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This issue of **Flora of North America Newsletter** consists of a report prepared on behalf of the systematics community and made to the ad hoc Steering Committee on Governmental Relations of the Association of Systematics Collections. The report describes activities in a number of federal agencies, particularly the National Biological Survey, and in The Nature Conservancy, that are important to Flora of North America and should be of interest to all of our Newsletter readers. The information was gathered by the myself and Andrea McFadden (Academy of Natural Sciences, Philadelphia). We interviewed agency staff in January and February, 1994. Names and addresses of contacts are given at the end of this report.

In each interview we described what the systematics collections have to offer, including: systematic research capability; taxonomic expertise; physical samples, associated data, and observations, in manual and, in some cases, machine-readable form; ability to train systematists; and public outreach. We asked how our community could best work with their agency.

Virtually every person interviewed expressed interested in what systematics and systematics institutions offer to the national effort. The **single greatest need right now is for a directory or directories for systematic collections and expertise**. Every agency needs to know where collections are, what organisms/regions are represented, and who the taxonomic specialists are. **They cannot work with us if they don't know who we are or where we are.** *Please see the questionnaire at the end of this report. It will form the basis for a directory on plant expertise for North America.*

NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

The National Science and Technology Council will coordinate science, space, and technology policies throughout the federal government. It was established by executive order on 23 November 1993, will be chaired by President Clinton, and cabinet members will be members of the Council.

The goal of the Council will be to set goals for science and technology investments and to ensure that the policies created will support the goals "harness science and technology to improve our quality of life and the Nation's long-term economic strength," in Clinton's words.

A megacommittee called the Federal Coordinating Committees for Science and Technology has been reorganized to include committees covering all federal research and development. All committees and sub-committees will have both a science and a policy co-chair plus a White House representative.

The most important of the committees to systematists is the Committee on Environmental and Natural Resources (CENR). It will be co-chaired by James Baker, Under Secretary for Oceans and Atmosphere and Director of NOAA, and by Ron Pulliam, head of the National Biological Survey (Tom Lovejoy, Smithsonian Institution, has been acting co-chair). Its subcommittees will develop balanced R&D programs that cover the

following aspects of environmental issues: 1. structure and function of the system; 2. socioeconomic dimensions of change; 3. impacts of change; 4. adaptation to change; 5. mitigation of change; 6.assessment of change. The subcommittees will develop 5 to 10 year missions with research priorities. Priorities will be evaluated on level of funding, state of knowledge, gaps, and potential for change or mitigation or adaptations. An assessment element will be required.

The Flora of North America (FNA) project is a cooperative program to produce a Flora of the plants of North America north of Mexico. The FNA Newsletter is published quarterly by the Flora of North America Association to communicate news about the FNA project and other topics of interest to North American floristic researchers. Readers are invited to send appropriate news items to: FNA Newsletter, P.O. Box 299, St. Louis, MO 63166, U.S.A.

Within CENR, the subcommittee of greatest interest to us is the Biodiversity and Ecosystem Research Subcommittee, chaired by Tom Lovejoy. This subcommittee will deal with population and community studies, systematic biology and surveys, habitat analysis, conservation biology, and ecological dynamics including physiology and biochemical ecology, genetic processes and responses, basic ecosystem processes, and population and community responses to stress.

Contacts for NSTC are Mark Schaeffer, Assistant Director for Environment in the Office of Science and Technology Policy, and Rosina Bierbaum, Committee on Environment and Natural Resources Liaison, Subcommittee on Biological Diversity and Ecosystems; and Tom Lovejoy, co-chair, Biodiversity and Ecosystem Research Subcommittee.

The committees welcome thoughtful contacts from our community. In particular, heads of institutions, societies, and consortia may wish to assure the committees of their interest. It may be worth organizing a public event to which experts from each subject area are invited, and at which presentations and public discussion could take place. The Sustainable Biosphere Initiative and Systematics Agenda 2000 reports may well influence the committee and subcommittee.

Lynne Corn, Congressional Research Service, mentioned that in the Executive Branch an Interagency Ecosystem Management Group has been meeting regularly, and has representatives from 20 or 30 agencies. This group specifically excludes non-federal employees and is primarily for information sharing.

NATIONAL BIOLOGICAL SURVEY

Background: On Earth Day, April 21, 1993, President Clinton called for the creation of a National Biological Survey (NBS) in the Department of Interior. The NBS was established by a Secretarial Order issued in September, 1993, and became operational on 11 November 1993 when Congress passed and President Clinton signed into law the 1994 Interior Appropriations Act. The House of Representatives passed H.R. 1845, a bill to authorize the NBS, in October 1993. The original Bureau of Biological Survey began in the Department of Agriculture in 1885 and was transferred to the Department of the Interior in 1939 as a predecessor to the U. S. Fish and Wildlife Service.

In February, 1993, Secretary of the Interior Bruce Babbitt requested advice from the National Research Council on the formation of the NBS. A committee was formed and produced the report "A Biological Survey for

the Nation," which calls for a **National Partnership for Biological Survey**.

