U.S. Department of the Interior
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LOUISIANA COASTAL GEOGRAPHIC INFORMATION SYSTEM NETWORK: ALPHA VERSION 0.1 YEAR THREE FINAL REPORT

by

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ABSTRACT

Average shoreline retreat rates in excess of 10 m/yr and land loss rates of about 100 km^2/yr are common for the Mississippi River delta and chenier plains. These changes have immense environmental, economic, social, political, and public safety ramifications for the state and nation. To assess the potential risk these factors pose to Louisiana citizens, coastal information regarding direct and indirect causes needs to be compiled. Although much coastal information exists, Louisiana has neither a central GIS repository for coastal data nor an organized mechanism by which this information can be identified, accessed, or shared. In response, the LSU Coastal Geoscience Laboratory, the LSU Department of Geography and Anthropology, the LSU CADGIS Research Laboratory, and others, through funding provided by the U.S. Geological Survey, are developing the Louisiana Coastal GIS Network (LCGISN). LCGISN was created to facilitate the identification and exchange of geographic data pertinent to research, planning, and management in the Louisiana coastal zone. To accomplish this mission, LCGISN is developing a spatially indexed cataloging system that will include a framework, procedures, and guidelines for documenting hard copy and digital data such as maps, aerial photography, satellite imagery, videotape surveys, reports, and other coastal-related data. The first working version of LCGISN is complete and is known as *alpha* (version 0.1).

INTRODUCTION

In response to Louisiana's coastal land loss problem, the U.S. Geological Survey (USGS) developed a cooperative research initiative with Louisiana State University (LSU) to investigate critical processes of barrier beach erosion and wetland loss. This joint effort focused on understanding the problem from a geomorphic, stratigraphic, process, and cultural impact point of view (Davis, 1992; McBride et al., 1992; Williams et al., 1992; List et al., in press). In addition, other local, state, and federal projects are underway to study and map additional natural and cultural resource characteristics of the coastal zone. The product of these various research activities is one of the largest multidisciplinary coastal data sets in the United States. A considerable amount of these data have been collected, analyzed, and archived; however, much of the information is not cataloged properly or linked effectively. Furthermore, these data come in a wide variety of media types, including digital maps, high-resolution seismic profiles, vibracores, aerial videotape surveys, satellite imagery, tabular records, high- and low-altitude photography, and field surveys. Unfortunately, much of the digital data is unknown to other agencies or inaccessible because of software format and hardware platform differences. To organize these diverse, multi-agency data sets into a functional access system, the USGS committed funds to establish the Louisiana Coastal GIS Network (LCGISN) for data identification, dissemination, and where possible, retrieval (see McBride et al., 1990, 1991a; Hiland et al., 1991, 1992; Davis et al., 1992).

Various capabilities and components of the LCGISN, especially the work completed by the Technical GIS Group on *alpha*, are highlighted in this report. *Alpha* represents the first working version of LCGISN over a distributed network in a Unix environment and will be used for internal review of functionality, consistency, and ease of use. Once the *alpha* version is fully tested and revised, a *beta* version is planned for limited release in summer 1993, and the first public release is scheduled for 1994 (figure 1).

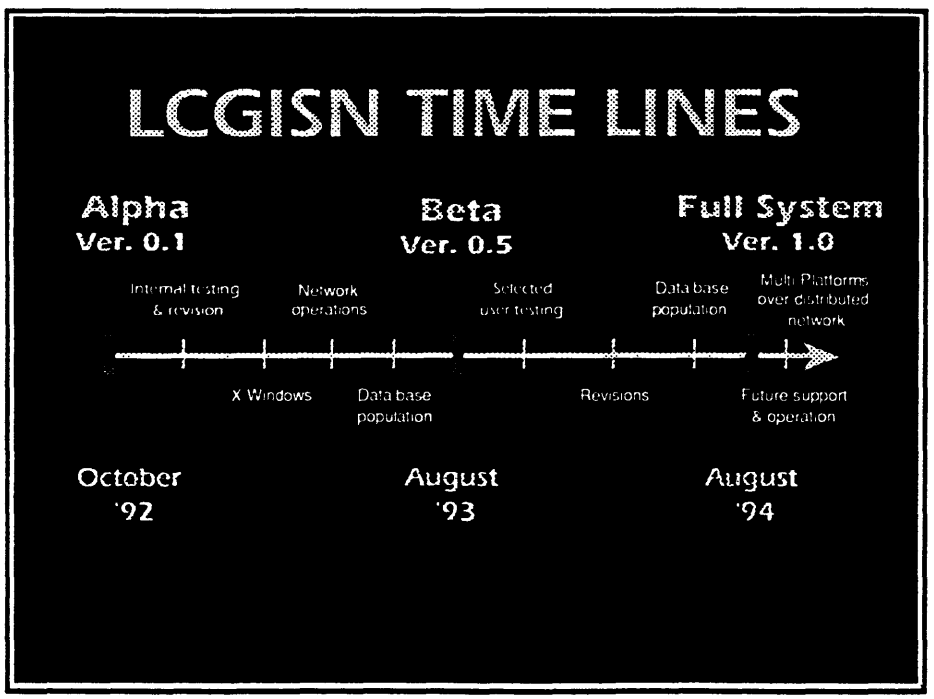

Figure 1. LCGISN development plans over the next two years (years 4 and 5).

Project Mission and Goals

The LCGISN Technical GIS Group has outlined a general framework for project development that has led to a better understanding of project goals by the potential user community. The primary mission of LCGISN is to establish a spatially indexed cataloging system to facilitate the identification and exchange of geographic data pertinent to Louisiana's coastal zone. Specific goals of the project include the following:

1. Develop a cataloging framework for documenting hard copy and digital data such as maps, aerial photography, imagery, reports, and other coastal-related data,

2. Develop a computerized information system that enables users to search cataloged data by subject, location, keywords, or other common criteria,

3. Identify and locate priority data sets,

4. Establish procedures and provide guidelines for cataloging available data,

5. Expand the developed information system into a distributed network capable of serving remote users,

6. Publish a newsletter and establish a computerized bulletin board for communication among users,

7. Establish digital data transfer policies and procedures,

8. Develop a plan for future operation and support of LCGISN.

ORGANIZATIONAL FRAMEWORK OF LCGISN

The LCGISN consists of four major components: 1) a Management Council, 2) a Network Core Group, 3) a Technical GIS Group, and 4) two independent advisory groups (figure 2). These interactive components are centered around the LSU Coastal Geoscience Laboratory (CGL) (formerly part of the Louisiana Geological Survey), which is the headquarters for LCGISN.

Management Council

The council was established in the fall of 1989 and meets at least twice a year. At the meetings, the Technical GIS Group presents a progress report of LCGISN developments and usually includes a computer presentation. This synopsis provides the council with an opportunity to discuss issues and concerns pertinent to LCGISN as well as their own GIS activities. This allows coordination among the most important organizations working in Louisiana's coastal zone. At the end of the meeting, council members are asked to present a summary of their agencies' GIS activities and make suggestions to improve LCGISN. The Management Council not only provides guidance for the LCGISN, but provides a necessary forum for current and future coastal GIS activities in Louisiana.

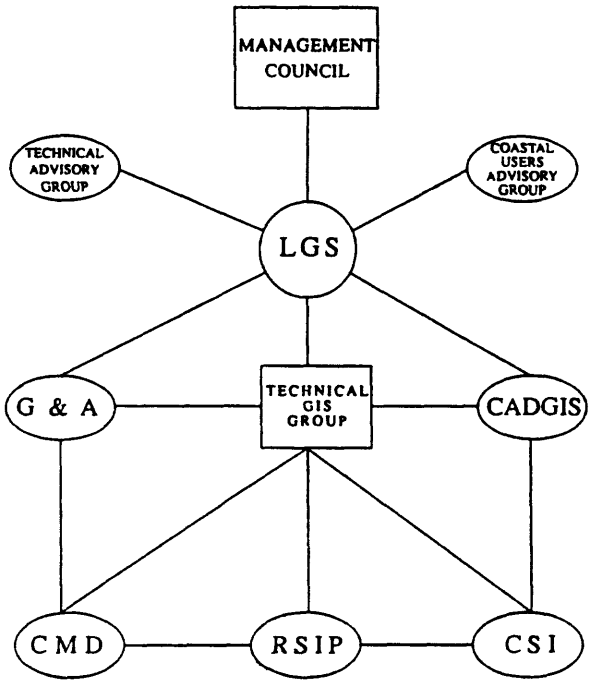

Figure 2. Major organization components of the LCGISN (after McBride et al., 1991).

In year three, the LSU Coastal Geoscience Laboratory organized two LCGISN Management Council meetings. The first meeting convened on 27 February 1992 at the LSU Union. DeWitt Braud, formerly of Decision Associates and currently with the Department of Geography and Anthropology, chaired the meeting. Represented organizations included the LSU Coastal Geoscience Laboratory, USGS, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers—New Orleans District (USACE-NO), Department of Natural Resources—Coastal Management Division (DNR-CMD), DNR Coastal Restoration Division (DNR-CRD), LSU CADGIS Research Laboratory, and the LSU Department of Geography and Anthropology. The two major topics discussed at this meeting were 1) clarifying the purpose and major goals of LCGISN as described above and 2) future support of LCGISN. The second meeting was held on 21 October 1992 at the LSU Howe-Russell Geoscience Complex. This meeting concentrated on *alpha* (version 0.1) and consisted of three slide lectures and a full computer presentation. In addition to the above-mentioned list, other organizations represented included the Louisiana Governors Office for Coastal Affairs, Department of Environmental Quality, Barataria-Terrebonne National Estuary Program (BTNEP), Louisiana State GIS Task Force, Coalition to Restore Coastal Louisiana, and LSU Coastal Studies Institute.

Advisory Groups

Two advisory groups were organized at the Sixth Annual Workshop on Remote Sensing and Geographic Information Systems (RS/GIS) for Coastal Management in April, 1990. Coastal zone managers and others were asked to participate in the **Coastal Users Advisory Group**, while the **Technical/Applications Advisory Group** provides input on GIS hardware, software, and networking.

Co-chairpersons for the Coastal Users Advisory Group were Karen Wicker, Coastal Environments, Inc., and Sharon Balfour, Louisiana Department of Transportation and Development. Nelson May served as chairman for the Technical/Applications advisory group. These groups continue to meet during the annual RS/GIS workshop.

Network Core Group

LCGISN functions around the concept of sharing information. To insure data sets are integrated into the network, LCGISN was built around a core group consisting of LSU's remote sensing and geographic information system research laboratories (CADGIS Research Laboratory, Coastal Geoscience Laboratory, Remote Sensing and Image Processing Laboratory, Earth Scan Laboratory, and the Department of Geography and Anthropology) as well as the Louisiana Department of Natural Resources, Coastal Zone Management Division. A successful working relationship exists among these organizations and personnel working on the LCGISN. This association is further enhanced through the LSU RS/GIS Coordinating Council, a multi-disciplinary council which facilitates the coordination of remote sensing/GIS-related data and research. The LCGISN is also represented on the State GIS Task Force. Although the GIS Task Force is concerned with all aspects of GIS activity within Louisiana, LCGISN's operational framework may serve as a model to assist the State GIS Task Force in organizing a diverse number of state agencies into an efficient information access system.

