

NBII Metadata Clearinghouse Continues To Grow

The Metadata Clearinghouse <<http://www.nbio.gov/clearinghouse.html>> is one of the most important National Biological Information Infrastructure (NBII) components. Through this service, NBII users can search an online “card catalog” of detailed descriptions (metadata) of hundreds of different biological data sets and information products from many different sources around the United States to find the particular data sets or information products that meet their needs. The metadata descriptions in the NBII

Clearinghouse are developed by a host of NBII participants who want to make their data sets or information products (such as technical reports) more widely available to others for sharing, exchange, and analysis.

Metadata formats in the NBII Clearinghouse follow the NBII biological metadata standard, which also is an approved “profile” or extension of the Federal Geographic Data Committee’s geospatial metadata standard. The NBII Program provides training and technical support in metadata development to assist those

agencies, organizations, and individuals who are interested in documenting their data and information for the NBII Clearinghouse (see the “Metadata Training” column).

Over the last year, the NBII Clearinghouse has been expanding. Metadata descriptions of new data sets and information products are continually added to the Clearinghouse. In addition, several NBII partner organizations have established their own NBII Clearinghouse “nodes” through which they are serving their collections of NBII metadata. All of the NBII

NBII and NSDI Programs Work Together

NBII and the National Spatial Data Infrastructure or NSDI <<http://www.fgdc.gov>> support and complement each other in helping to increase access, sharing, and application of data among a broad set of public and private cooperators and partners. The focus of the NSDI is on geospatial data — data which are geographically referenced — while the focus of the NBII is on all types of biological data and information.

The NSDI and NBII programs work closely together in several ways to help support their common goals. In 1998, the NSDI and NBII programs initiated a new partnership agreement through which NSDI and NBII funds help support projects selected through the State Partnerships Program of the U.S. Geological Survey’s Biological Resources Division (BRD). Each of these projects involves a partnership



between one or more BRD science centers and one or more state agencies.

State Partnership projects supported with NBII/NSDI funds have a particular emphasis on expanding access to and sharing of biological geospatial data (such as on the distributions of migratory bird species or tracking the extent of non-native species invasions) through the NBII/NSDI federation. In the first year of this new effort, the NBII/NSDI partnership contributed an additional \$250,000 to support a total of five special State Partnership projects in Arizona, Florida, New Mexico, and Texas. This joint effort is continuing in 1999. 

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Decision Support Systems, the Aurora Partnership, and the NBII

Decision support systems have the potential to integrate data, methods, models, and other tools within a framework that explicitly addresses the decision-making process. The U.S. Interagency Group on Decision Support for Natural Resources and the Environment (IGDS) — an interagency group of several federal agencies who deal with natural resources issues — has developed a strategy to apply this concept for “place-based” decision making. The group’s strategic goal is to improve the management and protection of natural resources and the environment through the development and application of decision support systems. The IGDC expects that these systems will provide a suite of integrated tools and services that will facilitate the decision-making process.

Specific IGDC objectives are to:

- Improve the interoperability, modularity, and transferability of decision support tools and services.

- Apply decision science principles to natural resource and environmental decision making.
- Incorporate decision science principles and tools into a science-based, flexible, and extensible decision support framework.

The Aurora Partnership is a collaboration of public and private decision support efforts with objectives similar to the IGDS strategy and, to date, includes participants from 20 non-government organizations; 10 companies and corporations; 20 federal agencies; and 15 universities, state, and local governments. The Aurora Partnership is focused on stimulating the development and application of next-generation decision support systems that will enable the practical use of natural and social science in decision making. The Aurora Partnership approach is to use an open, collaborative process that builds on existing efforts in defined

geographic regions (such as watersheds and counties). The setting for the Aurora’s initial pilot project is the Greater Yellowstone area.

Benefits envisioned from the Aurora Partnership include identifying ways to provide all sectors of society with greater access to information, applications, and results; promoting research, development, and implementation of architectures and technologies that enable data sharing and use; strengthening the links between science and decision making by fostering the integration of physical, biological, social, and economic information; and enabling more effective participation by the public in the decision-making process.