The mission of the National Biological Survey is to serve as the non-regulatory biological research arm of the Interior Department and to provide leadership in gathering, analyzing, and disseminating the biological information necessary to support the sound management of the Nation's natural resources. The NBS is modeled after the U.S. Geological Survey, which was created in response to the demands of industry and conservationists for accurate baseline scientific data.

Interviews with NBS staff focused on gathering information about NBS that would be useful for systematists and systematics institutions, and on discussing how the systematics community can (1) help NBS carry out its mission and benefit from NBS efforts, and (2) participate fully in the National Partnership. All the NBS staff we contacted were very gracious and helpful; we particularly thank Robin O'Malley and Mike Ruggiero, who were particularly generous with time, ideas, and assistance.

Structure: Ron Pulliam has now been appointed Deputy Director of the NBS. The Acting Deputy Director of NBS through May 1994 has been F. Eugene Hester. NBS is divided into four functional units: **Budget and Administration** (Jim Leupold, Assistant Director); **Research** (Terry Terrill, Assistant Director); **Information and Technology Services** (Doyle Frederick, Assistant Director); and **Inventory and Monitoring** (Kemp Conn, Assistant Director). In addition, there are four umbrella units for research centers, field stations, and field scientists: Western Ecoregion, Mid-Continent Ecoregion, Southern Ecoregion, and Eastern Ecoregion. NBS has inherited 1,850 people from seven bureaus with ongoing work. Until new initiatives have been finalized and new priorities set, most of these people will work on their current projects.

NBS: Inventory and Monitoring

Inventory and Monitoring includes (1) Ecosystem Inventory and Assessment, which will coordinate and interpret ecosystem and habitat data, establish procedures to collect and share data, develop monitoring and implementation programs, and provide expertise on ecosystem delineation. Relevant projects include National Water Quality Assessment (NWQA), GAP Analysis. (2) Population Inventory and Monitoring, which will coordinate and interpret population data, establish procedures for evaluating status and trends; establish new monitoring programs, and collect and interpret population data. Relevant projects include Bird Banding Laboratory, Breeding Bird Survey. (3) Inventory Standards and Protocol Development. It will create an "Inventory of Inventories", and welcomes information from us on what inventories have been or are being done (send information directly to Gene Hester). It will cooperatively develop inventory and monitoring standards and establish procedures for integrating local, regional, and national inventory and monitoring efforts and cooperatively design standards and sampling techniques. This last concept forms the core of a memorandum of understanding that NBS has signed with The Nature Conservancy.

The Inventory and Monitoring unit is responsible for preparing a **Status and Trends Report** to be presented to Congress. This publication will be a comprehensive summary of the status and trends of the Nation's biological resources and will serve as a focal point for trend data collection and for identifying gaps. A sourcebook will be published in August 1994 and will contain 200 separate contributions. A comprehensive description, to be published in April 1995, will integrate information from various

sources.

The Museum Initiative falls within the Inventory and Monitoring section of NBS. Right from the beginning, NBS staff fully appreciated the importance of the holdings and expertise found in natural history museums, botanical gardens, and other systematics collections. Through the efforts of the Association of Systematics Collections committee on governmental relations, and of K. Elaine Hoagland, the ASC Executive Director, it was possible to define areas of common and practical interest between the systematics community and NBS. Secretary Babbitt signed a Memorandum of Understanding between Department of Interior and the Association of Systematics Collections in February, 1994. A joint NBS/ASC task force has been established to discuss key issues such as voucher specimens, accessibility of collections, data automation, data standards, and public education. ASC representatives on the task force are Wayne King, Florida State Museum, and Larry Nevling, Illinois Natural History Survey; Allen Allison is alternate. The task force is likely to create committees and subcommittees to make recommendations on specific issues.

According to Kemp Conn, Acting Assistant Director for Inventory and Monitoring, (1) museums are viewed as institutions with a wealth of information that is particularly useful for baseline data, but NBS recognizes that the information is often not automated and therefore not easily accessible; much information is in paper form only; (2) much taxonomic work remains to be done (both research and identifications). NBS recognizes that it may need to provide support to speed these activities up. Conn said the NBS will be a very lean organization and will not be heavily staffed. There will be few staff in the national office and the regional offices. Most staff will be in field offices. Some restructuring of staffing may be required to ensure that they have an appropriate representation of specialists on staff, but the total size of NBS will not increase significantly. Their goal is to be a credible organization, and they will do this by building partnerships with other experts.

High priority questions, according to Conn, are: 1. Where are the collections, 2. Who is the resident expert, 3. How were the collections made (metadata). They are eager to set standards for monitoring and to identify practical indicators of healthy ecosystems. They are working with the Ecological Society of America on the question of environmental indicators.

Michael Ruggiero said there is a need for identification of leading biological indicators that could be reported on periodically. Which are the most important entities to monitor, and how can they best be routinely monitored. If groups are poorly known, priorities should be set for which groups should be studied first. The reports would then reflect how well information on those groups was being gathered. There is a need for standards for collecting and standards for data collecting. He mentioned the work being done by Mercedes Foster at the Smithsonian. The collections community might usefully determine what documents or recommendations or handbooks are available giving instructions on how to collect particular kinds of organisms. A list of the work that is being done on databases and protocols for capturing and maintaining data would also be relevant here.