Technical GIS Group

The driving force behind LCGISN is the Technical GIS Group, which is responsible for developing, implementing, and operating the system. This committee meets bi-weekly and consists of experts in computer mapping and GIS, remote sensing, computer programming, systems design and management, database design, coastal geomorphology, geography, and library science. Presently, the Technical GIS Group is divided into seven components (figure 3). Each component is directed by one or more task leaders. The interface development and programming task is led by Farrell Jones, who is assisted by two "C" programmers (see Interface Design...p. 8). The base map construction task is headed by DeWitt Braud with assistance from Matt Hiland, Farrell Jones, Jay Arnold, and Randy McBride (see Satellite Image... p. 17). The cataloging standards task is directed by Michael Carpenter and is assisted by a graduate assistant (see Cataloging Framework...p. 15). LCGISN coordinates its efforts with several federal, state, local, and private organizations, and this broad task is handled by Lynda Wayne and Randy McBride (see Emerging Metadata Issues...p. 24). Data acquisition efforts are led by Anthony Lewis, with assistance from Jay Arnold and Lynda Wayne (see Data Resource Inventory...p. 18). The hypsography digitizing project is a cooperative effort with the USGS National Mapping Division in Rolla, Missouri, and is jointly monitored by Matt Hiland and Farrell Jones (see Contour Digitizing...p. 22). Finally, the database table design and implementation task is headed by Henry Streiffer, with help from the entire Technical GIS Group (see Database Design...p. 15).

At the bi-weekly Technical GIS Group meeting, task leaders give a status report and discuss problems that have been encountered and appropriate ways to solve them. These meetings serve as an open forum to keep the Technical GIS Group members informed about progress on each individual task.

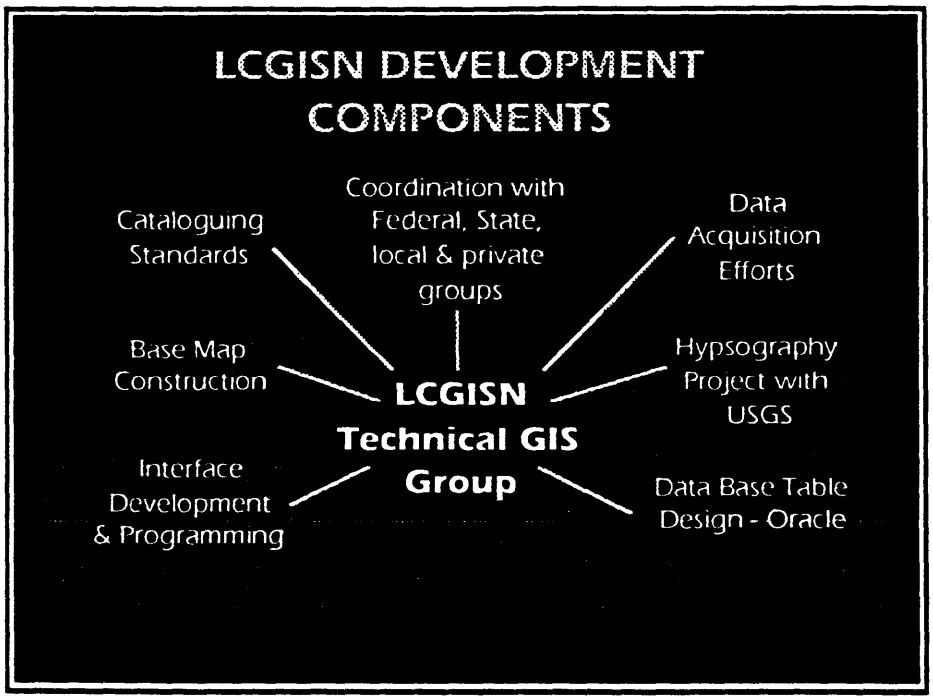

Figure 3. Development components of the LCGISN Technical GIS Group.

INTERNAL MANAGEMENT STRUCTURE

Because LCGISN is becoming increasingly complex, the internal management configuration was refined and divided into several components. By following this organizational approach, project personnel can manage LCGISN's diverse and distinct elements more efficiently. The following personnel are part of the Technical GIS Group.

Project Coordinator

The project coordinator, Randy McBride, is responsible for managing and directing the different components of LCGISN weekly. These tasks include the following: 1) chair the GIS Technical Group (which meets every two weeks), 2) prepare and manage the budget, 3) participate in interagency meetings, 4) coordinate publication of the LCGISN newsletter, and 5) produce progress and final reports. Overall, he coordinates all of LCGISN's diverse elements and is the primary contact for the LCGISN project.

Technical Supervisor

Matt Hiland is the technical supervisor and is responsible for software development, database design and implementation, graphical user interface implementation, incorporation of existing digital data sets

into LCGISN, monitoring of the hypsography digitizing project, and hardware and software decisions. He coordinates closely with the GIS manager as described below.

Applications Supervisor

Lynda Wayne, applications supervisor, evaluates system usability and functionality, identifies and locates available resources and contacts, develops data catalog methods and documentation, and introduces LCGISN to potential users. Overall, she strives for the effective use of LCGISN by users. The technical and applications supervisors are the primary liaisons with the programmers to ensure program execution and completion. Furthermore, these two supervisors act as a team in cooperation with the principal investigator.

GIS Manager

Farrell Jones, CADGIS Research Laboratory, serves as the GIS manager. His duties include system development, management, and operations; software implementation; computer and network trouble shooting; equipment maintenance; menu interface; programming and networking needs; database structure and fields; and dataset transfer and translation programs.

Cultural and Natural Resources Specialist

Don Davis specializes in cultural and natural resource data sets pertaining specifically to Louisiana's coastal zone. He is responsible for locating, organizing, and incorporating important and hard-to-find coastal data sets, especially at the local and parish level (e.g., oil and gas activities, sulphur mining, fisheries industry, marsh management, soils, pollution, etc.) into LCGISN and coordinates with Lynda Wayne. He also will coordinate with similar activities underway at USFWS for incorporation into LCGISN.

Library Scientist

Michael Carpenter, School of Library and Information Science, was added to LCGISN's Technical GIS Group in year three to coordinate the library/cataloging effort. He coordinates his efforts with Lynda Wayne and has been working on three aspects of the project: 1) developing a framework for cataloging spatial data, 2) cataloging appropriate coastal materials in the custody of the LSU Coastal Geoscience Laboratory, and 3) developing a geographical retrieval methodology for cataloged materials. The library scientist is responsible for recommending the most suitable cataloging strategy and for furnishing specific cataloged data based on the recommended strategy.

PROJECT RESULTS: ALPHA VERSION 0.1

In October 1992, the Technical GIS Group presented the first working version of LCGISN known as *alpha*. Below is a synthesis of the work completed by the Technical GIS Group as it pertains to *alpha*.

LCGISN: Concepts and Functional Design

Although access to information has always been critical to the decision-making process, the use of computers in library catalogs, database management systems, GIS, data collection, and many other applications has increased the amount of available information and the importance of its organization. While the rate of data collection continues to accelerate, professionals are realizing that information is useless if it is inaccessible to those who need it (see Morris, 1988; Holmes, 1990). Many automated systems exist for information searches. Libraries have on-line catalog search systems; the USGS has an extensive index of aerial photography records; and others too numerous to mention are available. But, most of these systems are text-based searches; users must key in subjects, titles, authors, key words, or geographic coordinates to locate references. Programmers of these automated search systems generally have not taken advantage of advances in computer graphics and GIS technologies to provide access to spatially located data.

LCGISN will enable users to search for cataloged data by subject, location, key words, and other common criteria. However, LCGISN is more than just a spatially indexed cataloging system; it also provides a graphical user interface as well as digital maps and images for interactive definition of geographic locations. Hence, a user can perform textually and spatially based queries by combining locational information with typical searches (e.g., subject, location, key word) (figure 4). The user interacts with a menu interface that guides search criteria selection. Spatial criteria are set by displaying a base map consisting of several familiar locational references (e.g., parish boundaries) as well as high-resolution Landsat Thematic Mapper satellite data.

Textual search criteria are specified using a separate series of menus for each data type. Defined data types are maps, aerial photography, imagery, literature, audio/visual, and geotechnical. On the menus, users can define common criteria such as author, publisher, subject, and date or data specific items such as cloud cover, filter type, and season. These criteria choices are translated to a Structured Query Language (SQL) statement and submitted to the Oracle Relational Database Management System.

The *alpha* version focused on perfecting searches for aerial photography records. A user logs onto the system via the **Welcome Menu**, which provides access to new user information, e-mail, bulletin board, and the **Main Menu** (figures 5 and 6). From the **Main Menu**, users can find information on LCGISN members, enter the **Contacts Search Menu**, or access the **Search Menu** (figure 7). The **Search Menu** displays all current search criteria and provides search management functions such as saving a set of criteria, retrieving a previously saved search, and manually editing the current criteria as well as providing access to the **Search Criteria Menu** (figure 8). The **Aerial Photography Search Menu** (figure 9) is accessed from the **Search Criteria Menu** and provides for the selection of the desired criteria by which to search for aerial photography.

For the *alpha* version, there are three principle means of defining a geographic area of interest. First, a user can use a mouse to draw a box on the LCGISN base map (i.e., visual image for orientation).

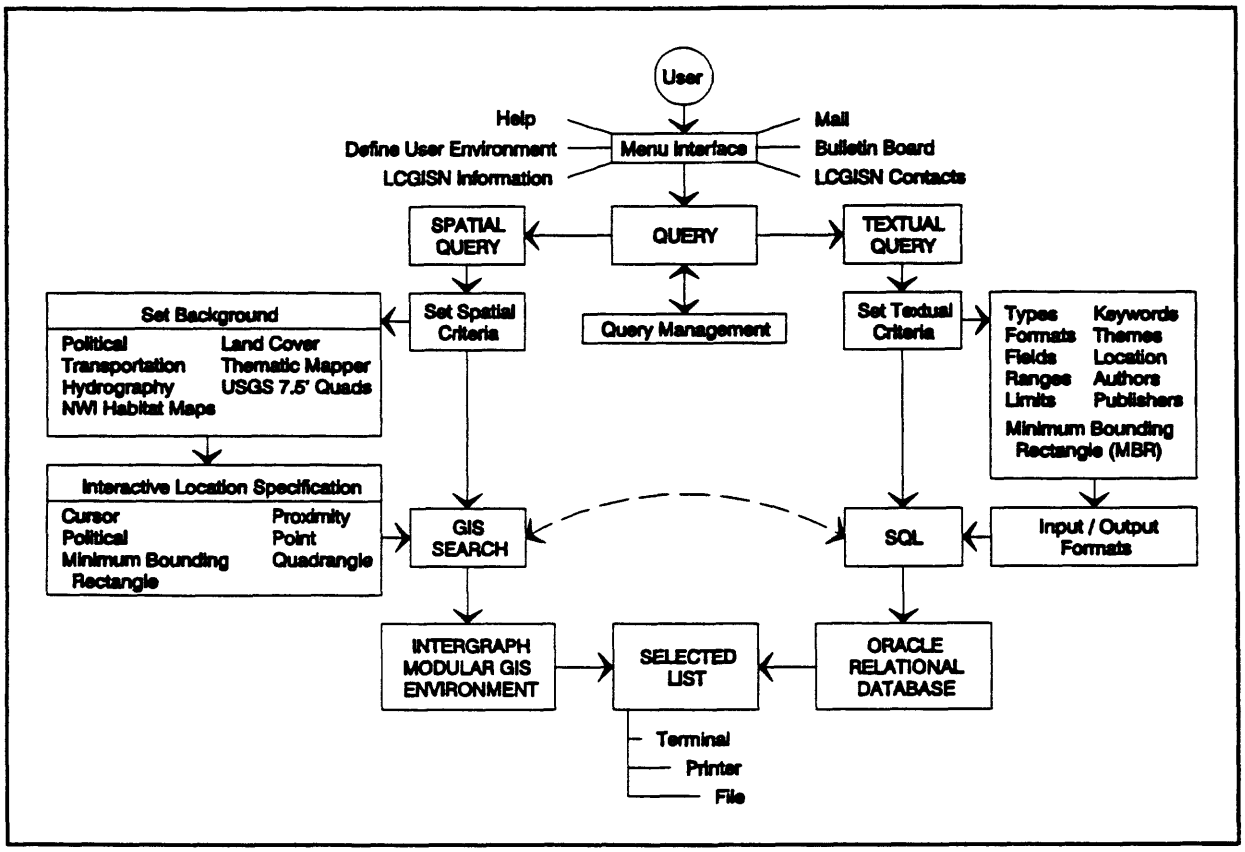

Figure 4. Conceptual diagram showing LCGISN functions and work flow (Hiland et al., 1992).

