorities in its tenth year. The interview is available online³³.



NICK KING

DONALD HOBERN

Secretariat changes

Donald Hobern, previously Director of the Atlas of Living Australia, was appointed as the Executive Secretary of GBIF and Director of the GBIF Secretariat, with effect from February 2012. He succeeds Nicholas King who was Executive Secretary from 2007 to 2011.

Donald Hobern previously worked in the GBIF Secretariat between 2002-2007, most recently as Deputy Director for Informatics.

Announcing the appointment, the GBIF Chair Joanne Daly said, "I am delighted that Donald has decided to come back to GBIF at this critical and exciting time.

"He pulled off a remarkable achievement in building the Atlas of Living Australia in a very short time, showing leadership in bringing together disparate parties to construct an amazing portal for Australian biodiversity data. That achievement was only possible because it was built on the backbone provided by GBIF, to which Donald himself had contributed so much.

"Donald is the right person for GBIF at the right time, and this appointment confirms that it has a great future."

Joanne Daly also paid tribute to Nicholas King, commenting: "Nick has worked tirelessly and with great skill, ensuring that GBIF has fulfilled the mission of its current phase, to move into full operation as a global facility for the benefit of science and society."

In 2011, the GBIF Secretariat also welcomed Burke Chih-Jen Ko as Informatics Liaison, Jan Legind as Data Administrator, Katja Christensen as Nodes Capacity Officer for the duration of Mélanie Raymond's maternity leave, Tim Hirsch as Senior Programme Officer for Engagement, Sampreethi Aipaniguly as Communications Officer, Dag Endresen as Knowledge Systems Engineer and Olaf Bánki as Senior Programme Officer for Participation. Juan Bello stepped down as Senior Programme Officer for Nodes during 2011.