Third, Ruggiero mentioned the need for a better understanding of what data are available and what they can actually be used for. An analysis of what information is available would make it possible to identify where gaps in information existed and where new collecting and research needed to be

done. Ruggiero recognized the need, especially a long term need, for training systematists. He feels that the NBS needs to significantly stimulate and encourage the training of new taxonomists.

NBS is committed to insuring that information flows both ways. Systematists should begin to ask what they want from on-going NBS work. What does NBS have that could assist OUR scientists?

NBS: Research

Terry Terrill is Acting Assistant Director of NBS Research. Most of the staff in NBS and 85% of the funding fall within the Research Unit, which includes the Cooperative Research Units. All Fish and Wildlife, Bureau of Land Management, and Park Service cooperative units operate under the NBS Research umbrella now. The Cooperative Research Units are the basis of the most substantial NBS partnerships because each of the many Units represents the combined efforts of Federal, State and university partners. Since so much of NBS activity will happen "on the ground" in the states, a very effective way of linking into NBS is to locate the relevant cooperative unit and make direct collaborative agreements with that unit. NBS is taking care to be sensitive to interests of their current constituencies, particularly the fish and game agencies in the states.

NBS: Information and Technology Transfer

Doyle Frederick is Acting Assistant Director of NBS Information and Technology. NBS is determined to play a leadership and facilitation role in the National Biological Information Infrastructure rather than developing databases themselves. They recognize the importance of using existing data and working with experts. Their goal is to tie the data sets together in an intelligent way, which may include development of software. The CERES project, a prototype network of databases in California, is a possible model. NBS would like to have access to a catalog of systematics databases and collections. A similar catalog is being developed for federal agency databases.

Secretary Babbitt is particularly interested in the information management side of NBS and is chair of the Federal Geographic Data Committee.

NBS: Other Initiatives

NBS considers the development of a **science agenda for the National Partnership** to be a high priority. It anticipates doing this through structured discussions involving a broad cross-section of federal, state and other agencies, and the scientific community, regarding priorities for a national biodiversity/ecological science agenda. Discussions held by the National Council on Science and Technology (see above) obviously will be relevant to this. Gene Hester has suggested that perhaps the National Academy of Sciences, the professional societies, and others could cooperatively organize forums for discussion.

Pilot **state partnership** projects are being initiated to increase access to and integration of biological information. Secretary Babbitt sent the National Academy report book with a cover letter to all governors asking their thoughts and comments. Not all states responded. Institutions might wish to contact their governor's office to determine whether a response was sent and, if not, work with the governor's staff to draft an appropriate response outlining the state's interest in participating in NBS and its current capabilities. Prospectuses from ten states were received by NBS as of Feb. 16 and four were identified for further project development. A

Memorandum of Understanding was signed with the State of California on March 4 and more will come (possibly from MD, NY, and IL).

Pilot **Ecosystem Projects** are being developed to serve as laboratories for NBS's and its partners' ability to provide information in ways that support multi-agency, cross-jurisdictional, ecosystem-oriented natural resource management decision making. Twelve projects will be implemented. Announced so far are: south Florida, California's coastal sage and gnatcatcher region, and California's Central Valley giant garter snake region. Also expected are Hawaii, Glacier Bay, northeastern watersheds, southern forests and wetlands, and southern Appalachians. Integration between the ecosystem approach and focus on states is being addressed.

Success with species at risk will identify species about which critical information is lacking, and for which, if such gaps were filled, actions might be identified that could result in improved prospects for species survival.

It seems important that the **Science Agenda for the National Partnership** be established soon so that these additional initiatives and Partnership participation in them can be integrated into the agenda.

In each meeting it was clear that many individuals/groups/institutions/states are making their interests and needs known to the NBS. NBS welcomes this, and is trying to organize the information, and encouraged our contacts to send such information to them.

NBS Legislation

A bill authorizing the National Biological Survey has passed the House and a Senate bill is now pending. Support for this legislation should be carefully orchestrated. It will be useful if institutions are willing to work with legislators within their states (for instance, by giving a tour of their scientific facility), and if community leaders publicly support the NBS (for instance, in editorials in public media). Support from individuals or organizations in the private sector is particularly important. Gwen Williams, legislative coordinator in NBS, is the person to contact. Lynne Corn of the Congressional Research Service provided some insight on this issue. Robert Irvin is the staff person in Senator Baucus's office handling the legislation.

NATIONAL BIODIVERSITY INFORMATION CENTER

The need for a collaboratively-governed effort to support the electronic networks and to provide a central resource for data access has long been recognized. In addition, the United States is obligated by the Convention on Biological Diversity to establish a center that can serve as an international gateway to information about the country's biodiversity. The Smithsonian Institution and the Environmental Protection Agency have contributed considerable resources for workshops and meetings to achieve a shared vision within the biological community of what this center should be. An ad hoc committee drew up a "straw-man" plan; this was used as a point of discussion by an advisory group that met in March to make recommendations about criteria for the location of the Center, what it should be, how it should be governed, and how it can be funded. Another meeting will deal with practical elements like computer standards. At a minimum, it appears that the Biodiversity Center would maintain a database of databases including metadata and access information. The databases themselves, held by participants in the NBS partnership, form the

National Biological Information Infrastructure. NBIC could provide a storefront access point for the nation's databases, provide a forum in which people could come together to discuss legal, technical, and ethical issues that are challenges for the entire industry, and ultimately provide some technical services.