Users can also key in specific coordinates (figure 10) or select from a list the name, USGS number, La. Dept. of Transportation & Development (DOTD) number, or moniker of a USGS 7.5-min. quadrangle map (figure 11). After setting geographic and search criteria, the program executes the current search and all matching records are displayed. If no suitable data references (e.g., aerial photography) are available for a particular area or subject, there is an extensive data base of potential contacts (individuals or agencies) that can be searched.

Interface Design and Development

An interface for a computer application provides a means of communication between the application software and the user. In the case of LCGISN, *interface* refers to the mechanism by which a user gains access to information stored in the LCGISN data base. This mechanism is composed of menus designed by the Technical GIS Group and implemented by the LCGISN programming staff. Through the menus, the user conveys what information should be found in the LCGISN graphic files and database tables. In

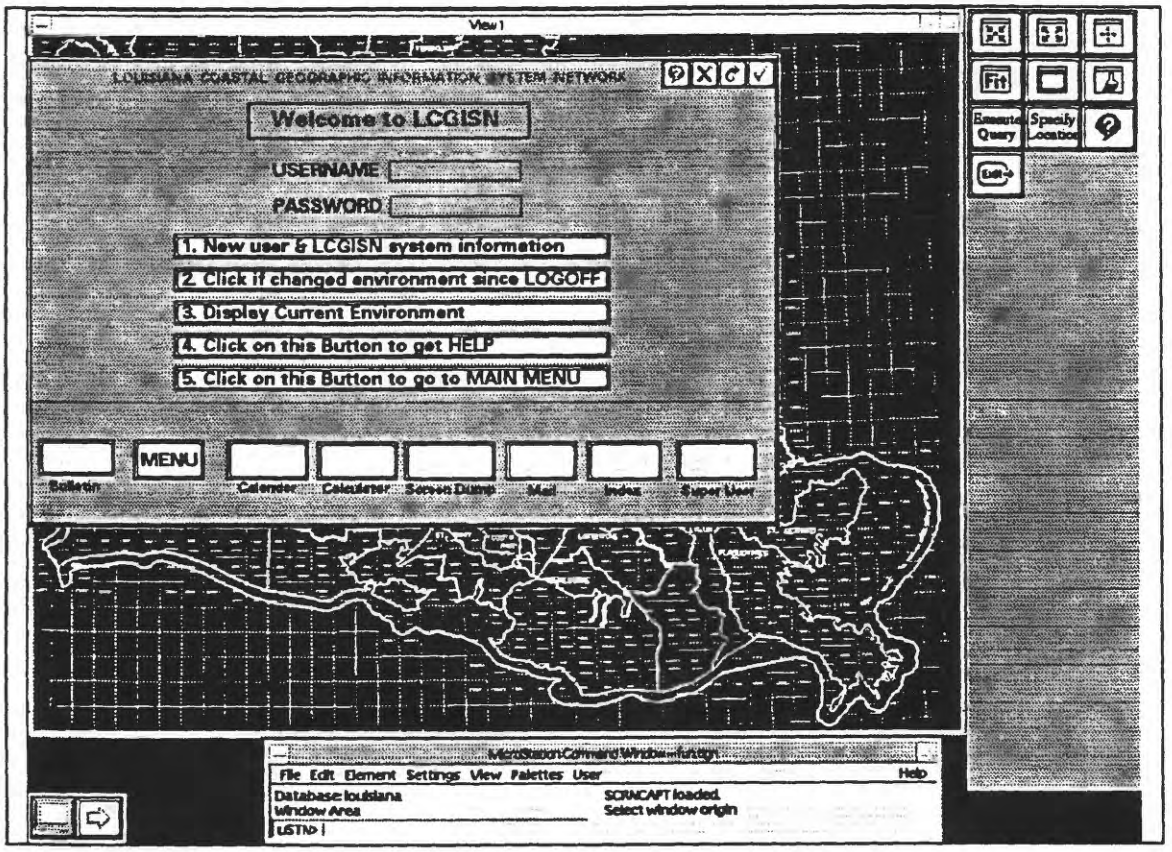

Figure 5. LCGISN welcome menu.

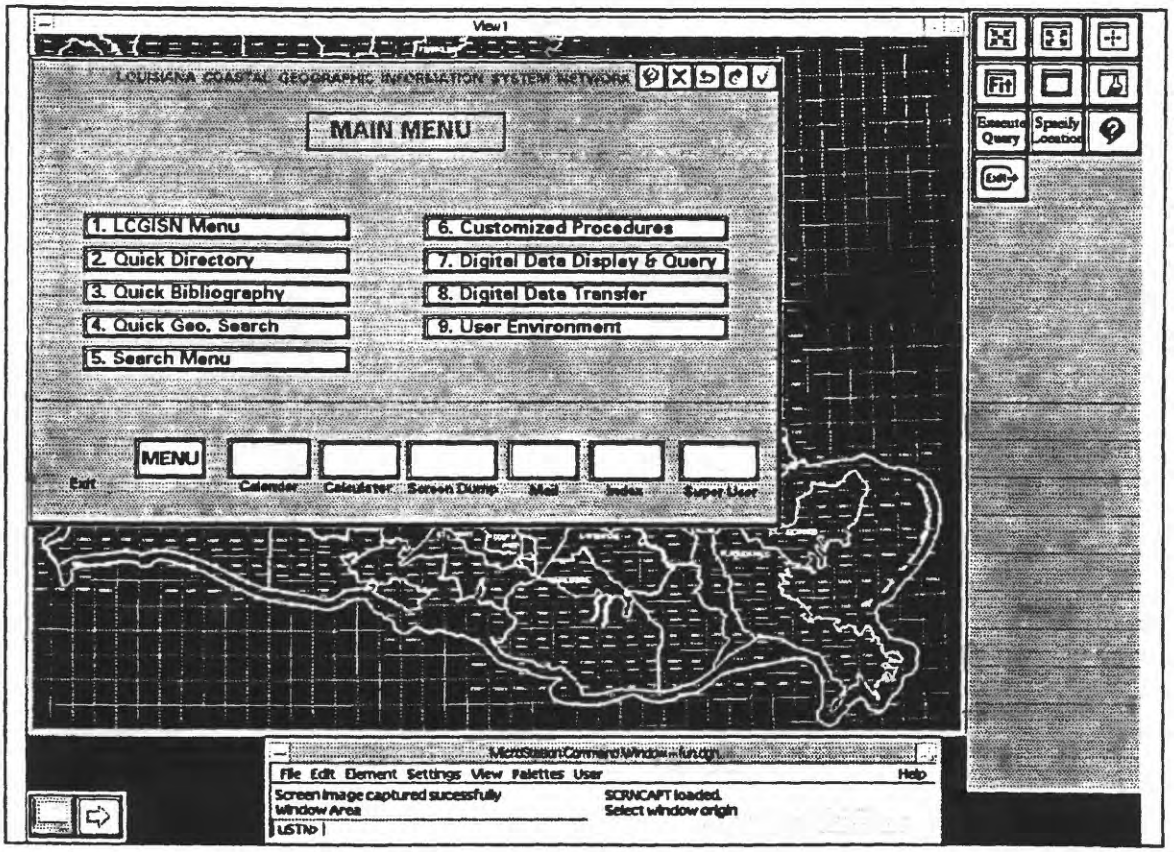

Figure 6. LCGISN main menu.

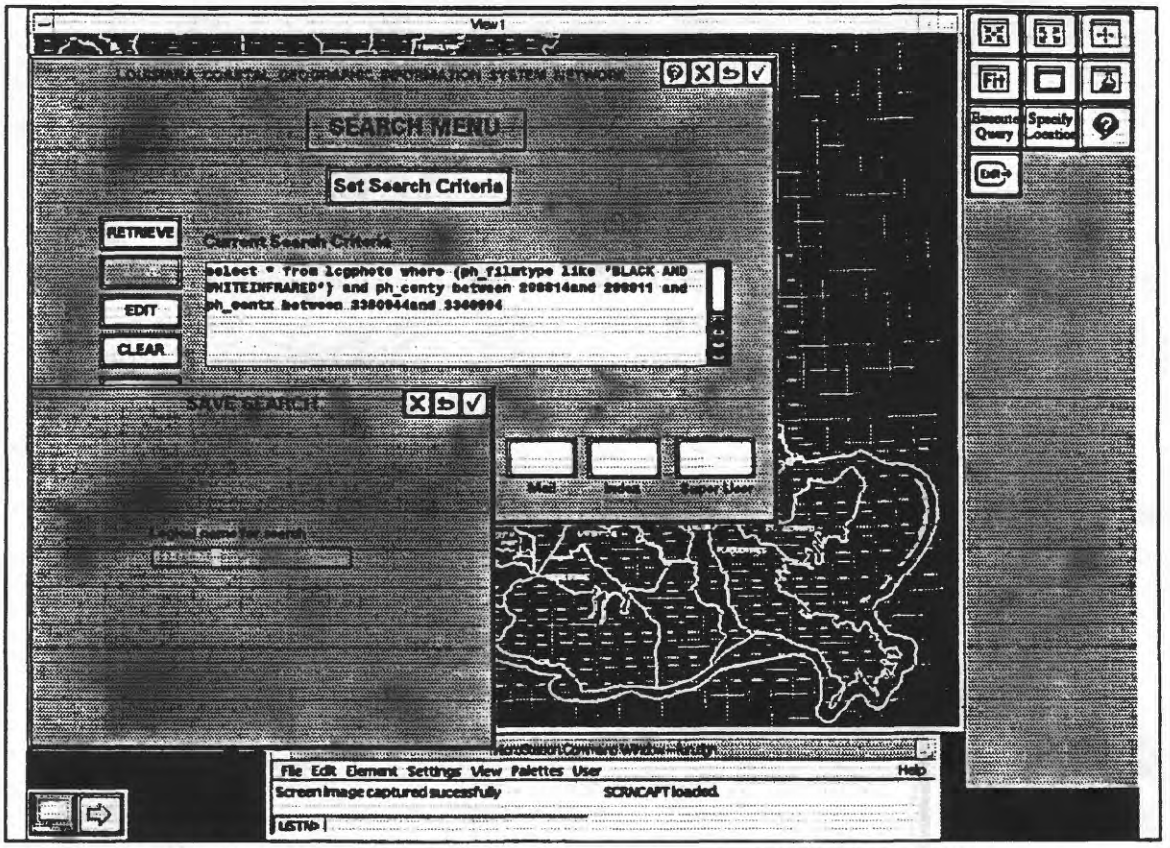

Figure 7. Search menu which is superimposed on the LCGISN digital base map.