The Aurora Partnership shares similar philosophies, approaches, goals, and objectives with the NBII. In fact, the programs are mutually supportive and synergistic. Appropriate technological or other advances will be freely shared and transferred between Aurora and the NBII. 

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Clearinghouse “nodes” are interconnected, and a Clearinghouse user has the option of searching through all the nodes simultaneously with just one query, or searching on one or more nodes at a time. Instructions for how an office can easily establish its own NBII Clearinghouse node are available on the NBII at http://www.emtc.usgs.gov/http_data/meta_isite/howto.html.

Since the NBII Clearinghouse is also fully compliant with (and a registered node of) the National Spatial Data Infrastructure (NSDI) Clearinghouse, users of the NSDI Clearinghouse system can readily search through metadata in the NBII Clearinghouse; conversely, NBII users can easily search through metadata in the NSDI Clearinghouse. 



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Moving Toward the Next Generation NBII

The NBII as we are familiar with it is beginning an exciting technical journey aimed at providing increased user capabilities. New NBII benefits will be based on state-of-the-art technologies and tools that better enable customers to find, locate, publish, and use the program's valuable biological data and information. The need for the NBII's technical evolution was outlined in *Teaming with Life: Investing in Science to Understand and Use America's Living Capital*, a report issued in June 1998 by the Biodiversity and Ecosystems Panel of the President's Committee of Advisors on Science and Technology.

One of the current strengths of the NBII is its growing and increasingly valuable collection of data and information on the nation's biological resources. The next generation NBII or NBII-2 has to continue to build on this content while also providing additional user capabilities. This presents a host of special challenges to NBII developers, data producers, and users.

A brief sampling follows of the new capabilities being designed and prototyped to support the next generation NBII. These capabilities are organized into the Services, Tools, Content, and Infrastructure components that will be required for the dramatic expansion and development of the NBII as it is envisioned.

The pyramid, shown on the following page, illustrates the technical evolution the NBII is undergoing. The pyramid is arranged hierarchically to demonstrate the evolutionary phases that the NBII must go through to achieve its ultimate goal of being the world's premier biological information network. The evolutionary process will take the next 3-5 years for us to

fully realize our future vision for the NBII. As described below, considerable progress is already being made with prototype projects, identifying partner organizations, and defining the NBII functionality required to meet the nation's ever growing biological needs.

Building Blocks of Next Generation NBII Examined at 1999 AAAS Annual Meeting

At the 1998 annual meeting of the American Association for the Advancement of Science (AAAS), John Gibbons, then the President's Science Advisor, announced the imminent publication of *Teaming With Life: Investing in Science to Understand and Use America's Living Capital*, a special report produced by the Biodiversity and Ecosystems Panel of the President's Committee of Advisors on Science and Technology (PCAST). One of the key areas discussed in *Teaming With Life* was the need to develop a next generation National Biological Information Infrastructure or NBII-2 (see *Access*, September 1998).

NBII-2, the PCAST panel noted, needs to greatly enhance current NBII capacities to integrate and synthesize many different databases, analyze information in new ways, and answer questions and present results that can be readily used by resource managers, policy makers, and educators.

At the 1999 AAAS meeting, a panel of policy and technical experts offered several perspectives on the progress that has been made, and the opportunities identified, while implementing the report's recommendations. Key areas of focus: the concepts behind the original report and the need for bioinformatics research; what progress has been made and how it is evolving; the current

The bottom layer of the pyramid — the Controlled & Secure Network — is based on the need of users, researchers, and NBII-2 customers to limit access to certain data sets for a period of time and for the program to provide a secure and encrypted

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status of the NBII and the realities of building a federation of public and private sector involvement; and the development of the framework for increasing involvement of the public, not-for-profit, and private sectors.