End notes

1. Gaikwad, J., Wilson, P.D. & Ranganathan, S., 2011. Ecological niche modeling of customary medicinal plant species used by Australian Aborigines to identify species-rich and culturally valuable areas for conservation. *Ecological Modelling*, 222(18), p.3437-3443. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S0304380011003759>
2. Kent, R., Bar-Massada, A. & Carmel, Y., 2011. Multiscale Analyses of Mammal Species Composition – Environment Relationship in the Contiguous USA. J. Wright, ed. *PLoS ONE*, 6(9), p.e25440. Available at: <http://dx.plos.org/10.1371/journal.pone.0025440>
3. Huettmann, F. et al., 2011. Predictions of 27 Arctic pelagic seabird distributions using public environmental variables, assessed with colony data: a first digital IPY and GBIF open access synthesis platform. *Marine Biodiversity*, 41(1), p.141-179. Available at: <http://www.springerlink.com/index/10.1007/s12526-011-0083-2>
4. Herrera Campo, B.V., Hyman, G. & Bellotti, A., 2011. Threats to cassava production: known and potential geographic distribution of four key biotic constraints. *Food Security*, 3(3), p.329-345. Available at: <http://www.springerlink.com/index/10.1007/s12571-011-0141-4>
5. Fuller, T. et al., 2010. Using Remote Sensing to Map the Risk of Human Monkeypox Virus in the Congo Basin. *EcoHealth*, 8(ii), p.14-25. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/21069425>
6. Nori, J. et al., 2011. Climate Change and American Bullfrog Invasion: What Could We Expect in South America? A. Stow, ed. *PLoS ONE*, 6(10), p.e25718. Available at: <http://dx.plos.org/10.1371/journal.pone.0025718>
7. Willis, K. J. et al., 2012. Determining the ecological value of landscapes beyond protected areas. *Biological Conservation*. Available at: <http://linkinghub.elsevier.com/retrieve/pii/S0006320711003995>
8. Available online at http://www.globaltrees.org/rl_rhododendrons.htm
9. The Ebbe Nielsen Prize was established in honour of the late Ebbe Nielsen, a Danish entomologist who was among the inspiring founders of GBIF. More information is at <http://www.gbif.org/communications/news-and-events/ebbe-nielsen-prize/>
10. More information on the award and previous recipients is at <http://www.gbif.org/communications/news-and-events/young-researchers-award/>
11. The AFORO website with an online catalogue of otolith images for shape analysis is at <http://www.cmima.csic.es/aforo/>
12. The GBIF Work Programme 2012-2013 is available at http://www.gbif.org/orc/?doc_id=4394
13. The addendum to the terms of reference for the Participant Node Managers Committee is available at http://imgbif.gbif.org/CMS_NEW/get_file.php?FILE=693d470600b66366f205dfoobb478c
14. Presentations of the 2011 GBIF Science Symposium are available through <http://www.gbif.org/communications/news-and-events/gbif-symposia-and-workshops/>. A summary of the event is at <http://www.iisd.ca/ymb/gbif/sc2011/>
15. Economy is the term applied to Chinese Taipei, which hosts a GBIF node under the category of Other Associate Participant.
16. A small percentage of records labelled as 'high seas' may be records for which no country has been assigned due to data discrepancies.
17. Cadman, M., Chavan, V., King, N., Willoughby, S., Rajvanshi, A., Mathur, V., Roberts, R., and Hirsch, T. (2011). Publishing EIA-Related Primary Biodiversity Data: GBIF-IAIA Best Practice Guide. IAIA Special Publication Series No. 7. August 2011. Pp. 6. Accessible at http://links.gbif.org/eia_biodiversity_data_publishing_guide_en_v1
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23. <http://www.gbif.org/participation/training/events/training-event-details/?eventid=107>
24. <http://www.gbif.org/participation/training/events/training-event-details/?eventid=108>
25. <http://www.gbif.org/participation/training/events/training-event-details/?eventid=111>
26. <http://www.gbif.org/participation/training/events/training-event-details/?eventid=109>
27. http://www.gbif.org/orc/?doc_id=2935&l=en
28. <http://community.gbif.org/pg/pages/view/13016/resources-from-the-ipt2-workshop>
29. <http://www.gbif.org/participation/training/events/training-event-details/?eventid=114>
30. Available at http://www.gbif.org/orc/?doc_id=2969&l=en
31. UNEP/CBD/SBSTTA/15/INF/14, available at <http://www.cbd.int/doc/?meeting=sbstta-15>
32. GEO-BON, 2011. Adequacy of Biodiversity Observation Systems to support the CBD 2020 Targets. A report prepared by the Group on Earth Observations Biodiversity Observation Network (GEO-BON), for the Convention on Biological Diversity. 106 pp. Available at: www.earthobservations.org/documents/cop/bi_geobon/2011_cbd_adequacy_report.pdf
33. <http://www.research-europe.com/index.php/2011/08/dr-joannedaly-chair-and-dr-nick-king-executive-secretary-global-biodiversity-information-facility/>

Appendix 1 – Data records published by node

Node	Total	With coordinates	Publishers	Data Sources
Voting Participants				
Argentina	625,529	311,110	9	38
Australia	20,696,960	20,391,433	13	101
Belgium	4,725,197	4,378,925	6	45
Canada	1,776,119	1,600,538	11	86
Costa Rica	5,801,465	5,743,427	2	5
Denmark	5,743,266	5,548,189	3	50
Estonia	154,186	91,937	3	6
Finland	10,006,160	9,698,792	9	52
France	14,520,543	10,710,865	32	60
Germany	9,289,596	6,876,453	18	8,895
Iceland	450,889	431,049	1	4
Ireland	1,622,479	1,621,358	1	81
Japan	2,887,429	376,923	3	198
Korea, Republic of	1,648,194	334,156	21	137
Mauritania	151	0	1	1
Mexico	3,122,264	2,748,777	4	407
Netherlands	12,002,976	10,983,549	4	42
New Zealand	1,507,817	945,727	1	5
Norway	8,214,262	8,143,574	4	69
Peru	50,014	0	4	6
Portugal	82,774	4,702	5	7
Slovakia	107,300	1,603	1	1
Slovenia	265,966	61,440	3	5
South Africa	7,780,969	7,095,003	2	21
Spain	5,933,888	3,975,598	6	168
Sweden	32,284,998	29,764,539	3	49
Tanzania	10,033	9,458	1	14
United Kingdom	36,067,468	35,213,230	11	357
United States	104,962,049	86,190,468	97	283
Associate Country Participants				
Andorra	75,142	75,142	1	7
Austria	2,616,676	2,430,510	11	14
Benin	7,375	7,048	1	1
Cameroon	6,203	5,740	2	2
Colombia	557,763	410,769	3	10
Guinea	493	468	1	1
India	5,818	4,071	1	3
Luxembourg	752,825	724,755	1	1
Madagascar	17,760	5,833	3	3
Nicaragua	0	0	1	0
Pakistan	773	176	1	3
Poland	1,572,737	1,278,483	28	98
Switzerland	1,458,990	1,231,231	4	12
Togo	7,978	7,978	1	1
Other Associate Participants				
BioNET-ASEANET	13,029	4,775	1	1
BioNET-EASIANET	1,682	1,680	2	1
Biodiversity International	1,857,460	627,968	2	4
CABI Bioscience	229,305	0	1	3
Chinese Taipei	1,158,793	844,352	5	30
Consortium of European Taxonomic Facilities (CETAF)	94,678	0	1	1
Inter-American Biodiversity Information Network	219,430	214,595	1	8
International Centre for Insect Physiology and Ecology	3,939	3,909	1	3
NatureServe	759,536	0	1	1
Nordic Genetic Resource Center (NORDGEN)	37,162	6,022	1	1
Ocean Biogeographic Information System	12,176,146	11,708,177	6	186
Pacific Biodiversity Information Forum	2,300	2,219	1	2
Scientific Committee on Antarctic Research (SCAR)	276,442	276,340	1	74
Society for the Management of Electronic Biodiversity Data	4,702	4,534	1	1
World Federation for Culture Collections	43,889	0	1	18