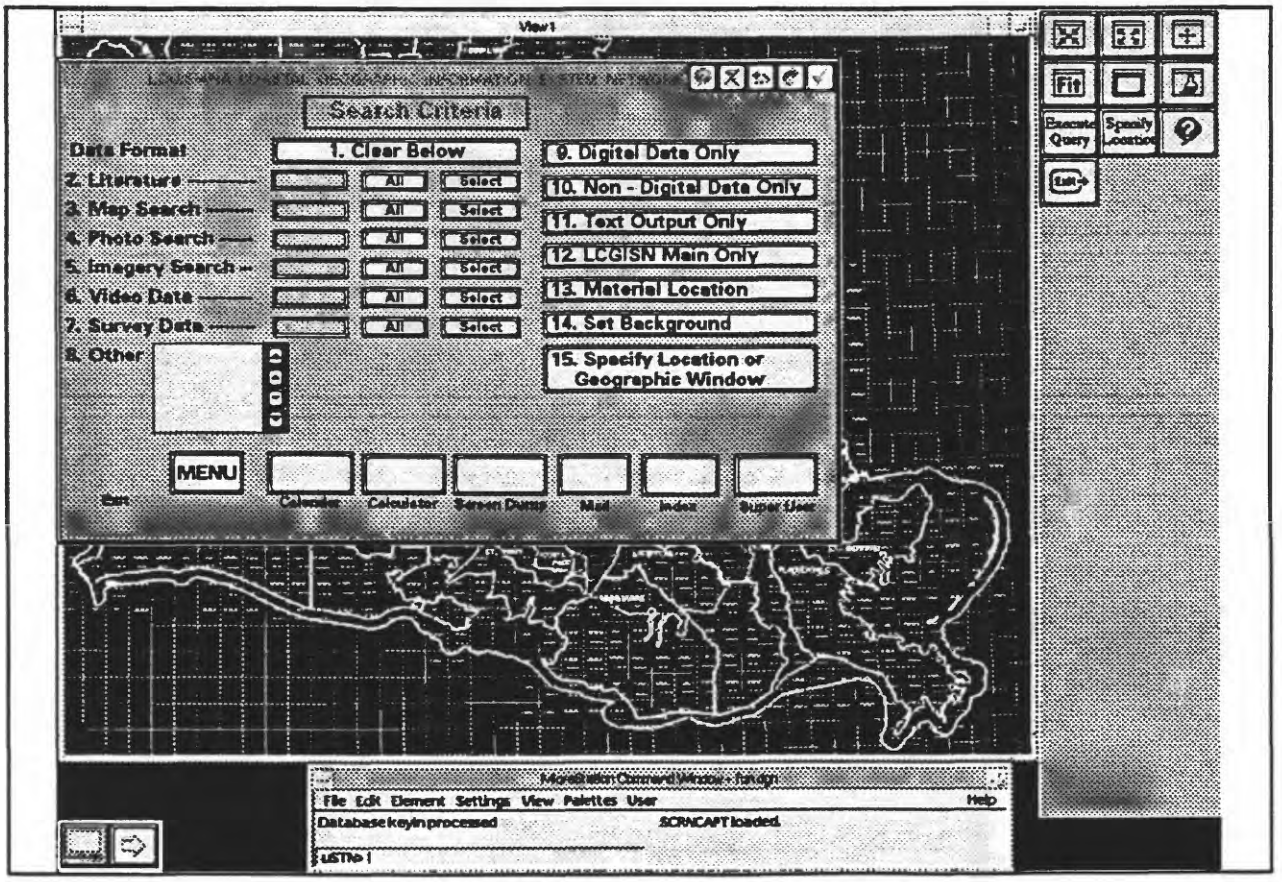

Figure 8. Search criteria menu.

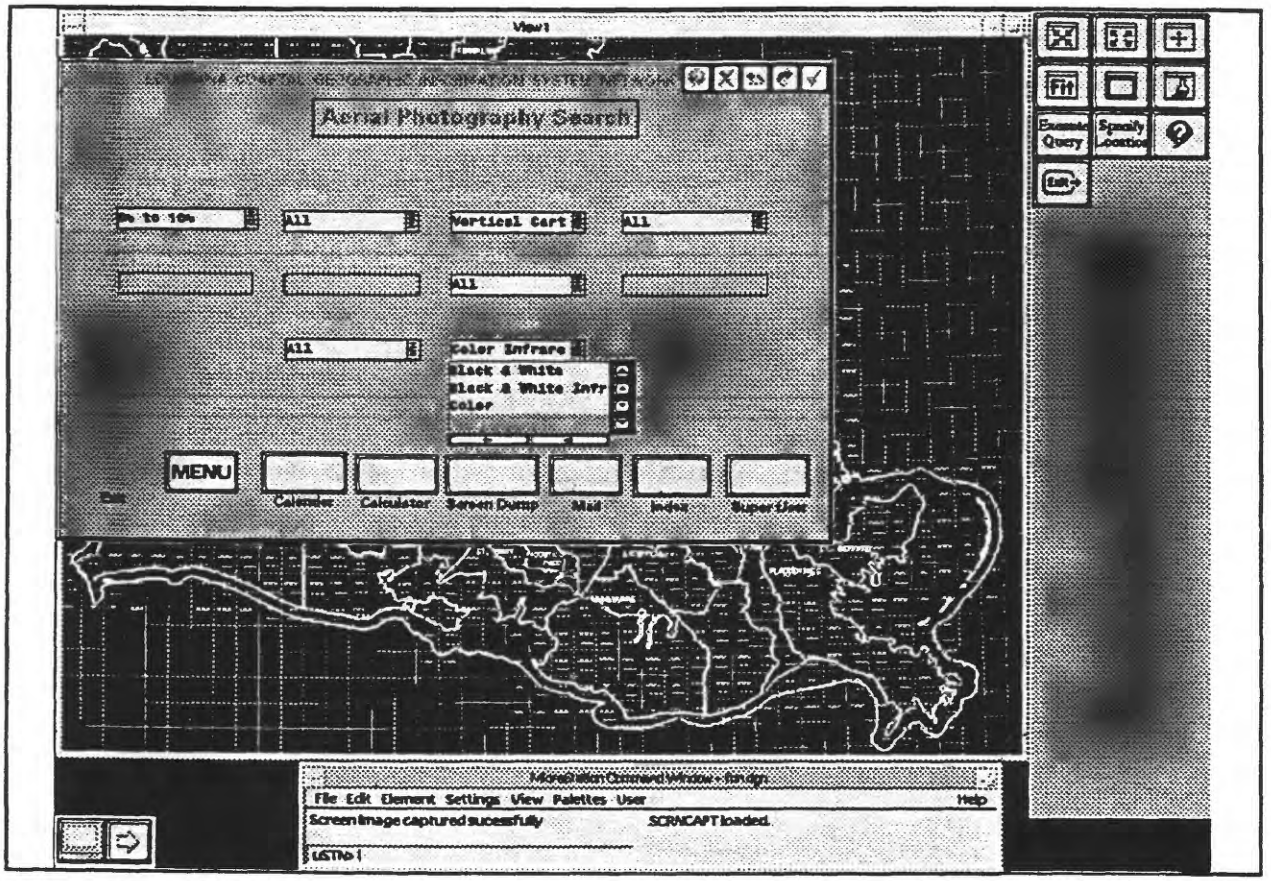

Figure 9. Aerial photography search menu. Specific search criteria include acceptable cloud cover, sensor class, agency, season, and film type.

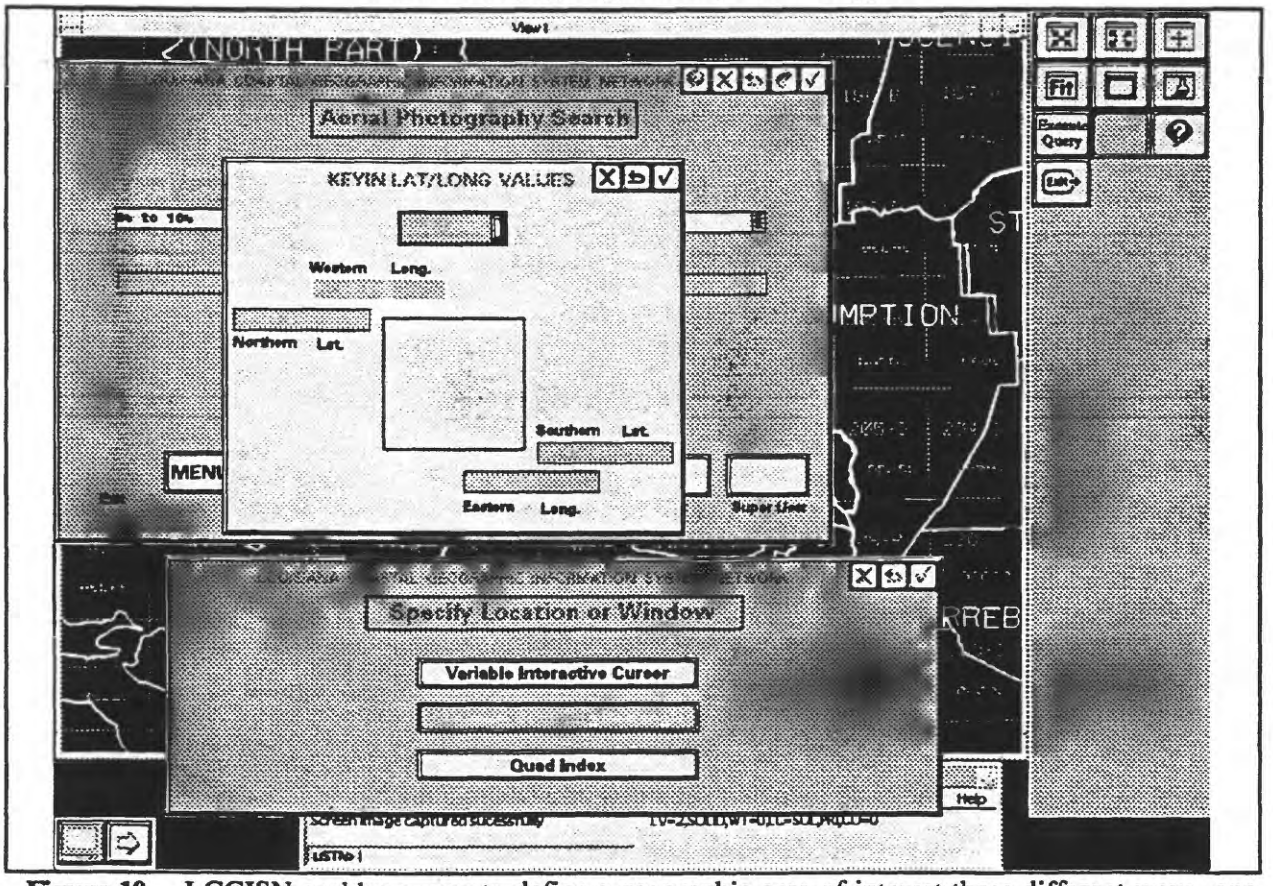

Figure 10. LCGISN enables a user to define a geographic area of interest three different ways, one of which is keying in coordinates.