The panel was chaired by Bonnie Carroll, President, Information International Associates, Inc., and included presentations by Rosina Bierbaum, Associate Director for the Environment, Office of Science and Technology Policy; Meredith Lane, PCAST Staff Director; Jim Edwards, Directorate for Biological Sciences, National Science Foundation; Dick Kaser, Executive Director, National Federation of Abstracting and Information Services; and Gladys Cotter, Associate Chief Biologist for Information, U.S. Geological Survey.



Dick Kaser, Executive Director of the National Federation of Abstracting and Information Services, spoke about metadata and the vital role it will play in the next generation NBII.

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network that ensures data integrity.

The next layer — Standards, Vocabulary, Hardware/Software — serves as the foundation for the NBII. This layer includes the standards, controlled vocabulary, and hardware/software that allow users to use the NBII more effectively. The development and establishment of standards and the use of a flexible controlled vocabulary (see *Access*, September 1998) will provide not only the means for the effective and efficient exchange of information, but will also greatly aid in the discovery of information. Several NBII partners and stakeholders are actively pursuing efforts in this area through the National Vegetative Classification standard, the Federal Geographic Data Committee's biological metadata standard, and the California Environmental Resources Evaluation System (CERES) Vocabulary project.

The core focus for NBII and NBII-2 is to provide ready and easy access to both metadata, data sets, and information products through the Data and Information Repository layer. Due to the distributed nature of the World Wide Web, these information products exist at multiple sites in various formats. NBII-2 will make it easy to access these products, in part, by providing a seamless interface to users to aid in the process of information discovery. Several activities that support this goal include the Advanced Search Facility (ASF) <<http://asf.gils.net/>>, the Z39.50 Biology Implementers Group (ZBIG) <[\[raptor.kbs.ukans.edu/zbig\]\(http://raptor.kbs.ukans.edu/zbig\)>, the Oak Ridge National Laboratory Mercury Distributed Retrieval system, the prototype implementation of Hiawatha Island Software Co. LLC software product, TagGen <<http://www.taggen.com>>, and the USGS Center for Biological Informatics \(CBI\) prototype Uniform Resource Locator \(URL\) Registration and Categorization system <<http://bp.cr.usgs.gov/urlreg/nbiides.html>>.](http://</p>
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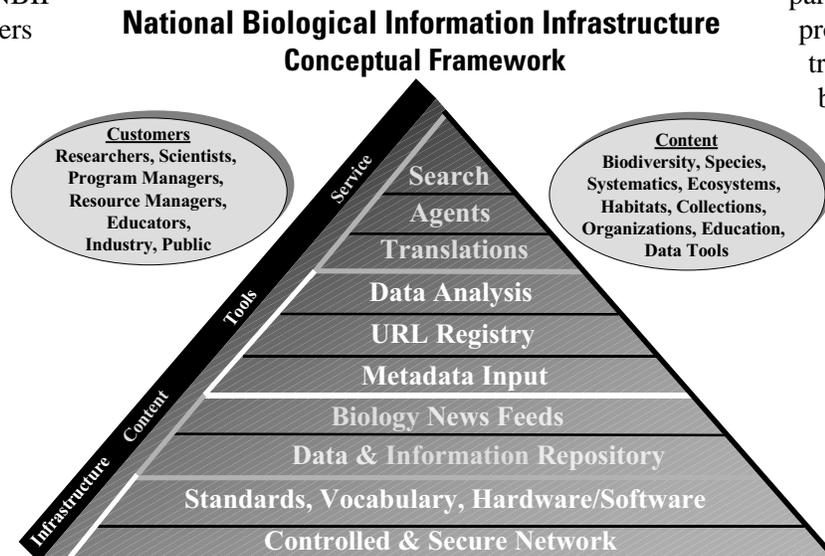
The need to provide timely biological information contained in national and international newspapers

MetaMaker metadata tool.

