DEVELOPMENT OF
A CENTER FOR BIOSYSTEMATICS RESOURCES

Progress Report
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ABSTRACT

The objective in the development of a Center for Biosystematics Resources is to provide a centralized source of information regarding the biological expertise available in the academic/museum community; and the federal and state regulations concerning the acquisition, transport, and possession of biological specimens. Such a Center would serve to facilitate access to this widely dispersed information.

The heart of the Center is a series of computer assisted data bases which contain information on biologists and their areas of expertise, biological collections, annotated federal regulations, and federal and state controlled species lists.

The purpose of this three-year contract with the Department of Energy is to continue the updating and revision of these data bases, make the information they contain readily available to the Department of Energy, other government agencies, the private sector, and the academic community; and to achieve financial independence by the end of the three-year period.

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SUMMARY REPORT TO PROJECT OFFICER
(Year 1 of a 3 year project)
DEVELOPMENT OF
A CENTER FOR BIOSYSTEMATICS RESOURCES
Contract No. DE-AC02-79EV10026
SUBMITTED BY
THE ASSOCIATION OF SYSTEMATICS COLLECTIONS

As stated in our original proposal, the objective of the three year project has been to develop a Center for Biosystematics Resources to provide essential services and information to the Department of Energy and the academic/museum community. The success of the Center will be enhanced if its services are relevant to both the academic/museum community and applied users as represented by the Department of Energy. The purpose of the Center is to serve as a central clearing house to provide current information on: 1) biologists and/or biological collections that are prepared to provide a variety of services (Table I) in a number of taxonomic categories (Table II); 2) federal regulations that control the scientific use of plants and animals; 3) lists of those species which are protected under state regulations; and 4) lists of federally protected species of plants and animals, the agencies that control their use, and the statutory authority under which each species is controlled.

The ultimate determinant of the success of the Center will be whether or not it can become self supporting by the end of the three-year development period. At the conclusion of the first year we have identified four possible sources of income that can contribute toward support of the Center: 1) fees from inquiry services; 2) sales of publications and up-dating subscription services; 3) administrative costs related to other projects that require use of the Center's facilities; and 4) grants and/or contracts to perform specific tasks based on the various data files that have been developed within the Center. It is our intent to demonstrate the cost feasibility of the Center by the conclusion of the second year.

To establish the Center and attain this financial independence, we proposed to address a number of tasks under the following topical areas: A) Provision of Services; B) System Development; C) Maintenance of Data Files; D) Evaluation; and E) Promotion. The work accomplished during the past year toward these various tasks is described below, and where appropriate, the relevance of the task to the future financial independence of the Center is discussed.

TABLE I: SERVICES AVAILABLE THROUGH THE REGISTRY

Individual Services	Collection-Oriented Services
Collection of specimens	Repository for specimens
Preparation of specimens	Access to collections and
Sorting of specimens	data
Identification of specimens	Access to library facilities
Information about species	
Biological reconnaissance	
Training of personnel	
Review of reports, impact statements	
Evaluation of project designs	
Provision of expert testimony	
Preparation of scientific illustrations	
Consultations of computer based management for collections	
Review of grant/contract proposals	

TABLE II: TAXONOMIC CATEGORIES REFERENCED IN THE REGISTRY

Mammals	Protozoans
Birds	Vascular Plants
Amphibians	Nonvascular Plants
Reptiles	Parasites of Plants
Fishes	Parasites of Animals
Invertebrates	Vertebrate Fossils
Arachnids	Invertebrate Fossils
Crustaceans	Plant Fossils
Insects	Bacteria
Non-parasitic Helminths	Viruses
Mollusks	Living Cells and Tissues

A. Provision of Services

1. Referral services.-- Referral services have been provided using the Registry, a computer based system containing the names of biologists and biological collections, their areas of taxonomic expertise, and the services they are willing to provide. Since November 1978, there have been 130 requests from people for information on individuals and/or collections. This number, while relatively small, does not adequately reflect the actual use of the system. Many inquiries are actually compound questions that take considerable effort to answer. For example, one individual may want to know who can identify species of a particular Order of birds from California, while another may want to know all the collections that contain invertebrates that were collected along the Pacific Coast. Of great importance, is the fact that the rate of inquiry has increased sharply following the distribution of the User's Guide in May.
2. Permit requirements.-- During the past year, the Center has responded to 93 inquiries requesting information on: a) clarification of federal regulations concerning wildlife permit procedures; b) the kinds of permits that are needed to collect, transport, and import various species of plants and animals; and, c) the schedule for submitting permit applications and the persons to whom the applications should be submitted.

Of special interest to inquirers have been the rules and regulations concerning Endangered and Threatened species. Examples of inquiries are: a) What species are controlled? By whom? b) What are the procedures for handling endangered and threatened species? c) Is a particular species that is considered to be "endangered" under U.S. Law also controlled under the Convention on International Trade in Endangered Species of Wild Flora and Fauna? d) Is a particular species on the U.S. Endangered Species list? e) Is an endangered species, according to U.S. law, also protected by a particular state?