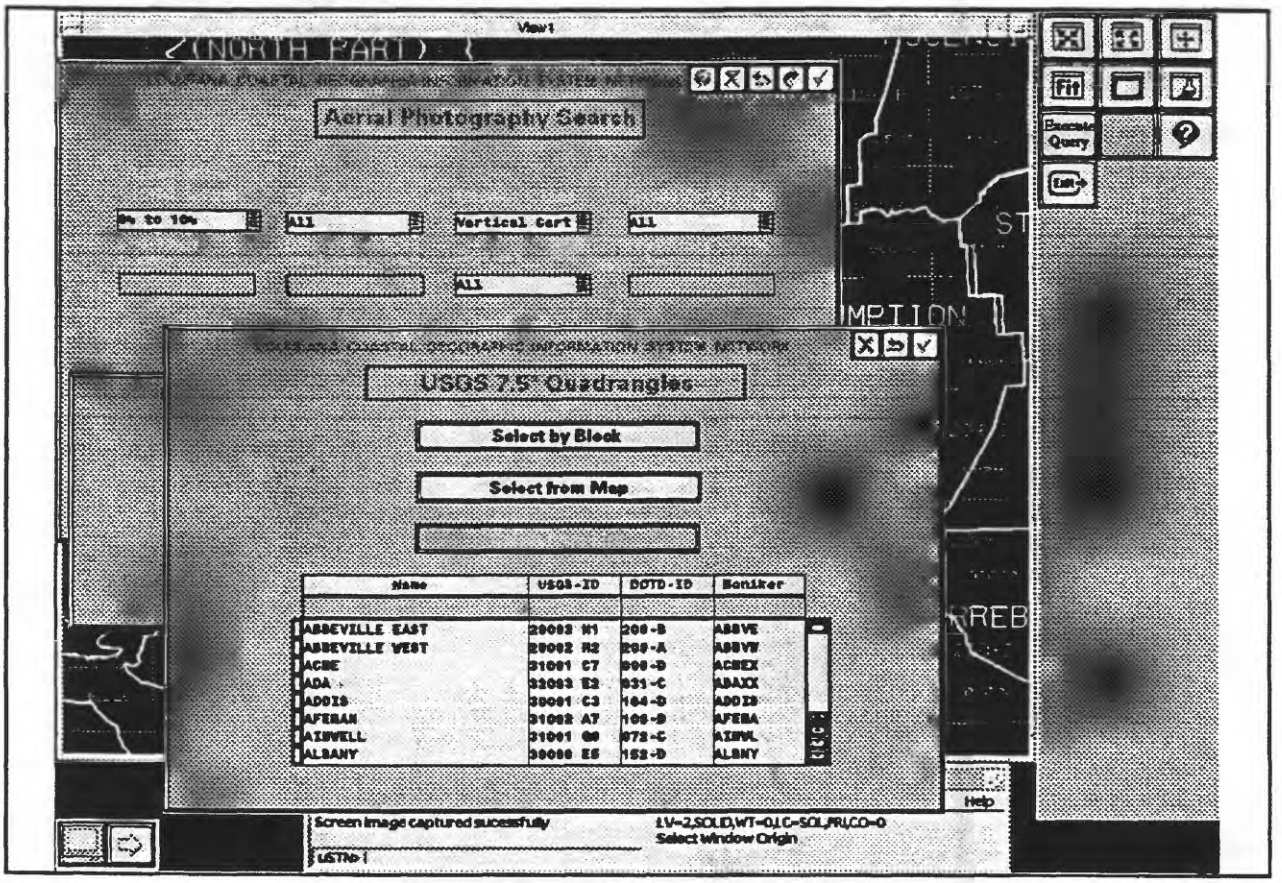

Figure 11. LCGISN also enables users to define an area of interest by selecting USGS 7.5-min. quadrangle maps either by name, USGS number, DOTD number, or moniker.

this section, the basic concepts for designing menus and computer tools used to implement the designs are discussed.

Basic Interface Design Concepts

In designing the interface, the Technical GIS Group attempted to keep interface menus consistent, intuitive, and flexible. A consistent interface is one that allows the user to perform similar functions in a similar manner. For example, to exit any menu, the user activates the *exit* button in the upper-right-hand corner of the menu. The *check-mark button* causes any menu to act on the request and then return to the previous menu. The *X button* causes the menu to return to the previous menu without any action. These buttons appear on every menu in the upper-right-hand corner, have no other meaning, and are the only ones that control exiting the menu (see figures 5–11). Consistency between menus ensures that the user will need to learn a function only once and then apply this knowledge to other menus. Therefore, the user will spend less time learning the system and, hopefully, more time using it.

Intuitiveness in the interface is extremely important. The menus should suggest their functions readily, with little if any explanation from manuals or other users. Words are used instead of obscure graphic icons when possible. The Technical GIS Group carefully selected the terms and phrases used in the menus to make the vocabulary similar to that of probable users. Two main tools for intuitive

criteria selection are available: buttons and scrolling lists. Buttons are used when a menu presents limited choices (figure 6). When too many values are possible for a particular criterion, a list of choices is activated by button, and users select a value(s) from the list by clicking on them with a mouse (figure 9). Flexibility in accepting user input is an important part of a user friendly system. For example, scrolling lists are available for several items. However, for many of these, a key-in field also is available. On some menus, there are fields marked *other*, which will allow for requests that may not be normal but are still valid requests. Flexibility, however, can be a disadvantage—the more flexible a menu is, the more complicated it may be. A user confronted with too many options may find a menu too cumbersome or confusing to use. Therefore, menus are often broken into submenus to reduce the number of options presented to users at one time.

Design Implementation Tools

The LCGISN model for hardware and network design is described in figure 12. It consists of a central storage and processing system (server), which holds LCGISN resources (interface program, database tables, graphic [design] files). A user can gain access over the network to all LCGISN information through a user friendly menu interface. These menus will pop up on the user's PC, Unix workstation, or Macintosh (assuming the user is running X-Windows), and the user can access information such as maps or database tables.

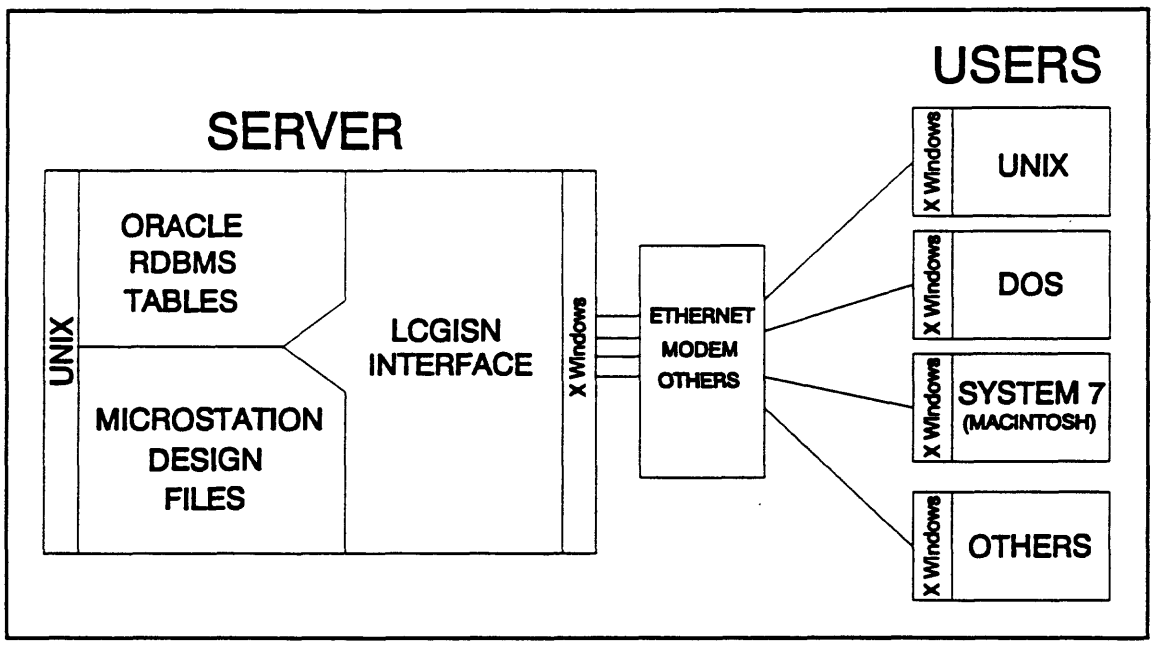

Figure 12. Hardware and network model for LCGISN.

Below is a list of tools being used by LCGISN to implement the interface design.

Network protocol:	TCP/IP
File sharing software:	NFS
Windowing standards:	X-Windows
Graphic user interface:	OSF Motif
Database management system:	Oracle (through RIS)
Database query language:	SQL
Vector graphics:	MicroStation
Raster graphics:	Under evaluation but probably Intergraph Imager
Forms generator:	I/Forms

Many of these tools are standard in the computer industry. TCP/IP is the network protocol most Unix workstation vendors have implemented on their systems. The Network Filing System (NFS) from Sun MicroSystems has become a *de facto* standard for file sharing on an ethernet network. X-Windows is a graphics package that will be standard on all Unix workstations in the near future. X-Windows is available for personal computers and Macintoshes. Although X-Windows will not be used with the *alpha* version of the menu interface, it is planned for the *beta* version. With X-Windows, it is anticipated that LCGISN graphics will be displayed on any microcomputer or workstation regardless of manufacturer. Menu graphics are designed with the use of Intergraph I/Forms, a tool used to modify an application interface or create a new interface. Soon, I/Forms will become X/Forms when Intergraph moves from its Environ V window system to X-Windows.

The software that drives the menus is written in the programming language C. Software designed for accessing vector graphics and the data base is written in MicroStation Development Language (MDL). MDL is a combination of C programming and over 1,000 procedures for displaying and manipulating graphics and the associated data base within MicroStation. Raster graphics also will be manipulated in C, with routines from an as yet undetermined library.

MDL is used to manipulate database tables through the Relational Interface System (RIS) from Intergraph. This provides LCGISN the possibility of expanding the number of database management systems available from various vendors. Currently, Oracle is the relational database management system for LCGISN. RIS can also access Ingres, Informix, IBM DB2, and DEC rdb. All interaction with RIS and the database management systems is through use of the Structured Query Language (SQL).

LCGISN will not provide the analysis capabilities found in a GIS because its primary purpose is to assist in locating data. However, Intergraph Modular GIS Environment (MGE) is used by the menus to manage vector graphics and database tables. GIS functions could be added at a future date if desired.

Software Design Concept

The programming concept behind LCGISN is based on a client-server model (figure 13). The user communicates with the system through the client (menus—I/Forms) by supplying data to a form. The

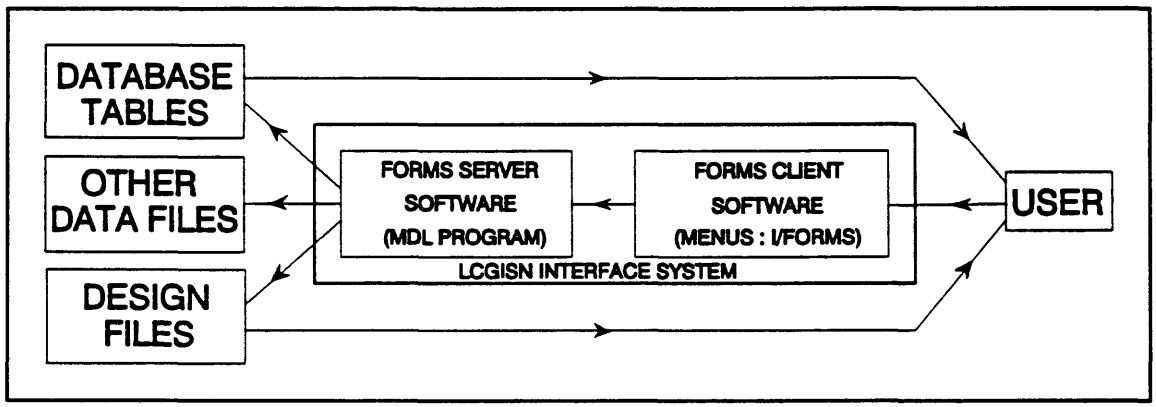

Figure 13. Programming framework based on a client-server model.

forms client in turn processes request of the user by sending appropriate messages to the forms server (MDL program) using Inter-Process Communication (IPC). The server controls the resources that comprise LCGISN (Note: In this case, *server* refers to a software programming concept and not computer hardware). The resources include the database tables and spatial data stored in design files.