Another effort currently underway by the USGS Center for Biological Informatics and the USGS Patuxent Wildlife Research Center is the implementation of metatags on the Bird Information Center <<http://www.mbr-pwrc.usgs.gov/id/framlst/framlst.html>> Web pages. Defining some unique NBII metatags and implementing standard HTML tags (title, description, and so forth) will greatly enhance the discovery of this information. The ultimate goal of this effort is to work with other NBII partners to produce a working prototype which shows the tremendous benefits that can be obtained through this approach.

The URL Registration layer is designed to ease the burden on current NBII staff to discover and include various data sites, links, and Web pages within the NBII. The NBII-2 is being designed to support biological data repository owners — whether data sets and/or Web

pages — to automatically register and categorize their information site for inclusion into NBII-2. This will greatly enhance the number of partners and data repositories in NBII-2 and, ultimately, make more biological information available to users in a more timely manner. This capability is also being linked to creating a centralized search mechanism to allow users to locate vast amounts of information more easily through the NBII. Several initiatives including the CBI prototype URL Registry/Categorization tool, the CERES project, the ORNL Mercury Distributed searching tool, and the ASF project all are contributing



is an NBII capability that will not only serve researchers, but policy makers, resource managers, and the general public, too. This layer, Biology in the News, is currently being designed and prototyped for release in the June timeframe.

One of the key components of both the current NBII and the evolving NBII will be the continued enhancements and creation of metadata tools that facilitate user contributions to the NBII of both information products and data sets. The Metadata Input tools layer is currently undergoing an evaluation to determine what possible tools could augment or replace the current

various aspects to this layer.

The Data Analysis Tools layer will be an important NBII-2 component that makes it possible for users to re-manipulate, validate, and/or recast various biological data sets to support national biological initiatives. Current NBII efforts of this type include the ZBIG prototype biological tool, San Diego Super Computing Center biological models, and various decision support system tools under development within the Department of Interior and its partner agencies.

The need for periodic data and Web site translations exists within NBII-2 because of its international clientele. The Translations layer will expedite access to biological information that is being produced around the world. At the same time, NBII-2 must provide the capability to present that information in multiple languages. Current related NBII National Program Office and partner efforts in the Translations layer include: the Inter-American Biodiversity Information Network project, and the potential evaluation of the National Air Intelligence Center Machine Translation package.

The Intelligent Agents and Push Technologies layer will provide a much needed capability of "profiling" information for various user communities so that hundreds of thousands of extraneous records, projects, or efforts do not have to be reviewed by researchers or program managers. The NBII National Program Office concept

is to create a "BioBot" that will allow users and researchers to automatically be notified and presented with relevant information from a variety of sources.

The top layer of the NBII is the Search and Retrieval layer. One of the basic NBII-2 capabilities will be to make it possible for users to query across various distributed data sources from a single user interface. NBII-2 users do not and will not necessarily know all of the biological resource sites available on the World Wide Web. That is why probably the most important NBII component may be to provide a seamless interface to the countless data and information repositories worldwide. Search and Retrieval services are often the most utilized by the information community. Current NBII partner efforts include: ASF research and evaluation, and the CBI Gateway to the Earth Prototype Model <<http://www.nbii.gov/digitalearth/digitalearth.htm>>.

All of the capabilities required of a dynamic and effective NBII-2 cannot be provided by any single NBII partner. Moreover, the current NBII partner mix itself has limited resources and capacities. As NBII looks to the future, new working partnerships with universities, other government agencies, national laboratories, and international working groups will be required to ensure the transition to NBII-2 proceeds in a timely and efficient manner. Conversely, without a coordinated effort in the funding and

oversight of the initiatives already outlined, as well as others still under development, NBII-2 creation will be significantly slowed. 

UPDATE

Hope to See You in St. Louis!

This coming August, the NBII exhibit team will be getting its act together and taking it on the road. The destination is St. Louis, Missouri, at the International Botanical Congress (IBC), the world's largest gathering of plant scientists. If you're planning to attend the IBC, which runs from August 1-7, please stop by the NBII exhibit area and say hello! We'd be delighted to meet you. Plus, we'll be offering a variety of handouts, demonstrations, and special prize drawings.