Bruce Umminger (National Science Foundation) and detailed Steve Young (EPA) have been detailed to the National Biodiversity Information Center and are located in the National Museum of Natural History, Smithsonian Institution. Steve Young urged that our institutions consider creating an official "virtual" network of our existing databases on Internet. Bruce Umminger mentioned that major Mexican institutions signed an agreement in November 1993 to form such a network. He suggested that we jump-start the networking by making a conscious effort to improve our communications resources. The network could function across disciplines, providing motivation for standardization of data with common attribute information, suggest physical compatibility among the databases, and establish a means of quality control.

Stan Shetler, National Museum of Natural History, believes that museums should view the National Biodiversity Information Center as the main entry point for the effective mining of information found in museum collections and should use the Center as a way to ensure that museum collection information and systematics information is a very prominent part of the mix of data being offered. It should not only channel information from the providers to the users, but also stimulate, facilitate, and instigate analysis of that information. He believes that this will be one way for the museum community to "speak with one voice."

U. S. ENVIRONMENTAL PROTECTION AGENCY

Peter Jutro, Senior Scientist with EPA, anticipates that EPA will expand its interactions with the National Biodiversity Information Center, with the National Biological Survey, and with the museum/collections institutions. He had several suggestions about how the systematics institutions could increase their visibility (see section below).

Edward Martinko is Director of the Environmental Monitoring & Assessment Program (EMAP). He has been detailed to the NBS since mid January on a half-time basis to represent EPA in the NBS program development. His primary concerns are EMAP, Ecological programs in the EPA office of Research and Development, and bridging information transfer between the agencies. He is particularly concerned with improving communication, since he believes that most Federal agencies are having trouble coming together and that no one is completely aware of all of the agency programs that currently exist.

One of his primary responsibilities will be to develop an "inventory of inventories" at NBS. This is an attempt to put together information on inventories located throughout the entire biological/environmental community. This is not the "database of databases", nor will it replace that product. Instead, it will be the basis of the status and trends input. It will include listing by data format, sampling methods, voucher specimens, etc. This Inventory should be the base list for determining gaps in information. The first inventory searches are being done in the Federal agencies.

EPA has traditionally used specific projects to work with systematics institutions, and has used a number of mechanisms, including contracts.

EPA is now involved in an interagency project with NOAA to clarify and improve standards for taxonomic systems.

EMAP started four years ago. It uses probability-based sampling as one element of environmental tracking. Some unexpected benefits are that the EMAP process is documenting common species that were under-recorded because they are common and is finding new taxa and new distributions of rare and threatened species. EMAP is also now identifying ecosystems that may be overfunded compared to equally important systems that are underfunded. EMAP was originally designed to create a national, large scale, picture of biodiversity based on sound data that should compliment the traditional small scale samplings. EMAP has been well received on the Federal level and has had its funding increased to \$42 million.

Administrators are determined not to cut any funding for EMAP. EMAP continues to move forward on its work on national implications and is producing monitoring information on specific areas, for example forests of the NE, SE, and SW, and surface water information in the NE. EMAP is working very closely with the Forest Service as full partner with the Service investing as much as EPA in the project. The EMAP process is beginning to gain international recognition and its standards are being considered as new elements for the Australian Environmental Research Information Network (ERIN).

For voucher specimens, EMAP uses standardized data fields, bar codes, etc. for label data. Some voucher specimens are stored at various sites, including ASC member institutions, although many of the subsets are not kept. EMAP has not yet dealt with the issue of the costs of long-term specimen retention.

Martinko is very interested in the standards used by ASC member institutions and asked if ASC has a mechanism for determining the quality of a collection in terms of metadata. This is a major issue for the "Inventory of Inventories." Characterization of the quality of the data and metadata is of utmost concern. Federal guidelines on data quality are under discussion throughout the agencies. Quality assurance mechanisms must be included in the EMAP estuary and forest projects including information on how information was collected, methods for processing information as well as specimens, identification procedures, etc. These guidelines are not currently available outside of EMAP, but will be within the year. Quality management assurance is being built into all steps of the EMAP process, starting with specific projects. All of EPA will be adopting a quality assurance (QA) plan. Institutions working with EPA on projects or contracts will also be required to provide quality assurance procedures for any proposals, including EMAP and REMAP projects. QA procedures come out of R&D through the office of modeling, monitoring, and QA.

NATIONAL OCEANIC & ATMOSPHERIC ADMINISTRATION

Donna Wieting, Environmental Protection Specialist, is a NOAA liaison to NBS. Since the inception of NBS she has worked to insure that marine sciences are part of the NBS plan. Her agency has a strong commitment to participation in NBS to support NOAA and the marine science.