Database Design

Much time has been devoted to developing an ideal data base for cataloging information for the Louisiana coastal zone. Creating this data base involved extensive research and lengthy discussions as to what should be included: how to maximize efficiency, how to best populate the data base, how to satisfy requests, and how to handle all data types. The result was a *superset* of attributes sufficient to catalog most geographic products. Using this set of attributes, organizations involved with the Louisiana coastal zone can organize and initiate data cataloging to suit their internal needs, while meeting LCGISN data catalog standards (see Hiland et al., 1992; appendix A).

Cataloging Framework

Cataloging data holdings will be an enormous task. For example, it is estimated that basic cataloging will take at least 10 minutes per item. For 1,000 items, this amounts to 21 working days. Therefore, it is imperative to balance simplicity, ease, and speed of data entry with the benefits derived from entering extensive data about each item. Because of the time and energy invested in this project, the

Technical GIS Group has acquired a certain level of expertise that can benefit users in setting up an information management system for their particular environments and needs. For interested participants, LCGISN will provide software (Unix, DOS, or Macintosh platforms) and appropriate documentation for cataloging data. The participating organization will need to determine the proper fields to use for their holdings, human and financial resources available to catalog these holdings, goals for search and retrieval of data, and any additional fields required to meet library or internal organizational requirements. Data entry software can be customized to help data entry personnel. The contributing organization's personnel would then proceed with data entry, providing copies of the database records to be loaded into LCGISN. Eventually, all participating organizations will be able to search the same data base for information pertinent to their coastal zone work. This is expected to lead to an increase in interagency cooperation, a decrease in duplication of effort, and more efficient use of limited funds.

It became apparent early in the design phase of LCGISN that adherence to a national cataloging standard would offer many advantages such as the ability to exchange records with a national data base and easily share data with libraries around the country. We have chosen to use USMARC as that standard. USMARC is the United States implementation of the MARC (MAchine Readable Cataloging) format for communicating cataloging and bibliographic data through such networks as On-line Computer Library Center (Network Development and MARC Standards Office, 1987, 1988). The contents of the data, as communicated in the USMARC format, are determined by reference to the internationally accepted Anglo-American Cataloguing Rules (Joint Steering Committee for Revision of AACR, 1988). Included in the ambit of these rules are procedures for title transcription, general descriptions of the objects being cataloged, and the form of heading for author and title access points to the descriptions. Other fields, such as theme, are not covered by the cataloging rules.

USMARC has certain mandatory fields; fields without which, it will not accept a record for cataloging, and required fields or fields that must be supplied if the information is available. In some cases, these fields may be of little interest to the user, and attempts will be made to minimize their impact. However, their inclusion will be beneficial for the entire catalog. Adherence to national cataloging standards will make the data in LCGISN usable nationwide without fear of requiring users to learn a new system. It also will have the beneficial effect of creating records in LCGISN compatible with those in other, nationally based bibliographic data bases.

To ensure consistency in the names of authors, corporate bodies, and other terms, authority lists need to be established. An authority list contains the form of name used in the catalog, together with references from synonymous but unused forms of names. For example, the established form of heading for the United States Geological Survey might well be "U.S. Geological Survey"; the authority table would contain a reference from the acronym form of name, USGS, which will not be used in the catalog. Use of two or more forms of a name has the undesirable effect of returning incomplete search results.

LCGISN members are aware of the amount of work required to accurately catalog data and will provide a framework to assist users in deciding what fields would be best for their locations; priority of data sets for entry; the design of data entry procedures, forms, and screens; and automation of data entry where possible. Other important decisions include whether to catalog individual items or collections of items as single entries. Collection level cataloging offers the user a quick way to roughly catalog some of their least used holdings. In other words, it may be less timely to add one entry to indicate that a map library has a collection of 1,500 photos of the Mississippi River taken in 1943 rather than recording separate entries for each photo.

Satellite Image and Land/Water Interface as Part of LCGISN Base Map

Construction of the LCGISN digital base map is nearly complete and consists of several raster and vector data layers, including: 1) 1990 satellite image as raster backdrop, 2) land/water interface derived from satellite data, 3) USGS 7.5-min. quadrangle boundaries, 4) state political and legal boundaries (e.g., state, parish, coastal zone), and 4) major transportation routes (e.g., roads, railroads). Below describes the processing of the satellite data and how the land/water interface was derived.

Creation of Composite Satellite Image

Acquisition of recent (1990) Landsat Thematic Mapper (TM) data for the State of Louisiana by the Louisiana Department of Natural Resources (DNR) offered an opportunity to incorporate a unique satellite image backdrop into the LCGISN spatial data base. Raw or unaltered TM data is delivered geographically rectified by EOSAT Corporation, which means the data are located with geographic coordinates such as latitude and longitude, for easy incorporation with other spatially referenced data. The TM data have a ground resolution of 30 m and are divided into seven spectral bands (three visible, three reflective infrared, and one thermal infrared). The bands can be combined in various ways to simulate natural color and pseudo-infrared images similar to aerial photography to the user. These composite images are usually constructed with three of the seven bands. The resultant image is referred to as a true color or 24-bit image.

Three bands were chosen for the LCGISN base map, which uses two reflective infrared bands and a visible band to simulate a natural color image while retaining the superior benefits of reflective infrared to penetrate atmospheric haze and distinguish land from water. Such an image offers a unique locational reference that provides LCGISN users with an accurate and updated representation of the land cover, land/water interface, and environmental condition of the Louisiana coastal region. The image has a large amount of interpretive value and visual appeal. Associated with other information, the image backdrop will assist in locating areas of interest, identifying areas of change or concern, and providing an invaluable reference that places vector GIS data in the context of its surroundings. Such imagery has already proven useful in assisting the functions of state and federal agencies and university researchers concerned with the problems in the Louisiana coastal zone.

Because of copyright restrictions, the TM data cannot be provided to LCGISN by Department of Natural Resources in its raw form. For this and other reasons related to processing speed and disk space requirements, it is desirable to reduce the 24-bit, three-band raw images to 8-bit single band images referred to as GIS files. The 8-bit GIS image is created in such a way that it closely simulates the appearance of the original raw image. Such files are not restricted for distribution by EOSAT because they cannot be used to recreate the raw data. Aside from improved access speed and reduced disk space requirements, the 8-bit file also is easier to process, and portability is simplified. In addition, it provides faster plotter output and unique data manipulation. The improved processing speed and easier handling is particularly important within the network environment in which LCGISN will operate. This reduction technique is not intended to supplant 24-bit images, but it does have utility for a wide variety of applications.

In addition to the TM raster images, base map data for the LCGISN includes the USGS 7.5-min. quadrangle map boundaries, which are equipped with full quadrangle names, numerical codes, unique abbreviated monikers, and other useful information related to dates and location of the quadrangle. Other base map data include major legal boundaries for state, parish, and public lands and the USGS DLG data

that include principle transportation routes and other geographic information digitized from 1:100,000-scale quadrangle maps. These data will be significantly enhanced in association with the TM color image.

Development of Land/Water Interface

TM data are unusually well suited for generating a land/water interface because of the strong contrast between land and water in the reflective infrared portion of the electromagnetic spectrum. Water absorbs reflective infrared radiation, and vegetation is a strong reflector, making an ideal combination to map land versus water and thus generating an interface. Because of the strong land/water contrast, the interface is easy to visually discern. However, outlining the interface and measuring its extent in selected areas is difficult and complicates information extraction from satellite data, but it is possible using a combination of image processing techniques.

These image processing techniques involve edge enhancement via convolution filtering; binary classification of the data using a clustering algorithm; various operations using recoding, overlay, and density scan functions; creation of a land/water boundary with the use of roving scan windows; and filtering of the boundary file to characterize cell adjacency patterns that can be used to calculate lengths using an aggregate formula (see appendix B).

Binary classification involves running an unsupervised classification algorithm to generate 255 spectral classes and categorize them as land or water. This is an intricate procedure in some areas because of tidal fluctuations, wetness, seasonal variations, prevailing weather conditions, and the difficulty in assigning transitional areas as either land or water. From scene to scene, there is a high variability in the range of water and land classes, and the result captures the nature of the land/water boundary at only a given moment in time. Significant problems are presented by tidal stages, broken marsh, floating vegetation, heavy sediment-laden waters, exposed mud flats, and marsh burn scars to name the most important. Some of these problems must be resolved individually. The result is a land/water interface that delineates the shoreline for the entire coastal zone. The shoreline could be updated with the acquisition of future satellite data using the same procedure. The image can be viewed or plotted in context with other data; shoreline lengths and densities can be calculated; changes in shoreline position can be observed or documented; and the data can be vectorized for use in a vector GIS. Although measurements are possible and fairly easy, mensuration and analytic functions will be unavailable initially through LCGISN.

Data Resource Inventory and Acquisition Efforts

Efforts are underway to locate and inventory data as part of a spatially indexed cataloging system and, where possible, access digital data sets pertinent to LCGISN. The status of previously identified *most important* data sets is summarized in table 1. These data were identified and ranked by 18 federal, state, and university organizations during a Dataset Decision Workshop held at LSU in November 1989 (see McBride et al., 1991b).

Several of these data sets have been obtained, including:

- Air photo summary record system (APSRS) data (USGS)
- Digital Line Graph (DLG) files (USGS)
- 7.5-min. quadrangle sheet information (LA DNR)
- Oil and gas wellhead location data (LA DNR)
- Geographic Names Information System (GNIS) records (USGS)

Table 1. Status of LCGISN priority data sets (identical numbers mean equal ranking).

Rank	Data Themes	Source	Status	Remarks
1	**USGS Quadrangle Maps**			
	• features	DNR/USGS	in progress	1/2 digitized - need translation
	• 5-ft contours	LCGISN/USGS	in progress	about 1/3 digitized
	Spatial Index			
	• LCGISN	LCGISN	Alpha version (Oct. 1992)	spatially and textually based searches
	• quadrangle index	DNR	complete	translation needed
2	**Water Quality**	DEQ	available	reference info needed
3	**USFWS-NWEC**			
	• 1956 & 1978	USFWS	complete	reference info needed
	• 1988	USFWS	in progress	digitizing and editing
	Hydrography			
	• DLG	LCGISN	in progress	translating
	• 1990 land/water interface	LCGISN	in progress	entire coastal zone derived from TM imagery
	Geology			
	• state geologic map	CADGIS (LSU)	in progress	digitizing and editing
	• engineering geology	USACE	complete	Atlas (May et al., 1984)
	Mineral Extraction			
	• minerals	LGS/USGS	incomplete	not in digital format
	• oil and gas	LGS/USGS	incomplete	not in digital format
		DNR	available	reference info needed
4	**Land Use**			
	• 1978	State Planning DOA	complete	translation to LCGISN complete
	Biological Surveys			
	• vegetative type	DWF	complete	translation needed
5	**Topography <5 ft.**	unknown	unknown	sources needed
	Bathymetry			
	• project specific	USGS/LGS	complete	Ship Shoal to Sandy Pt. USGS/LGS Seafloor Change Atlas (List et al., 1992)
	• NOAA charts	NOAA	in progress	digitizing at NOAA
	Soils (detailed)			
	• Barataria - Terrebonne	SCS/BTNEP	in progress	data collection will begin soon
6	**Point Source**	DEQ	available	reference info needed
7	**Land Loss**			
	• 1932/58/74/83/90	USACE	complete	Atlas (May and Britsch, 1987)
	• 1956/78/84	USFWS	complete	Atlas (MMS, 1991)

Table 1 (continued).