ITIS: Now In the Online News

You might recall reading about the Integrated Taxonomic Information System or ITIS in the September 1998 issue of *Access* (ITIS is the first comprehensive, standardized reference for the scientific names of the flora and fauna of North America and surrounding oceans). The system, a

vital NBII component, can be found at <<http://www.itis.usda.gov/plantproj/itis/index.html>>.

Now ITIS is in the news again. This time, the enhanced visibility comes from a recent issue of the online magazine, *Access America* (which should not be confused with

this publication). For more information, just see <<http://www.accessamerica.gov/docs/namingsystem.html>> and the article, "Uncommon System for Naming Species Answers Common Need — and It's on the Internet." Happy reading! 

IABIN Launched, World Bank Funds Start-Up Projects

The Inter-American Biodiversity Information Network (IABIN) was officially launched at a meeting held April 15 – 18 in Brasilia, Brazil. More than 100 scientists and specialists from throughout the Americas participated in the inaugural meeting, which was sponsored by the Brazilian Ministry of the Environment. The meeting brought together officially designated national IABIN Focal Points for the first time and drew participation from more than double the number of countries previously engaged in IABIN.

Participants at the IABIN meeting examined possible governance models for the network, themes and criteria

for potential pilot projects, cooperation opportunities with other initiatives, and capacity building and connectivity issues within the network. The group agreed on a basic governance structure, a process for the establishment of the network, and a political host for IABIN. These recommendations will be submitted to the Organization of American States Committee on Sustainable

Development for endorsement.

The IABIN meeting established an official venue for communication and

The IABIN meeting established an official venue for communication and coordination of biodiversity information across countries of the Western Hemisphere.

coordination of biodiversity information across countries of the Western Hemisphere. Continued support of IABIN by the governments of

the Americas and organizations involved with biodiversity information will ensure a network that effectively meets the needs of the biodiversity and decision-making communities throughout the Hemisphere.

Recognizing the need for a biodiversity network in the Americas, the World Bank's Office of Environmentally and Socially Sustainable Development for Latin America and the Caribbean Region is providing \$470,000 to support the establishment of IABIN during 1999. These funds will support projects to: (1) establish a structure for the organization and coordination of IABIN, (2) develop and expand technological tools and standards for biodiversity information (for example, metadata databases, taxonomic authorities, and so forth), and (3) initiate pilot studies on biodiversity issues to provide a framework for information sharing among IABIN participants. These projects, developed in collaboration with IABIN experts and Focal Points, will set the baseline for successful implementation of the network. The World Bank funding represents the largest financial contribution to IABIN since the initiative was first agreed on at the 1996 Summit of the Americas. 

Upcoming Events of NBII Interest

1999

GIS for Energy '99, Houston, TX	June 15-17
Meeting of the Subsidiary Body for Scientific, Technical and Technological Advice, Convention on Biological Diversity, Montreal, Canada	June 21-25
International Interdisciplinary Conference on the Environment, Baltimore, MD	June 23-26
World Conference on Science, "Science for the Twenty-First Century: A New Commitment," Budapest, Hungary	June 26-July 1
Forest Ecology Into the Next Millenium, Orono, ME	June 27-30
International Botanical Congress, St. Louis, MO	August 1-7
Annual meeting of the Ecological Society of America, Spokane, WA	August 8-12
Association for Computing Machinery Digital Libraries '99 Conference, Berkeley, CA	August 11-14

Metadata Training Update

Documenting Canadian Biological Data

In January 1999, the NBII Program was invited to present a one-day biological metadata training workshop at the Canadian National Science Meeting held in Victoria, British Columbia. The science meeting was hosted by Environment Canada's Ecological Monitoring and Assessment Network (EMAN), a national network of more than 100 monitoring and research sites characterized by long-term, multi-disciplinary studies. These sites have been established for monitoring ecological functions over long periods of time and bring together academic, governmental, and private sector scientists to address the cumulative effects of major environmental stresses.