Within NOAA, biological survey work is largely driven by specific legislative mandates to focus primarily on commercial fisheries with some emphasis on endangered species, particularly marine mammals. Because of these limits, only about 2% of the information it collects is utilized. Most

of the data is used within assorted agencies, although usage continues to expand, particularly as agency budgets are reduced, requiring new uses for existing technology. NOAA and USGS are combining resources when feasible.

The agency has not developed clear initiatives for ecosystem management in the past due to limits on focus. A current strategic planning process, however, is moving research focus away from single species studies and toward ecosystems. The Coastal Ecosystem Health project is a small biodiversity project in the plan. There is no baseline data on estuaries and marine sanctuary reserves, and two or three sites may be selected for baseline inventories. One of these will be the all taxa inventory in Monterey Bay as a joint effort with the Center for Marine Conservation, directed by Mike Smith.

The availability of the enormous store of under-used data is problematic. Some of the collections at NOAA science centers and labs have not been cataloged. NOAA needs to determine what data it has and how it can be made available. Information on the broad outlines of NOAA data accumulation may be available from NOAA's Environmental Data and Information Service office. NOAA's current data management system has been designed specifically around mandated species and may therefore not be fully accessible for other data. Redesign and access to their data might be considered by the National Biodiversity Information Center.

Most non-governmental research partners have been universities and a few museums, and funding of that work is through the Sea Grant and Coastal Oceans Programs, including research grants and contracts. The Director of the Coastal Oceans Program is Don Scavia (301) 713-3338. One of their current projects focuses on South Florida.

Weiting mentioned that the Ecosystem Management Initiative of the White House office of Environmental Policy has selected four sites: Prince William Sound, Anacostia River, South Florida, and the Pacific Northwest. A priority international project is the Coral Reef Initiative which is being backed by the State Department.

The Nature Conservancy has a Memorandum of understanding with NOAA and is a partner in their Habitat Mapping program in Florida. Contact Kathleen Sullivan for more information (305/284-3013). Institutions interested in cooperative projects should contact the Sea Grant program for possible cooperative contracts. Weiting also suggested contacting the Minerals and Management Service in Department of Interior, which may be funding baseline work in their data information studies and has enormous data sets that are in various formats.

DEPARTMENT OF DEFENSE

Peter Boice is Deputy for Natural Resources in the Environmental Planning Division of the Department of Defense. His division is under Conservation and Installations and includes natural resources and cultural resources. DOD has 25,000,000 acres under its direct control and 15,000,000 acres through the National Guard or BLM. Another 12,000,000 acres are under Army Civil works.

The Legacy Program was established in 1991 to inventory significant elements on DOD lands. Current funding is \$50,000,000. The Legacy Program is beginning to consider stewardship issues starting with inventories of biological resources and followed by habitat enhancement. Almost all of the work is contracted. Inventories range from rare and

endangered taxa only to full inventories. Inventories are frequently done with grants to TNC, which has an agreement that allows DOD to use it as a sole source. Habitat enhancement frequently focuses on hunting and fishing because the installations can charge fees to use their properties and those fees are returned as income directly to the installations. Some recent habitat enhancement work has focused on the international migrating waterfowl plan.

An annual call is issued for submitting proposals. This includes guidelines and the theme chosen for the year for inventories and ecosystem management. The guidelines should be requested from DOD.

Legacy proposals are most successful when the commander of the installation on which the inventory is to be done has been contacted and indicates interest in the inventory. Outside proposals MUST have the input and support of the installation manager to be considered.

The vouchering process has not been fully worked out for Legacy projects. In general, collections tend to be stored at the pertinent facilities, but there is no standard policy. DOD is trying to identify and set guidelines for biological research needs outside the Legacy program. DOD wants to have the inventories of lands done by the year 2000, although "inventory" is not precisely defined. Non-Legacy inventories are funded with operations and maintenance funds available to each commander. The Air Forces undertakes wetlands, biological, and archaeological inventories. Projects outside of Legacy tend to come from the installations.

DOD intends to make its data as compatible as possible with TNC. It also uses the Integrated Training Area Management System (ITAM), which is a GIS system used in all of the major training centers. Currently ITAM focus is on soils and vegetation. DOD is not sure how to make its information available to the scientific community.

Other Department of Defense contacts are: Vic Diersing, ITAM, 703/696-8813; Tom Lillie, Air Force, 703/695-6118; Doug Ripley, Inspector General's office; Marlo Acock, Marines, 703/696-0865; Phil Pierce, Army, 703-696-8813; Tom Egglund, Navy, 703/325-0427.

NATIONAL SCIENCE FOUNDATION

In a meeting with Jim Edwards and Jim Estes on January 5 they both indicated that it was very important for the systematics community to pull together into a coalition and that it be able to speak with a single voice. They think that it is necessary that we have a portfolio for the institutions that can be used to promote what we do.

Jim Edwards mentioned a plan now being considered to have an international workshop to discuss doing an international all taxa biological inventory for soil organisms. Steve Blackmore of The Natural History Museum is the point person for this workshop.