To insure the broadest communication of this information, the ASC has published a Directory of State Protected Species and a Directory of Federally Controlled Species. Each is designed to allow for the implementation of an annual up-dating service under a subscription program. Publication of these volumes would not have been possible without the basic facilities and data resources that have been compiled through the Center. It is anticipated that income derived from the sale of these publications will provide a significant portion of the

income needed to make the Center self-supporting at the conclusion of the three year development period. A brochure describing these publications, prepared by the Association, has been distributed.

3. Preparation of Specialized Lists.-- Due to financial limitations, no new specialized lists have been developed to date. See page 4 of RENEWAL REQUEST.
4. Management of Projects.-- No projects that required the Center to assume management responsibilities were undertaken during the past year.

B. System Development

1. Personnel.-- While all staff budgeted were employed for the entire project year, no commitments were made to expend additional funds for mailings, purchase of equipment, surveys, advertising, etc., until after an advance was received from the Chicago Operations Office in late May. As a result, many of the contracted tasks were delayed. In order to compensate for this delay, temporary personnel were added during the last quarter of the project year.
2. Data.-- The number of registrants referenced in the Registry has been increased. Since November 1, 1978, the number of individual registrants has increased 47% and the number of collections has increased 51%, so that at present, the Registry contains information from more than 2000 survey forms. This growth has resulted only from announcements published in the ASC Newsletter and the distribution of the User's Guide.

The Center initiated collaboration with Advisory Committees for the following disciplines represented in the Registry: a) entomology; b) arachnology; c) crustaceans; d) invertebrate zoology; e) malacology; f) mammalogy; g) herpetology; and h) ichthyology. Representatives of these disciplines have assisted in refining the taxonomic resolution of the Registry data forms, advised the staff on the appropriate environmental categories for the taxa referenced in their disciplines, and provided suggestions for projects that they feel would benefit their discipline as well as the Center.

Because of the way in which the original data were computerized, it has become evident that it is possible to reference "nonsense" taxonomic/geographic relationships, e.g. alligators from Alaska.

A preliminary review of the survey forms by qualified professionals in the disciplines represented in the Registry has allowed us to identify the majority of the "nonsense" data that could be recorded in the computer files. These "nonsense" data are being assessed by all appropriate registrants as they review the taxonomic information that we have on them in the Registry.

The process of establishing an additional Center data base has begun. This will contain a list of specimens of endangered mammals which are contained in those museums listed with the Center's Registry. Data on museum catalog number, collector, locality collected, date collected, nature of the specimen (skin, skull, skeleton, alcoholic), and specimen measurements will be requested from museum curators. Letters to the curators and information forms have been designed; and a biologist has been contracted to organize the project and prepare the final data for computerization.

3. Software.-- Software development proceeded in the following areas during the past year. Of necessity, initial program development addressed the general problems of integrating and interrogating the data in the Jacquard minicomputer. The first program to be written and tested was designed to extract information from the data base in response to a particular question. This program was designed particularly for handling the specialized Registry data set. This program recently has been modified to process federal regulations and controlled species data. answering Registry inquiries. A query-verification program was written to insure that the questions asked of the data are in fact the questions answered by the system. As the data derived from the queries are in a "coded" form, a program was written to translate this code into English.

A series of data management programs were written to facilitate file management in the Jacquard system. These programs were necessary additions to the programs provided by the manufacturer and essential to the overall management system being developed. Of particular importance was a program that enhanced the system's sorting capabilities by allowing the operator to sort on any column and accommodate entries that are comprised of more than one line.

4. Hardware.-- The environment of the computer system has been stabilized by the installation of: a) a dedicated 220 volt line, an independent ground wire, and an isolation transformer; and, b) a free-standing, water-cooled, air conditioner and requisite plumbing. These

modifications have allowed us to operate the computer 24 hours per day with an absolute minimum in delays caused by interruptions due to hardware failures.

To accommodate the increase in computer-related activities, we have installed an additional 16K word memory module in the central processing unit and added another CRT terminal. Even with these additions, we are currently working at the maximum capacity of the present hardware configuration.

C. Maintenance of Data Files

A procedure has been implemented that will provide periodic review of computerized Registry data. During the first year, the first updating of the Registry data was begun. Despite the delay caused by the late arrival of funds from the Chicago Operations Office, update materials have been sent to persons who completed survey forms in 19 of the 21 Registry disciplines. The update procedure to date has involved: 1) mailing forms containing the survey information as it appears in the ASC computer to all individuals who completed forms prior to August 1978; 2) a follow-up letter to those who did not return the forms within one month; 3) coding responses and changes of survey information; 4) input of these changes into the ASC computer.

Prior to the update, the Registry had no means of discriminating between a person who worked on fresh water fish from Florida and marine fish from Florida. In order to present more precise information to the people utilizing the Registry's services, the following categories were added to Registry survey forms in the appropriate disciplines.