Appendix 2 – Checklists published in 2011

For more information on these checklists, search by name on data.gbif.org

1. The Integrated Taxonomic Information System	43. Passiflora vernacular names
2. CATE Sphingidae	44. Kihansi Gorge Amphibian Species Checklist
3. CATE Araceae	45. Birds of Tanzania
4. GBIF Backbone Taxonomy	46. Andrade-C., M.G. AAT de las mariposas de Colombia: las especies y subespecies de las familias Papilionidae y Pieridae Instituto Alexander von Humboldt 1.0 2005 (Spreadsheet)
5. IRMNG Homonym List	47. Checklist of the threatened species of Colombia (part)
6. The Catalogue of Life	48. Sendoya S., Fernández F. AAT de hormigas (Hymenoptera: Formicidae) del Neotrópico 1.0 2004 (Spreadsheet)
7. Zoological names. A list of phyla, classes, and orders, prepared for section F, American Association for the Advancement of Science	49. Peces de la zona hidrogeográfica de la Amazonia, Colombia (Spreadsheet)
8. World Typhlocybinae database	50. Wikipedia Species Pages - English
9. Interim Register of Marine and Nonmarine Genera	51. Wikipedia Species Pages - German
10. International Plant Names Index	52. Wikipedia Species Pages - Spanish
11. Index Fungorum	53. Taiwanese IUCN species list
12. World Register of Marine Species	54. COA Wildlife Conservation List
13. Fauna Europaea	55. Endemic species in Taiwan
14. Mammal Species of the World, 3rd edition	56. The National Checklist of Taiwan
15. NCBI Taxonomy	57. Vernacular names of Iberian fungi in Spain
16. GRIN Taxonomy for Plants	58. Inventario Nacional Biodiversidad Especies amenazadas (España)
17. Paleobiology Database	59. Leguminosae in Flora iberica
18. USDA PLANTS Database	60. Mimosaceae & Papilionaceae Fl. Paisós Catalans
19. Common names of Chilean Plants	61. Iberian Zygaenidae in Fernández-Rubio, F. 2005. Zygaenidae (Lepidoptera).
20. Database of Vascular Plants of Canada (VASCAN)	62. Fauna Iberica vol 26. Museo Nacional de Ciencias naturales- CSIC. Madrid
21. Aphid Species File	63. Catalogue of Afrotropical Bees
22. Phasmida Species File	64. The Tree of Life Web Project (ToL)
23. Embioptera Species File	65. The Rufiji Fish Checklist
24. Plecoptera Species File	66. Tanzania Plant Specimens
25. Blattodea Species File	67. Inventory of Fish Species in the Wami River Basin
26. Mantodea Species File	68. Birds of Lindi Forests Plantation
27. Coleorrhyncha Species File	69. Global Invasive Species Database
28. Psocodea Species File	70. IOC World Bird Names
29. Orthoptera Species File	71. The Clements Checklist
30. Coreoidea Species File	72. Amphibia and Reptilia of Yunnan
31. Dermaptera Species File	73. Gaoligong Shan Medicinal Plants Checklist
32. Afromoths, online database of Afrotropical moth species (Lepidoptera)	74. China: Yunnan, Southern Gaoligongshan, Rapid Biological Inventories Report No. 04
33. True Fruit Flies (Diptera, Tephritidae) of the Afrotropical Region	75. Pheasant Diversity and Conservation in the Mt. Gaoligongshan Region
34. Global taxonomic database of Gracillariidae (Lepidoptera)	76. Native Orchids from Gaoligongshan Mountains, China
35. Belgian Species List	77. Flora of Gaoligong Mountains
36. Invasive Alien Species in Belgium - HARMONIA database	78. Eastern Mediterranean Syllidae
37. ECAT Provisional Names	79. List of plant names: Huai Kao Arboretum, Chiangmai
38. Global Compositae Checklist (GCC)	
39. International Cichorieae Network (ICN)	
40. Freshwater Animal Diversity Assessment	
41. Botanical survey & taxonomical classification on the natural vegetation of Hingawali, Navanga & Simana in Lindi District	
42. IUCN Red List of Threatened Species	