Jim Edwards encouraged us to look at partnerships to get new funding. That is, in the current economic environment there will not be any truly new money coming in to the National Science Foundation. The only way to get new money available to us will be to encourage partnerships with the Park Service, Department of Defense, and other agencies.

NSF: Research Collections in Systematics and Ecology;

Biotic Surveys and Inventories

Jim Estes, Program Director, Division of Environmental Biology, Research Collections in Systematics and Ecology, Biotic Surveys and Inventories, made a number of suggestions. He recommended that we obtain and communicate more details to the systematics community on TELNET, Mosaic, Internet, etc. He would like to see our proposals include the latest developments in communications.

He also emphasized the need to start with constituent groups and work backwards to our resources in designing proposals. It is essential that we be able to identify our current user bases and track the specific expansion of these bases as our information becomes more available. He would be receptive to a workshop proposal for investigation and communication to the user community(ies).

He also reinforced the apparent fact that people outside the systematics community do not understand what resources we have and the value of that information. He was interested in whether Systematics 2000 might be a good tool for presenting our disciplines and institutions. He strongly suggests that our community create some kind of directory system that would include both information resources and experts. A checklist of US collections and systematists might be a start.

A high priority for him is the transfer of collections information into electronic format. He recommends that we present those proposals with the greatest opportunity for wide impact outside individual institutions and that include the lower tech institutions when possible, since those proposals will continue to be a problem for NSF funding. He suggested studying the LTER network as a model, since they have been very effective with on-site data bases. He thought we should investigate how the LTER program was initially established.

He strongly suggested that our community become more active in asking for increased support for collections to stimulate budget increases for NSF. We should find ways to clearly describe our work as an important part of the national research agenda that will produce specific benefits. We must always find ways to relate our work to development of new ideas, new technology, new research, not merely maintaining collections. He feels it is important that we describe some practical applications of systematics and recommended contacting Terry Yates at University of New Mexico or Joe Henin at Purdue for good examples. Our entire community should unify and mobilize to promote our resources as tools for advancing research, information links, and support resources for ecology. He cited LTER as a successful lobbying effort. We need to identify a few important issues and decide who the influential players are. He suggested contacting the White House, Congress, and the Executive Branch agencies, as a start. He also mentioned that a group of freshmen legislators had established an environmental study group, and suggested contact with Congressman Porter who has been important for NIH and other research funding.

When asked about NSF and other funding sources, Estes mentioned the following: (1) Keep in mind that we maintain sizable international collections and that seed money, in particular, may be available for international projects; (2) suggested we contact Kathy McKinnon at the World Bank for possible support for international research projects; (3) His division is interested in data base programs that address standardization and priorities for data capture within collections. Priorities of collections to be entered will be essential for good proposals. His ultimate goal is to get our collections computerized using methods that include integration within at

least the individual institutions, if not community wide. Core proposals should include standards and institutional integration. He cited the ichthyologists as a group that is a jump ahead of other disciplines and that now have a competitive advantage, and identified entomologists as the farthest behind. He again asked that cutting edge technologies be included when possible.

There is no recipe for the perfect proposal. Core themes could range from finding new ways for data to be used to innovative suggestion for data capture.

NSF: Division of Networking and Communications

Daniel J. VanBelleghem, Associate Program Director - NSFNET, Division of Networking and Communications, Research and Infrastructure, came to this program from work on biotic systems in LTER with Jim Edwards and Tom Callahan. He said the National Information Infrastructure concept is feeding network growth on all levels. The primary goal of his division is to network people and information. His division focuses on funding proposals in three areas:

1. Network connections for colleges and universities. Of the estimated 3,100 colleges and universities in the US, 1,200 are now on the Internet.
2. Support for the regional networks that provide information for the users, for example SURFNET, SURINET, including training and other support. NSF also has a cooperative agreement with MERIT to manage the national backbone service.
3. Unsolicited proposals for pilot projects and planning meetings. For example, his program has funded network workshops for the National Library Association to discuss linking libraries. It is also looking at various museum proposals, for example the Computer Museum in Boston and the Exploratorium.

Museum proposals and non/university research institutions have been difficult to fund, partly because of an earlier tradition of funding disciplines rather than institution-wide proposals. Also, museum proposals frequently included informal science elements, but there is no way to have these proposals formally pass between divisions. NSF is now interested in looking at full or multi-institutional proposals. Anything beyond networking (data capture proposals) should go to Jim Edwards. The Division on Networking and Communications would consider pilot projects on how networking will help a particular group of people and would be interested in providing planning dollars for a conference on network challenges. It also supports creation of tools for standardization with the network. (CNIDR)

VanBellegham suggested we start by first finding out who our major customers are and whether they are on the Internet, as well as putting together a directory of our institutions and individuals who are currently on-line. Then we should determine how we can use the current network technology to either bring these groups together or improve their joint access and communication.

NSF: Office of Biological Instrumentation Resources

Susan Stafford, Division Director, Biological Instrumentation and Resources, was very interested in the systematics institutions. Her focus is

on technical problems that overarch all of the disciplines, the basic scientific data base issues. This division is the most active in bridging different divisions in NSF. She is interested in proposals that facilitate or add infrastructure to the biological sciences, and would also be interested in ways to develop instrumentation to preserve samples in a cost effective way. She believes that accessibility issues in particular are critical and is aware of the long term maintenance problems of collections and data bases.