EMAN is interested in using the NBII biological metadata standard and MetaMaker software as guidelines for documenting long-term data sets in

Canada as part of the Network. This workshop provided the opportunity for several participants from EMAN sites across the country to get hands-on experience using the standard and MetaMaker software. In addition, EMAN and the NBII will partner to train several people in the metadata standard to help establish a Canadian metadata training program. As part of the effort to increase access to biological data and information, the EMAN Program is also establishing an independent

Clearinghouse node that will be linked through the NBII Clearinghouse. For more information, see the EMAN Web site at <<http://www.cciw.ca/eman/>>.



Janet Lamb, EMAN Network Science Advisor, Burlington, Ontario, speaks with Craig Stewart, Waterton Biosphere Association, Alberta.

Metadata Training Comes to the National Park Service

The National Park Service (NPS), Intermountain Region Intermountain Support Office (ISO), Denver, Colorado, hosted a NBII Metadata Training Workshop at the Denver Federal Center on January 5-6. Representatives from Salinas Pueblo Missions, Big Bend National Park, Grant-Kohrs Ranch National Historic Site, Black Canyon of the Gunnison, U.S. Forest Service Rocky Mountain Region, and the ISO attended the two-day hands-on workshop.

Sharon Shin participated as the lead instructor, while Michelle Gudorf, NPS-ISO, hosted the workshop and participated in her last phase in the train-the-trainer program.

The participants learned the FGDC Content Standard for Digital

Geospatial Metadata and the NBII Biological Data Profile. Based on data sets from their home offices, they also created metadata using MetaMaker (the data sets were parsed with Chew-n-Spit and Metadata Parser). The participants also experienced hands-on exercises on the FGDC and NBII Clearinghouses.

Michelle has scheduled another NBII Metadata Workshop for later in 1999 in which she will participate as the lead instructor. The January 1999 workshop was the third NBII training workshop in six months in which NPS personnel participated. Thus far, the NBII program has trained approximately 20 members of the NPS.

In recognition of her efforts

contributing to the NPS metadata program, Sharon Shin was presented with the NPS "Above and Beyond" award, a plaque, and an NPS fleece jacket.



NBII Metadata Training Schedule

For the latest information regarding location and dates of metadata training classes, just check <<http://www.nbii.gov/training/>> or phone Sharon Shin, NBII Metadata Training Coordinator, at 303/202-4230.

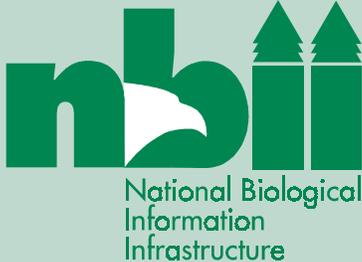
Training Schedule

1999

USGS Colorado Plateau Field Station, Flagstaff, AZ. 2 day workshop.	June 23-24
USGS Columbia Environmental Research Center, Colombia, MO. 2 day workshop. Dates to be announced.	July
USGS GAP Analysis Program Annual Conference, Duluth, MN. 1 day workshop. Date to be announced.	August 2-6
USGS, Reston, VA. 2 day workshop.	August 25-26
American Fisheries Society, Charlotte, NC. 1 day workshop.	August 29

New NBII Web Site on Natural History Collections

A new Web site, providing online information on hundreds of different research natural history collections, is now accessible through the NBII. The Directory of Research Systematics Collections (DRSC) has been developed through a partnership between the NBII Program and the Association of Systematics Collections. NBII users can search the DRSC for information on systematics collections across the United States and in other countries. The DRSC <<http://www.nbii.gov/DRSC>> includes information on the taxonomic groups included in each collection, the status and availability of databases pertaining to the collection, and information on the institution housing the collection. The DRSC currently contains information on more than 500 different collections.



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