Appendix 3 – New publishers in 2011

Publisher	GBIF Participant Node	Datasets	Number of occurrence records published
ArtDatabanken	Sweden	1	25,785,267
Association des Naturalistes de la Vallée du Loing et du massif de Fontainebleau	France	1	2,424
Birds Australia	Australia	1	7,403,521
Centre d'estudis de la neu i de la muntanya d'Andorra (CENMA), Institut d'Estudis Andorrans	Andorra	7	75,142
Centre d'Observation de Surveillance et d'Information Environnementales (COSIE)	Guinea	1	493
Centre National pour le Développement Rural - Madagascar (FOFIFA)	Madagascar	1	8,102
Cincinnati Museum Center	USA	1	6,513
Conservatoire Botanique National Alpin	France	1	2,221
Crop Research Institute (CRI)	Bioversity International	1	50,682
Department of Natural Resources, Environment, The Arts and Sport, Northern Territory of Australia	Australia	2	827,973
ECOCEAN USA	USA	2	83
Ecole de Faune de Garoua	Cameroon	1	4,985
Eremaea	Australia	1	986,699
Herbarium of Université de Montpellier 2, Institut de Botanique	France	1	21,781
Herbarium specimens of Bamboo collection Prafrance Générargue (BAMBO)	France	1	189
Herbier de l'Université de Limoges	France	1	84
Herbier des conservatoires et jardins botaniques de Nancy	France	1	13,669
Herbiers Universitaires de Clermont-Ferrand	France	1	3,795
Institut Scientifique, Mohamed V University	France	1	1,487
Institute of Research for Development	France	3	336,360
IRAD Cameroun (Institut de Recherche Agronomique pour le Développement Cameroun)	Cameroon	1	1,249
Isagen	Colombia	1	228,332
Kokkola Nature Collection Kieppi	Finland	1	498
Kuopio Natural History Museum	Finland	1	3,641
Lund Museum of Zoology	Sweden	1	143,950
Lycée Félix Esclangon. Comité du Patrimoine Manosquin. Herbier G. Fenoul	France	1	501
Musée cantonal de zoologie, Lausanne	Switzerland	1	103
Muséum d'Histoire Naturelle d'Autun, Herbarium	France	1	1,111
Muséum d'Histoire Naturelle de Bourges	France	1	430
Muséum d'Histoire Naturelle de Nice	France	1	2,731
Museum d'Histoire Naturelle of Aix-en-Provence, Herbarium	France	1	6,358
Museum of Natural and Cultural History - University of Oregon	USA	1	15,975
Natural History Museum, University of Tartu	Estonia	3	103,265
Naturkundemuseum im Ottoneum Kassel	Germany	1	40,927
New York State Museum (NYSM)	USA	1	14,312
NSW Department of Environment, Climate Change, and Water representing the State of New South Wales	Australia	1	4,288,512
Ohio State University Fish Division	USA	1	87,842
Parc Botanique et Zoologique de Tsimbazaza (P.B.Z.T.)	Madagascar	1	9,384
Research Institute for Nature and Forest	Belgium	2	3,325,224
Sir Alister Hardy Foundation for Ocean Science (SAHFOS)	UK	1	2,629,628
Société des Sciences Naturelles et Mathématiques de Cherbourg	France	1	991
South Australia, Department of Environment and Natural Resources	Australia	4	5,429,336
United States Geological Survey	USA	1	98,607
Universidad Nacional de San Agustín (Herbarium Arequipense HUSA)	Peru	1	11,251
Universität Salzburg	Austria	1	15,734
Université d'Abomey-Calavi, Faculté des Sciences Agronomiques	Benin	1	10,063
Université de Lomé	Togo	1	8,015
University of Arkansas Collections Facility, UAFMC	USA	1	5,803
University of Eastern Finland	Finland	3	28,098
University of Oulu	Finland	4	35,760
Western Australian Herbarium	Australia	1	731,445
Wildlife Sightings	Canada	1	685
Zoological Institute, Russian Academy of Sciences, St. Petersburg	Society for the Management of Electronic Biodiversity Data	1	4,702