1. Areas of environmental specialization.

- None
- Terrestrial
- Fresh Water
- Estuarine
- Marine

2. Organism life style.

- Parasitic
- Free-living
- Both

As part of the effort to increase the precision of our answers to inquirers, the taxonomic resolution of the Vascular Plant and Insect survey forms has been enhanced. We are now capable of gathering, and the computer is capable

of storing and retrieving information at the familial level for these two disciplines. Because of this revision of survey forms, updating procedures for the Vascular Plant and Insect registrants was delayed to provide this increase in information.

To ensure an even workload, this up-dating procedure is being staggered for the different disciplines. Eventually, the procedure will provide that each Registry file be reviewed by the registrant at least once every two years. All data in the system will also be verified against the completed forms provided by the registrant.

Of major importance in the Center's attempt to provide accurate information on government regulations, permit procedures, and endangered/threatened species is the continuous updating of this material. In order to achieve this, the Code of Federal Regulations, Federal Register, and other documents from a number of federal agencies are continuously reviewed. Publications of state conservation and wildlife agencies are also monitored.

D. Evaluation

During the past year two meetings of the Steering Committee have been convened. The first was directed toward establishing priorities for staff activities during the project year. The second was used to re-evaluate those priorities and provide a preliminary review of the Center's progress toward achieving the goal of self-sufficiency. It was the consensus of the Steering Committee that in order for the Center to become self-supporting it would have to implement a fee schedule for its informational services and develop other sources of income. Further, the staff was directed to implement whatever strategies were necessary to increase efficiency and reduce the number of manual operations now performed. To prepare the fee schedule, a basic economic model of the Center's operation will be developed. Achieving an understanding of the operating costs of the Center will provide the staff with a reasonable basis for calculating fees for the different services.

E. Promotion

A User's Guide to the Center has been published (Attachment C). This publication describes the Center, gives examples of the services available, and explains how to request these services. The User's Guide was mailed to over 7,500 individuals in May. Since then, as indicated above, distribution of this publication has increased the use of the Center.

A preliminary demonstration of the Center and the services available was presented at the ASC annual meeting at Harvard University in May of this year. This demonstration was given to "test" presentation techniques and determine the need for additional audio-visual materials. In conjunction with the demonstration, a reference document was prepared for participants. The content of this reference document is designed to provide graphic examples of the kinds of services, products, and information available through the Center.

The financial exigencies of the first seven months of the project year precluded our convening the previously scheduled workshops. However, a demonstration/workshop on the services available from the Center was held on October 2 for personnel from the National Laboratories who are responsible for environmental assessment programs. Six representatives from four DOE labs (Argon, Battelle, Brookhaven, Oak Ridge) participated in this workshop. We consider this to have been a valuable and worthwhile project because of the communication we established with these labs. Several potential projects involving the Center and the labs were discussed.

In order to help communicate the services available through the Center, a portable exhibit, which will be displayed at select scientific and professional society meetings (AIBS, AAAS, GSA, etc.) is being designed and constructed. The design of this exhibit was well underway by the end of the contract year. It is anticipated that it will be ready for presentation at one of the professional society meetings occurring in early January or February.

A promotional program is being outlined to be implemented during the remainder of the first year and continued into the second and third years. The program is designed to insure that the rate of inquiry does not exceed the capacity of the system to respond in a timely manner. The increase in inquiry rate brought about by the direct mailing of the User's Guide gives us every indication that a well directed promotional program will substantially increase the inquiry rate. A summary of the Center's promotional activities follows:

1. Center promotional material appeared in Herpetological Review, the ASC Newsletter, "Aviso" (a publication of the American Association of Museums), Science (30 November 1979 issue), the exhibit catalog of the IXth International Congress of Plant Protection, and the Entomological Society of America Exhibit Catalog, the Encyclopedia of Information Systems and Services, Educational Media Yearbook,

Directory of Special Libraries and Information Centers, Writer's
Resource Guide, Guild of Scientific Illustrators Newsletter.

2. The User's Guide to the Center for Biosystematics Resources and brochures describing ASC's Center publications were mailed to over 6,500 biologists and other interested persons. In addition, the publications brochure was mailed to 940 law libraries.
3. Center staff members have attended the annual meetings of the American Malacological Union, the Western Society of Malacologists, and the Canadian Museum Association. At these meetings, the staff person discussed the Center and its services and distributed Center literature.
4. Information on ASC's Center publications was distributed at six midwestern regional scientific meetings, at the IXth International Congress of Plant Protection, and at the annual meetings of the Entomological Society of America, Society for Vertebrate Paleontology, The Paleontological Society, and the Geological Society of America.

The goal of the advertising program is to generate over 1,000 inquiries by the end of the second year. At this level, given an average fee of \$25.00 to \$100.00 per query, income could provide a significant part of the Center's operating budget.