Her division supports funding for: 1. Instrumentation and development: microscopes, workstations, infrastructure, networking, etc. Most proposals are co-funded with the disciplinary office. 2. Research training: training grants, post doctoral programs. 3. Special projects that include living stock collections and support for the plant sciences and comparative biology.

Stafford has been closely involved with LTER through the Andrews LTER and mentioned the success of LMERS (Land Margin Ecosystem Reserves), which are operating conceptually as LTERs. NSF is very interested in expanding the LTER network.

She is particularly interested in bringing together people who have actually solved some of the technological problems to show how solutions can cross disciplines and institutions. She wants to focus on actually solving the problem rather than discussing it, with solutions that are not scale dependent. She was aware of some successful solutions that were being developed in the Forest Service. She also mentioned joint projects between NWQA and USGS, particularly at a set of 60 sites that had integrated data on ground and surface water.

Stafford was very interested in a proposal for a systematics community workshop to highlight successful problem solving techniques, since these are frequently not passed between institutions, and strongly suggested people from EPA, Human Genome project, NWQA, NBS, etc. be involved in such a workshop.

She mentioned that the library community is also dealing with similar interests. Carolyn Bledsoe at NSF has been working to develop a set of tools that would help link the LTER all site bibliography with the site information using Mosaic and releasing that to GOPHER. LTER people are also dealing with spatial data and meta data. Others to contact are Rudolph Nottrott, James Blunt, and John Porter in the LTER office, Bob Robbins (DOE), and John Rasure at University of New Mexico.

She urged us to continue to build a profile for the systematics community on the Federal level, but wants us to be sure to separate the management of the resource from the value of the resources. She recommends we make a realistic long-term commitment to champion our science on the national level. She also reminded us that funding is very competitive and that while only the top proposals will be funded, the practical discoveries will be shared with everyone.

Peter Arzberger, Program Director, Database Activity and Computational Biology, Office of Biological Instrumentation Resources, programs focus on the methods and tools (access and retrieval) of data bases and some prototyping with databases. Current proposal examples might focus on development of the prototype of a network idea for two existing programs; other problem solving environments; ways for individuals to network with graphics. He is also most interested in collaborative projects. This program has not dealt with long-term maintenance of data bases, but assumes it will have to look at that eventually. Should NSF finally decide that science needs major repositories, it will be forced to address the

challenge of long term support. They have no funds for data capture; their funds are for proof of concept. He suggested we look at how the library world managed data capture and interdisciplinary integration. His program funding has been mostly directed at academic institutions, but he would consider proposals from museums. His program has also given LTER long term project support. He suggested an interest in proposals that simulated possible environmental effects at the ecosystem level.

U.S. GEOLOGICAL SURVEY

Paul M. Young, Cartographer, National Mapping Division, explained that USGS started digitizing their maps from paper 15 years ago. They have completed roads and hydrography at 1:100,000 scale as a logical first USGS priority. Data entered since then has been driven by customer needs, i.e., other Federal and state agencies for the most part usually supported by a 50/50 cost split between the USGS and the customer. One of the current goals is to digitize public lands maps from Ohio west and from 1785 to present. They will also include political boundaries.

USGS uses ArcInfo software with customized interface for output. They collect data in files that can be integrated into any combination and have developed a standard attribute scheme for their system. The U.S. Forest Service is now using the USGS attribute scheme for digital line graphs programs for the National Wetlands Program. USGS is also involved in joint efforts with SCS and NOAA. The Federal Government is in the process of developing Spatial Data Government Standards, probably through the Federal Geographic Data Committee, chaired by Bruce Babbitt. A major goal of the committee is to coordinate efforts between agencies to encourage cooperation and data sharing.

U.S. FOREST SERVICE, PARK SERVICE, BUREAU OF LAND MANAGEMENT

In a meeting with Christopher Topik, National Endangered Plant Program Manager, USDA Forest Service, Peggy Olwell, National Park Service, and Ken S. Berg, National Botanist, Bureau of Land Management, the needs of biologists charged with species conservation with agencies was discussed.

They believe that the Federal agencies continue to need the classical taxonomic services systematics institutions can provide, particularly since the universities are no longer doing as much training in that area. For example, California is seriously hindered in addressing its plant work because the expertise isn't available.

They see the collections/museum/botanical garden community supporting the Federal agencies in the following ways: (1) technical expertise, (2) training, (3) independent review panels, and (4) public outreach on conservation biology

Ken Berg mentioned that BLM manages 270 million acres, yet only 10% have been inventoried for plants. They need to get people trained for remote sensing, need help to show value of taxa, need assistance in development of ecosystem approaches. For example, exotic species are now a concern of the range management people.

Beacham Publishing has produced a guide to threatened and endangered species on CD ROM. (W. Beacham: 202/234-0877). C. Cushwa at Virginia Tech is working on a fish and game data base. A person at

University of Vermont is putting together all of the floras and tracking plant occurrences by county.