Rank	Data Theme	Source	Status	Remarks
8	**Meteorology**	Southern Regional Climate Center (LSU)	available	translation needed, in database format
	Canal & Pipeline			
	• pipelines	LGS	incomplete	funding needed
	• wellhead	DNR	available	translation in progress
	Regulatory			
	• state	DEQ/DNR	available	reference info needed
	• federal	EPA	available	reference info needed
9	**Geomorphology**			
	• barrier islands	LGS/USGS	complete	USGS/LGS Shoreline Change Atlas (McBride et al. 1992)
	Land Cover			
	• 1984 classed TM image	DNR	complete	reference info needed
	Ownership			
	• state	State Lands DOA	available	LIS under development
	• federal	USGS	available	not in digital format
	Ecological Sensitivity			
	• habitat	USFWS/DWF	available	reference info needed
	• archaeological	CRT	restricted	availability based on project
10	**National Resource Inventory**	SCS	available	reference info needed
	Census/TIGER	CADGIS (LSU)	in progress	translating and editing
	Potable Water	DEQ	available	reference info needed
		DHH	available	reference info needed
	Recreation			
	• scenic rivers	DWF	available	reference info needed
	• state Parks	CRT	available	reference info needed
	• national Parks	USGS/NPS	in progress	digitizing
	• fishing	commercial maps	available	not in digital format
	Economic Zones			
	• Industry	RSIP (LSU)	complete	reference info needed (Miss. River Corridor)
		Land. Arch. (LSU)/ DEQ	complete	reference info needed
	• Other	DED	available	reference info needed
11	**Naturally Occurring Radiologic Material (NORM)**	DEQ	available	reference info needed
12	**Disease & Mortality**	DHH	in progress	environmental health GIS, reference info needed

- Geological long-range inclined asdic (GLORIA) sonar data (USGS)
- Non-hazardous Oilfield Waste pit GIS (NOWGIS) data (see Arnold, in press)

Scientists have concentrated on incorporating the first four of the above data sets into LCGISN for release with the *alpha* version of LCGISN. The remainder will be added to the system based on priority as determined by the LCGISN Technical Group. Following is a description of the data sets and an explanation of their roles in LCGISN.

Air Photo Summary Record System (APSRS) Data

APSRS is a USGS Earth Science Information Center (ESIC) data system for determining the availability of aerial photography meeting specified criteria over a given geographic area. The July 1990 version on CD-ROM contains over 2.3 million records referencing data that describe the holdings of 555 contributors from federal, state, and local government agencies, universities, and private industry.

APSRS data for the Louisiana coastal zone, a total of 47,432 records, were downloaded via ASCII format onto an Intergraph workstation for incorporation into LCGISN. With the records loaded in the data base, the system can be queried to produce a list of available aerial photographs for a specific geographic area, date, type of sensor, or a combination of these and other search fields. The output includes ownership information to facilitate data acquisition.

Digital Line Graph (DLG) Files

DLG data are digital map files produced by the USGS as part of the National Mapping Program and are distributed by the National Cartographic Information Center (NCIC). The files are arranged by category such as hydrography, transportation, and boundaries, and include attribute codes that act as a legend for map features. DLG files are supplied to the user in a standard format that can be translated into a format compatible with the employed system. LCGISN staff are incorporating 1:100,000-scale hydrography and transportation DLGs into the system. This data structure produces topologically structured maps for use in a GIS. Custom parameter files that specify color, level, and weight of DLG features to be translated are being used to translate the data into Intergraph format for use with LCGISN. The files cover the area concurrent with 7.5-min. quadrangle maps and contain information on hydrography, roads and trails, railroads, and pipelines and transmission lines.

7.5-min. Quadrangle Sheet Information

Map files digitized for the Louisiana Energy Information System from USGS 7.5-min. quadrangle sheets are being translated for use with LCGISN. This data set contains approximately 275 map files for the following parishes: Calcasieu, Cameron, Jefferson, Lafourche, Orleans, Plaquemines, Rapides, St. Bernard, St. Charles, St. James, St. John, St. Mary, Terrebonne, and some miscellaneous quadrangle sheets.

Approximately one-half of the files have been translated into Intergraph format for testing with *alpha*. Coupled with contour data digitized by the LCGISN (see Contour Digitizing...p. 22), this offers a comprehensive representation of USGS 7.5-min. quadrangle maps of coastal Louisiana.

Oil and Gas Wellhead Location Data

A subset of the graphics portion of the DNR Office of Conservation oil and gas wellhead location data set has been prepared for use with *alpha*. This data set contains wellhead locations for the coastal zone, cut from a larger data base of oil and gas well information for the state. The coastal zone subset comprises approximately 53,000 elements that represent oil and gas well location and status. Permission to use these data and statements of data accuracy and timeliness are pending.

Geographic Names Information System (GNIS) Records

LCGISN will provide access to USGS GNIS information for geographic names associated with the Louisiana coastal zone. GNIS is an automated data system developed to standardize and disseminate information on geographic names. The data set provides primary information for all known places, features, and areas in the United States identified by a proper name. The GNIS names and locations for the Louisiana coastal zone are used to assist in defining a geographic area of interest.

Geological Long-range Inclined Asdic (GLORIA) Sonar Data

Information from a CD-ROM of GLORIA sonar data for the Gulf of Mexico will be incorporated into LCGISN. Created by the USGS, NOAA, and NASA, this data set provides long-range, side-scan sonar data for the Exclusive Economic Zone (EEZ). The system is owned and operated under contract to the USGS by the Institute of Oceanographic Sciences in the United Kingdom. Also available are 1:250,000- and 1:1,000,000-bathymetric contours for overlay purposes. These were digitized from NOAA's bathymetric map series. The GLORIA data will be housed in the LCGISN vector-file data base.

Non-hazardous Oilfield Waste Pit GIS (NOWGIS) Data

On completion, NOWGIS, a GIS for Non-hazardous Oilfield Waste (NOW) pits in Cameron, Vermilion, Terrebonne, and Plaquemines parishes will become part of LCGISN. Site locations were digitized from USGS 7.5-min. quadrangle sheets with NOW pit locations mapped from aerial photography. There are currently 646 NOW pit sites in the data set (see Arnold, in press).

Contour Digitizing for the Louisiana Coastal Zone

Although LCGISN is not intended to be a data collection agency, a critical need was expressed for elevation information in the Louisiana coastal zone. Therefore, when the LCGISN project was initiated with USGS National Coastal Geology Program, an additional cooperative agreement was created with the USGS National Mapping Division. Under this agreement, LCGISN members agreed to digitize all hypsography (elevation features including contour lines, contour labels, spot elevations, spot elevation labels, levees, and side road grades) for the Louisiana coastal zone from USGS 7.5-min. quadrangle maps. The contour interval for these maps is generally five feet, and no contours are available for less than five feet. At the completion of this project, the digitized hypsography will be available from USGS as part of their Digital Line Graph (DLG) data base.

The coastal zone defined for this project includes three hundred ten, 7.5-min. quadrangle maps south of Interstates 10 and 12. This area is divided into four zones (figure 14). Zone four was completed first, and work will proceed from east to west. For each quadrangle map, the USGS Mid-Continent Mapping

Center in Rolla, Missouri, sends LCGISN two published paper copies and one bromide (stable base) sheet. The bromide copy is printed with only hypsography to make digitizing faster, easier, and more accurate.

The maps are digitized using RETSAM 32 software, which was developed by USGS specifically for digitizing quadrangle maps. It is based on MicroStation software from Intergraph Corporation and runs on an Intergraph InterView 220 at the LSU CADGIS Research Laboratory. Each person works on one map at a time to ensure consistency within the map. Several digitizing parameters and error checks have been established by USGS and are strictly adhered to. Once a person finishes a map, it is proofed by the digitizer and another person familiar with the project. The proofed and corrected files are stored both in MicroStation design files and in a customized format for use by USGS in the conversion to DLG. After a set of maps has been completed, backup copies are made, and the files are copied onto floppy disks for submission to USGS. The floppies as well as the bromide sheets are returned, and USGS personnel check the files for errors. If any are found, the bromide sheets are returned to LCGISN with instructions for corrections.

As of 30 August 1992, 115 (37%) of the maps had been digitized, with zone four completed and zone three nearing completion (figure 14). Digitizing has been in progress for about one year. All hypsography for the Louisiana coastal zone should be completed by August 1994 and will be available from USGS in DLG format.

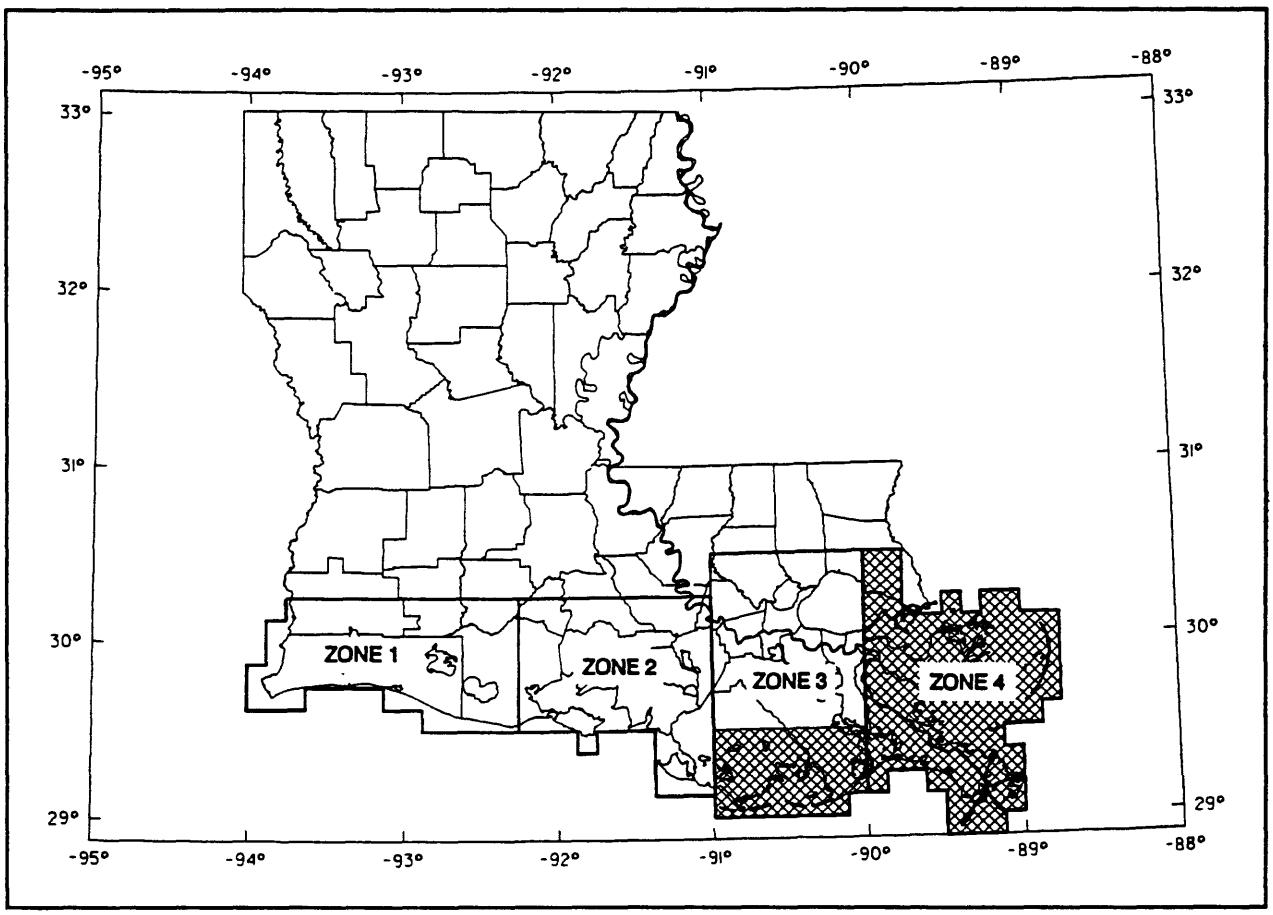

Figure 14. Progress of LCGISN hypsography. Cross-hatching represents area completed.