Appendix 4 – Publications in 2011

Data publishing training manuals and guides

English

A beginner's guide to persistent identifiers
 Create your own Darwin Core Archive: step-by-step guide
 Darwin Core Archive Assistant: user guide
 GBIF Darwin Core Archive: how-to-guide
 GBIF Metadata Profile: how-to guide
 Getting started: overview of data publishing in the GBIF network
 Improving EIA practice: best practice guide for publishing primary biodiversity data
 Publishing and registering data with GBIF
 Publishing species checklists: best practices
 Publishing species checklists: step-by-step guide

French

Créer votre propre Archive Darwin Core: guide pratique
 Premiers pas: introduction à la publication de données dans le réseau GBIF
 Publier et enregistrer des données avec le GBIF

Spanish

Cómo crear su propio Archivo Darwin Core: guía paso a paso
 Primeros pasos: perspectiva general del proceso de publicación de datos en la red GBIF
 Publicar y registrar datos en GBIF
 Guía para principiantes sobre identificadores persistentes: resumen ejecutivo

Reference guides

Darwin Core Archive Format: reference guide to the XML descriptor file
 Darwin Core quick reference guide
 GBIF GNA profile reference guide for Darwin Core Archive: core terms and extension
 GBIF Metadata Profile: reference guide

GBIF training manual I: Digitization of natural history collection data

French

La généralisation des données
 Lancer un projet de numérisation d'une collection
 Les principes de qualité des données
 Les usages des données primaires d'occurrence d'espèces
 Principes de la bonne pratique sur le géoréférencement
 Principes et méthodes de nettoyage de données

GBIF governance

GBIF annual report 2010
 GBIF strategic plan 2012-2016: seizing the future
 GBIF work programme 2012-2013
 Participants report 2010

Data infrastructure

GBIF IPT v2 user manual
 GBIF position paper on data hosting infrastructure for primary biodiversity data
 Recommendations for the use of Knowledge Organisation Systems by GBIF (white paper)