The Forest Service would be interested in putting some time and money into a project that would link Heritage Program and voucher specimens. They are also interested in the historical collections. If systematics collections vouchers supported the Heritage data, agencies would see this as ready access to the best science, i.e., our data would be interpreted in the existing heritage platform. It would also be a way to keep Heritage Programs updated on the latest taxonomic changes and set up a regular dialogue between our scientists and Heritage.

THE NATURE CONSERVANCY

George Fenwick and Bruce Stein discussed the relationship of The Nature Conservancy to the National Biological Survey and the systematics community. They both believed that many issues in NBS would be resolved once a permanent head was appointed. A Memorandum of Understanding between TNC and NBS was developed by first circulating the draft to all of the field offices. Then of the Heritage directors came together for a full day discussion on the draft, including a speech by Tom Lovejoy on the then-current status of NBS. The Heritage programs are separate entities, but TNC provides services to them, including R&D, technical support, training, communications, government work and financial support. In developing the MOU They looked at three issues: 1. What did TNC want to influence at NBS? 2. What areas were mutually advantageous to both Heritage and NBS? and how could the agreement work both ways? This led to establishment of a national Heritage office at NBS, so Heritage could work with NBS and NBS could work with that information within the agency. 3. How could TNC and the NBS interact? For example, could they develop a partnership to advance and sustain the Heritage network as a whole.

Finally, certain goals for the partnership between TNC and NBS were set out and the MOU was signed. A working group has been charged with the task of making recommendations for actions needed to meet those goals, and ultimately funding will be necessary for those activities. The Heritage Programs have now formed their own official organization. The Nature Conservancy is interested in promoting closer collaboration between itself and the systematics community. Possible ways to do this include cross-training staff and having workshops to address specific issues.

GREAT IDEAS FOR PROMOTING SYSTEMATICS

Lynne Corn, of the Congressional Research Service, suggested that the museum community try to get congressional staff to a museum in the DC area, possibly to the Smithsonian, to show them what actually happens in a natural history museum. Previously such tours have focussed on gem and mineral collections rather than specimens used for biological research. The National Museum of Natural History organized such a tour for Secretary Babbitt, and he was enormously impressed with the value of the collections.

Peter Jutro, Senior Scientist with EPA, suggested that systematists be more involved with policy development. He thinks the community needs more high-profile spokespersons. He suggested that the collections institutions hold some kind of major event in Washington each year to draw attention to our institutions, collections, and research. This might be a half day event

focusing on hot policy issues as they are interpreted by our science, with a social event afterward. A related idea would be for the community to give an award to the best natural history exhibit of the year, and to install that exhibit in a prominent place in Washington and have an event celebrating it in Washington.

Eric Fischer, Director, Board on Biology, National Research Council, would like to see some kind of symposium or convocation held that would really deal with the cutting edge of research in biodiversity and that this symposium should have high visibility and high priority, and that it would be sponsored by the Department of Interior.

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Questionnaire for Directory of Taxonomic

Specialists for Plants and Fungi

Occurring in the United States

The National Biological Survey has identified as one of its highest priorities the need for a director of taxonomic expertise. For plants, much of this information is already available from four sources: American Society of Plant Taxonomists 1994 Membership Directory, Flora of North America list of contributors, edition 8 of Index Herbariorum (including the three supplements published in Taxon), and Plant Specialists Index. We propose to merge the data from these four references and make them available in hard copy and in electronic form on Internet.

The usefulness of the directory will be increased substantially by having it as up-to-date as possible. If your taxonomic expertise has changed, or if the informatin is not specific, or if you are not included in any of the above references, please send updated information to: **Vascular Plants:** Patricia K. Holmgren, New York Botanical Garden, Bronx, NY 10458-5126; fax 718/562-6780; e-mail pholmgren@nybg.org OR Nancy Morin, Missouri Botanical Garden, P. O. Box 299, St. Louis, MO 63166-0299; fax 314/577-9595; e-mail morin@mobot.org. **Fungi** (note: a separate questionnaire relating to fungal specialists is being distributed. Use the form here only if you do not receive the other questionnaire): Amy Rossmann, Herbarium, U.S. National Fungus Collections, Systematic Botany and Mycology Laboratory, Building 011A, BARC-West, Beltsville, MD 20705; fax 301/504-5810; e-mail amy@fungi.ars-grin.gov. **Bryophytes:** Marshall Crosby, Missouri Botanical Garden, P. O. Box 299, St. Louis, MO 63166-0299; fax 314/577-9594; e-mail crosby@mobot.org. **Algae:** Richard Norris, Botanical Research Institute of Texas, 509 Pecan Street, Fort Worth, TX 76102-4060; fax 817/332-4112.

Compilation of these data will be completed BEFORE 1 November 1994, so return the questionnaire NOW.

Name _____

Address _____

Institutional acronym _____

Telephone _____ **Fax** _____ **e-mail** _____

Geographic expertise (be as specific as possible)

Taxonomic expertise (be as specific as possible; give genus, family, order, as appropriate)