Appendix 5 – GBIF Participants

Participant	Member as of	Participant	Acronym	Member as of
Voting participants		Other Associate Participants		
Argentina	March 2002	Albertine Rift Conservation Society	ARCOS	January 2010
Australia	February 2001	ASEAN Centre for Biodiversity	ACB	August 2009
Belgium	February 2001	BioNet-ANDINONET		October 2007
Canada	March 2001	BioNet-ASEANET		October 2002
Chile	December 2009	BioNet-EASIANET		October 2002
Costa Rica	May 2001	BioNet-INTERNATIONAL		May 2001
Denmark	January 2001	BioNet-SAFRINET		July 2003
Equatorial Guinea	March 2005	Bioversity International		January 2007
Estonia	September 2003	Botanic Gardens Conservation International	BGCI	August 2004
Finland	April 2001	CABI Bioscience		September 2001
France	April 2001	Chinese Taipei		March 2001
Germany	February 2001	Ciencia y Tecnología para el Desarrollo	CYTED	April 2006
Iceland	June 2001	Consortium for the Barcode of Life	CBOL	March 2005
Ireland	December 2007	Consortium of European Taxonomic Facilities	CETAF	June 2007
Japan	February 2001	Discover Life		February 2008
Kenya	July 2008	DIVERSITAS		May 2007
Korea, Rep. Of	May 2001	Encyclopedia of Life	EOL	December 2007
Mauritania	August 2009	Endangered Wildlife Trust	EWT	July 2008
Mexico	March 2001	ETI Bioinformatics		March 2001
Netherlands	February 2001	European Environment Agency	EEA	September 2010
New Zealand	February 2001	Finding Species		December 2003
Norway	February 2004	Freshwater Biological Association – FreshwaterLife		August 2003
Peru	September 2002	International Long Term Ecological Research	ILTER	July 2008
Portugal	June 2001	Integrated Taxonomic Information System	ITIS	March 2001
Slovakia	August 2001	Inter-American Biodiversity Information Network	IABIN	May 2001
Slovenia	February 2001	International Barcode of Life Project	iBOL	April 2011
South Africa	April 2003	International Centre for Insect Physiology and Ecology	ICIPE	March 2004
Spain	February 2001	International Centre for Integrated Mountain Development	ICIMOD	September 2009
Sweden	February 2001	ICLEI - Local Governments for Sustainability	ICLEI	October 2010
Tanzania	September 2002	International Commission on Zoological Nomenclature	ICZN	June 2005
United Kingdom	August 2001	International Species Information System	ISIS	May 2006
Uruguay	January 2009	Major Systematic Entomology Facilities	MSEF	February 2006
United States	January 2001	Natural Science Collections Alliance	NSCA	December 2004
Associate Country Participants		NatureServe		June 2001
Andorra	September 2010	Nordic Genetic Resource Center	NordGen	March 2004
Austria	September 2001	Ocean Biogeographic Information System	OBIS	June 2001
Benin	December 2004	Pacific Biodiversity Information Forum	PBIF	August 2004
Bulgaria	August 2001	Scientific Committee on Antarctic Research	SCAR	February 2008
Burkina Faso	January 2007	Secrétariat Intérimaire du Volet Environnement du NEPAD	SINEPAD	July 2009
Cameroon	March 2005	Society for the Management of Electronic Biodiversity Data	SMEBD	March 2009
Central African Republic	March 2011	Society for the Preservation of Natural History Collections	SPNHC	January 2007
Colombia	September 2003	Species 2000		March 2001
Congo, Rep. Of	May 2011	Taxonomic Databases Working Group	TDWG	March 2002
Cuba	August 2008	United Nations Environment Programme – World Conservation Monitoring Centre	UNEP-WCMC	May 2001
Ghana	March 2001	Wildscreen		January 2003
Guinea	March 2005	World Data Center for Biodiversity and Ecology	WDCBE	April 2005
India	July 2003	World Federation for Culture Collections	WFCC	October 2002
Indonesia	October 2004			
Luxembourg	April 2008			
Madagascar	January 2003			
Morocco	January 2003			
Nicaragua	June 2001			
Pakistan	August 2001			
Philippines	March 2005			
Poland	March 2001			
Switzerland	February 2001			
Togo	October 2009			
Uganda	October 2009			

Appendix 6 – GBIF Governing Board and Standing Committees 2011

Elections for some of the committee positions were held at the 18th Governing Board meeting in October 2011. New officers elected at that time will be presented in the 2012 Annual Report.

Executive Committee		Node Managers Committee	
Chair	Joanne Daly	Chair	Francisco Pando
1st Vice Chair	Keiichi Matsuura	Vice Chairs	Stephen Wilkinson Francis Oguya
2nd Vice Chair	Wouter Los	Members	All Node Managers
3rd Vice Chair	Gladys Cotter		
Committee Chairs		Nodes Steering Group	
Science	Leonard Krishtalka	Chair	Francisco Pando
Budget	Per Backe Hansen	Vice Chairs	Stephen Wilkinson Francis Oguya
Nodes	Francisco Pando		
Rules	Christoph Häuser	Regional Node	
Ex-officio		Representatives	Guy Baillargeon Cees Hof Beth Mantle Maria Auxiliadora Mora Fatima Parker-Allie
Executive Secretary	Nicholas King		
Standing Committees		Rules Committee	
Science Committee		Chair	Christoph Häuser
Chair	Leonard Krishtalka	Vice Chair	Mark Fornwall
Vice Chairs	Mark Graham Tanya Abrahamse	Members	E. Manrique Reol William Alex Gray Fabian Haas
Work Area Chairs			
DIGIT	Arturo H. Ariño		
ECAT	Yde de Jong		
IDA	William Ulate		
Outreach	Thomas Kristensen		
Training	Townsend Peterson		
Ex-officio			
Chair GB	Joanne Daly		
1st Vice Chair GB	Keiichi Matsuura		
2nd Vice Chair GB	Wouter Los		
3rd Vice Chair GB	Gladys Cotter		
Executive Secretary	Nicholas King		
Budget Committee			
Chair	Per Backe Hansen		
Vice Chairs	Edgardo Romero Eli van der Heide		
Members	Bonnie C. Carroll Shunichi Kikuchi Lars Nilsson		
Ex-officio			
GB Chair	Joanne Daly		
Executive Secretary	Nicholas King		

Appendix 7 – GBIF Task Groups 2011

Content needs assessment task group	
Co-chairs	Daniel P. Faith Ben Collen
Members	Arturo H. Ariño Henrik Enghoff John Guinotte Jeremy Kerr Patricia Koleff Osorio Leslie Underhill
Secretariat	Vishwas Chavan

Data publishing framework task group	
Co-chairs	Tom Moritz S. Krishnan
Members	Donat Agosti Philippa Benson Matthew Cockerill Peter Ingwersen Lyubomir Penev David Roberts
Secretariat	Vishwas Chavan

Multimedia resources task group	
Chairs	Robert Morris
Members	Vijay Barve Mihail Carausu Chris Freeland Gregor Hagedorn Patrick Leary Dimitry Mozzherin Annette Olson Greg Riccardi Ivan Teage Greg Whitbread
Secretariat	Vishwas Chavan

Appendix 8 – GBIF Accreditations and representations

GBIF accreditations
1. United Nations Environment Programme (UNEP) Governing Council (Major Groups and Stakeholders/Global Ministerial Environment Forum)
2. United Nations Framework Convention on Climate Change (UNFCCC)
3. Intergovernmental Panel on Climate Change (IPCC)
4. United Nations Economic and Social Council (UN ECOSOC)
5. Convention on Biological Diversity (CBD)
6. Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS)

GBIF representations
1. Group on Earth Observations Biodiversity Observation Network (GEO-BON) Steering Committee
2. Inter-American Biodiversity Information Network (IABIN) General Assembly
3. Ocean Biogeographic Information System (OBIS) Governing Board
4. LifeWatch Policy & Science Board
5. Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)
6. Trondheim Environmental Conferences
7. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
8. Conservation Commons Steering Committee (CMS)
9. Biodiversity Indicators Partnership (BIP)
10. United Nations Environment Programme (UNEP) GEO-5 Policy & Advisory Board
11. GEO BON Implementation Plan: Co-lead of Working Group on Data Integration and Interoperability

Appendix 9 – Financial information

Preliminary financial statement 2011 in EUR

GBIF CORE FUNDS	
Income Statement	EUROS
Income	4,973,729
Work Programme 2011 - Informatics	-1,551,120
Work Programme 2011 - Participation	-853,526
Governance - Committee costs	-114,102
Staff expenditure - Management	-748,756
Running expenditure - Management	-294,717
Secretariat facilities - Management	-119,688
Total expenditure	-3,681,909
Changes in foreign exchanges rates	-305,633
Interest	20,062
GBIC Conference	-100,000
	-385,571
Surplus	906,249
Balance Sheet	
Assets	
Other receivables and VAT	20,588
Cash and Cash at bank	2,378,721
Total assets	2,399,309
Retained funds and liabilities	
Retained funds	1,164,796
Provisions	272,237
Supplementary funds	490,227
Auditor	6,053
Prepayments re. 2012-2013	362,920
Other payables	103,076
Total equity and liabilities	2,399,309
GBIF Supplementary Fund	
Balance on 1 January	361,213
Income	437,638
Expenditure	-308,624
	490,227

Basic Financial Contributions 2011

Voting Participants	Financial Contributors
Argentina	CONICET - Museo Argentino de Ciencias Naturales
Australia	CSIRO Entomology
Belgium	Belgian Federal Science Policy Office
Chile	Comisión Nacional del Medio Ambiente
Costa Rica	Asociación Instituto Nacional de Biodiversidad (InBio)
Denmark	Danish National Research Council
Equatorial Guinea	CICTE - Council of Scientific and Technological Research
Estonia	Ministry of Environment
Finland	Finnish Museum of Natural History
France	Direction Générale de la Recherche et de l'Innovation
Germany	German Research Foundation (DFG)
Iceland	Ministry for the Environment
Ireland	National Parks & Wildlife Service
Japan	Japan Science and Technology Agency
Kenya	National Museums of Kenya
Mauritania	Ecole Normale Supérieure de Nouakchott
Mexico	CONACYT
Netherlands	Ministry of Education, Culture and Science
New Zealand	Ministry of Research, Science and Technology
Norway	The Research Council of Norway
Peru	Instituto de Investigaciones de la Amazonía Peruana (IIAP)
Portugal	Foundation for Science and Technology
Republic of Korea	Ministry of Education, Science and Technology
Slovak Republic	Ministry of the Environment
Slovenia	Ministry of Higher Education, Science and Technology
South Africa	Department of Science and Technology
Spain	Ministry of Education and Science
Sweden	Swedish Research Council
Tanzania	Tanzania Commission for Science and Technology (COSTECH)
United Kingdom	BBSRC, Polaris House, Swindon NERC, Polaris House, Swindon Royal Botanic Gardens, Kew Natural History Museum Joint Nature Conservation Committee DEFRA
Uruguay	Departamento Biodiversidad
United States	National Science Foundation

Externally Received Grants 2011

For supplementary Funds	DKK	EUR
University of Copenhagen (IT equipment)	170,000	22,867
SEP CEPDEC Institut de Recherche pour le Développement, France	260,113	35,000
University of Copenhagen (Salary Subsidy)	126,000	16,949
EMODNET	74,436	10,013
EuroGEOSS	260,447	35,000
VIBRANT	560,759	75,430
Open-Up	202,851	27,247
Total external funding	1,654,606	222,506

Appendix 10 – GBIF Secretariat staff

Executive Secretary/Director	Nicholas King (until 31 December 2011)
Deputy Director for Management and International Relations	Hugo von Linstow
Office Manager & PA to the Director	Susanne Lønstrup Sheldon
ICT Support Manager	Anne Mette Nielsen
Financial Officer	Bo Thorsteinsson
Senior Programme Officer for Participation	Olaf Bánki (from August)
Senior Programme Officer for Nodes	Juan Bello (until May)
Nodes Capacity Officer	Mélanie Raymond (on maternity leave from June), Katja Wolfhechel Christensen (from April)
Senior Programme Officer for Training	Alberto González-Talaván
Senior Programme Officer for Engagement	Tim Hirsch (from June)
Communications Officer	Sampreethi Aipanjiguly (from July)
Senior Programme Officer for Digitization and Mobilization of Primary Biodiversity Data (DIGIT)	Vishwas Chavan
Senior Programme Officer for Science and Scientific Liaison	Samy Gaiji
Senior Programme Officer for Inventory, Discovery and Access (IDA)	Éamonn Ó Tuama
Senior Programme Officer for the Electronic Catalogue of Names of Known Organisms (ECAT)	David Remsen
Technical Assistant (ECAT)	Nikolas Ioannou
Knowledge Systems Engineer	Dag Terje Filip Endresen (from August)
Information Systems Architect	Tim Robertson
Webmaster and Network Administrator	Ciprian Vizitiu
System Administrator	Andrei Cenja
Systems Analyst	Andrea Hahn
Data Administrator	Jan Krzysztof Legind (from April)
Programmer	José Miguel Cuadra Morales
Programmer	Kyle Braak
Developer	Federico Mendez Hernandez
Developer	Lars Francke
Developer	Oliver Meyn
Informatics Liaison	Burke Chih-Jen Ko (from February)



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