Emerging Metadata Issues

There is great emphasis on the production of digital information for use in GIS and other automated information management programs. There is less emphasis, however, on the documentation of data content, quality, and structure of these digital data sets. As a result, data usefulness is greatly diminished, and the susceptibility of data to misapplication is great. Problems associated with poor documentation become increasingly more significant as technological improvements enhance the ability to share and transfer digital information (see Tosta, 1992a, b, and c).

In June 1992, the Federal Geographic Data Committee (FGDC) sponsored an information exchange forum in Reston, Virginia, to discuss the need for improved digital data documentation, also referred to as *metadata*. Representatives from government agencies, universities, and the private sector participated in the forum and shared ideas, concerns, and suggestions for improved metadata coordination. Small working groups were organized to discuss issues of spatial metadata content, access, and standards.

The primary issue to emerge from the forum was the need for a set of essential metadata elements that could serve as an operational model for use in geographic information systems, in data catalogs, and for data transfer. The elements were to be generated using examples of existing metadata and the draft, "Spatial Data Transfer Specification," proposed by ASTM, formerly the American Society for Testing and Materials (the acronym is now used independently). Examples of the proposed elements are shown in table 2.

An *ad hoc* group was formed to develop the model. The group met in July during the Urban and Regional Information Systems Association (URISA) conference to review metadata examples provided by governmental and university organizations, including LCGISN, the Florida Growth Management Data Network Coordinating Council, the Wisconsin Land Information Program, and the U.S. Army Corps of Engineers. A preliminary list of elements was derived, and detailed definitions were generated for each element. The proposed metadata model was submitted to the FGDC for further review and was recently released in draft form (Federal Geographic Data Committee, 1992).

In addition to the metadata model, the forum also identified the need for 1) coordination with the Library of Congress machine readable cataloging (USMARC) data elements, 2) a standardized keyword hierarchy, and 3) vendor cooperation in developing tools to prompt for and automatically generate

Table 2. Spatial Metadata Elements

LOCATION	LINEAGE	GENERAL	DICTIONARY	QUALITY
projection parameter	data version	scale	data set identifier	positional accuracy
control points	processing steps	temporal character	theme identifier	attribute accuracy
resolution	reason for processing	dates	data schema structure (entity/attribute organization)	consistency (logical and topological)
extent (minimum and maximum coordinates)	source data descriptions	description/ keywords	imagery parameters (source, media, etc.)	completeness

metadata. These issues will be addressed during future meetings to be held in association with URISA, American Society for Photogrammetry and Remote Sensing (ASPRS), American Congress on Survey and Mapping (ACSM), and GIS/LIS conferences. LCGISN developers have been working through metadata issues such as these since the program's inception. We are, and will continue to be, an active member of the FGDC metadata ad hoc group. Our continued participation enables LCGISN to assist in the development of national standards, benefit from the shared experiences of similar organizations, and stay at the forefront of emerging metadata issues.

SUMMARY AND FUTURE DIRECTION

LCGISN represents an information access system that provides users a mechanism for locating spatial and textual data from multiple sources for Louisiana's coastal zone. Organizationally, it consists of a Management Council, Network Core Group, Technical GIS Group, and two independent advisory groups (coastal users and technical/applications). One of the top-ranked data sets identified for inclusion in LCGISN is a spatial index/bibliography for available data relating to Louisiana's coastal zone. Such an index will link true geographic location to maps, imagery, photographs, names, and bibliographic references to allow spatially defined searches for geographic information. An essential function of LCGISN is to act as a communication center for existing GIS's and lead users to spatial data available in different formats and media types.

Initially, the prototype user interface was designed, tested, and refined using HyperCard running on a Macintosh. Unix workstations and GIS software were acquired, and the network core group was connected through LSU's campus-wide ethernet. The Management Council and two independent advisory groups were established and integrated with LCGISN. In October 1992, the first working version of LCGISN was completed and is known as *alpha*. This version operates over a distributed network in a Unix environment. Currently, implementation of a user interface (Intergraph I/Forms) onto Unix workstations running X-Windows is in progress. The major data sets identified and ranked will be further assessed and, where possible, imported into the system. In the future, work will focus on refining the user interface, cataloging various types of media, importing additional digital data sets, refining a computer bulletin board, and regularly publishing a newsletter. A *beta* version will be available for selected users to test in the Summer of 1993 and by 1994, LCGISN will exist as a fully functioning system.

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REFERENCES

Arnold, J. S., (in press). Using GIS and remote sensing to identify and monitor oilfield waste pits in Louisiana's coastal zone. First Thematic Conference on Remote Sensing for Marine and Coastal Environments, Environmental Research Institute of Michigan, New Orleans, La., June 15—17, 1992.

Davis, D.W., 1992. A historical and pictorial review of Louisiana's barrier islands. In: Williams, S.J., Penland, S., and Sallenger, A.H., Jr., (eds.), Louisiana Barrier Island Erosion Study—Atlas of Barrier Island Changes in Louisiana from 1853 to 1989. Miscellaneous Investigations Series I-2150-A, U.S. Geological Survey, pp. 8—23.

Davis, D.W., Hiland, M.W., McBride, R.A., and Williams, S.J., 1992. Louisiana Coastal Geographic Information System Network–Year Two Final Report. Open-File Report 92-424, U.S. Geological Survey, 14 p.

Federal Geographic Data Committee, 1992. Draft content standards for spatial metadata. U.S. Geological Survey, Reston, Va., 83 p.

Hiland, M. W., McBride, R. A., Davis, D. W., Braud, D., Jr., Streiffer, H. R., Jones, F. W., Lewis, A. J., and Williams, S. J., 1991. Louisiana Coastal GIS Network: Graphical User Interface for Access to Spatial Data. In: GIS/LIS '91 Proceedings, American Society for Photogrammetry and Remote Sensing, Bethesda, Md., 2:845—856.

Hiland, M.W., Wayne, L., and Streiffer, H.R., 1992. Louisiana Coastal GIS Network: relational database design for a spatially indexed cataloging system. In: GIS/LIS '92 Proceed., Amer. Soc. of Photogrammetry and Remote Sensing, Bethesda, Md., 1:322—338.

Holmes, D.O., 1990. Computers and geographic information access. Meridian, 4:37-49.

Joint Steering Committee for Revision of AACR, 1988. Anglo-American Cataloging Rules, 2nd ed., 1988 revision, American Library Association, Chicago, Il. 677 p.

Network Development and MARC Standards Office, 1987-. USMARC format for authority data, including guidelines for content designation. Cataloging Distribution Service, Library of Congress, Washington D.C., 1 volume (looseleaf).

Network Development and MARC Standards Office, 1988-. USMARC format for bibliographic data, including guidelines for content designation. Cataloging Distribution Service, Library of Congress, Washington D.C., 3 volumes (looseleaf).

List, J., Jaffe, B.E., Sallenger, A.J., Jr., McBride, R.A., and Penland, S., (in press), Seafloor changes along Louisiana's barrier shoreline from 1890 to 1986. Atlas of Seafloor Changes. Miscellaneous Investigations Series I-2150-B, U.S. Geological Survey.

May, J.R., Britsch, L.D., Dunbar, J.B., Rodriguez, J.P., and Wlosinski, L.B., 1984. Geological investigation of the Mississippi River deltaic plain. Technical Report GL-84-15, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

May, J.R. and Britsch, L.D., 1987. Geological investigation of the Mississippi River deltaic plain—land loss and land accretion. Technical Report GL-87-13, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

McBride, R.A., Davis, D.W., Jones, F.W., Braud, D., Jr., Lewis, A.J., Streiffer, H.R., Penland, S., Lam, N.S.N., and Williams, S.J., 1990. Louisiana Coastal Geographic Information System Network (LCGISN). Meridian, 5:57-59.

McBride, R.A., Davis, D.W., Jones, F.W., Byrnes, M.R., Braud, D., Jr., Hiland, M.W., Lewis, A.J., and Streiffer, H.R., 1991a. Louisiana Coastal Geographic Information System Network (LCGISN): Access to spatial data. Meridian, 6:29-43.

McBride, R.A., Davis, D.W., Jones, F.W., Byrnes, M.R., Braud, D., Jr., Hiland, M.W., Lewis, A.J., and Streiffer, H.R., 1991b. Louisiana Coastal Geographic Information System Network: Access to spatial data. Open-File Rept. 91-622, U.S. Geological Survey, 17 p.

McBride, R.A., Penland, S., Hiland, M.W., Williams, S.J., Westphal, K.A., Jaffe, B.E., and Sallenger, A.H., Jr., 1992. Analysis of barrier shoreline change in Louisiana from 1853 to 1989. In: Williams, S.J., Penland, S., and Sallenger, A.H., Jr., (eds.), Louisiana Barrier Island Erosion Study—Atlas of Barrier Island Changes in Louisiana from 1853 to 1989. Miscellaneous Investigations Series I-2150-A, U.S. Geological Survey, pp. 36-97.

Morris, B., 1988. CARTO-NET: Graphic retrieval and management in an automated map library. Bulletin Special Libraries Association Geography and Map Division, 152:19-35.

Tosta, N., 1992a. The digital data wave. Geo Info Systems, 2(6):24-27.

Tosta, N., 1992b. Metadata standards. Geo Info Systems, 2(9):28-31.

Tosta, N., 1992c. The national spatial data infrastructure. Geo Info Systems, 2(10):30-35.

Williams, S.J., Cichon, H.A., Westphal, K.A., and Ramsey, K.E., 1992. Representative publications from the Louisiana Barrier Island Erosion Study. Open-File Report 92-530, U.S. Geological Survey, 557 p.

APPENDIX A

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LOUISIANA COASTAL GIS NETWORK: RELATIONAL DATABASE DESIGN FOR A SPATIALLY INDEXED CATALOGING SYSTEM

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ABSTRACT

The coastal wetlands of Louisiana have been the focus of numerous studies by various organizations. The United States Geological Survey (USGS) has funded the Louisiana Geological Survey (LGS) and Louisiana State University (LSU) to establish a spatially indexed cataloging system to facilitate the identification and exchange of geographic data pertinent to the Louisiana coastal zone. Access to this information is critical for managers, planners, and researchers to make informed decisions concerning the future of the coastal zone. The Louisiana Coastal GIS Network (LCGISN) will allow users to interactively define an area of interest on a map, then proceed through a user-friendly menu system to define search criteria such as author, title, and subject. The system will then return a list of references to data sets, information on obtaining these data sets, and contacts within various organizations dealing with applicable data (Hiland et al. 1991).

Several federal and state agencies have shown an increased interest in procedures for cataloging and organizing all types of information. LCGISN has utilized experts in the fields of remote sensing, geographic information systems, cartography, geography, geology, and library science to develop a relational data base design that provides for recording, searching, and retrieving information specific to various data types (e.g. aerial photography, satellite imagery, maps, geotechnical, literature, audio/visual). Various database tables, fields and column joins needed to accomplish this complex task are discussed in this paper.

INTRODUCTION

In Louisiana, research on coastal erosion and wetland loss has led to the accumulation of large amounts of information covering many subjects in a wide variety of media and formats. LCGISN is a spatially indexed cataloging system created to facilitate the identification and exchange of these data sets. To accomplish this mission, members of LCGISN have established the following goals:

- develop a cataloging framework for documenting hard copy and digital data sets such as maps, aerial photography, imagery, reports, and other coastal-related data;
- develop a computerized information system that enables users to search data by subject, location, keywords, or other common criteria;
- identify and locate priority data sets;
- establish procedures and provide guidelines for cataloging available data;
- expand the developed information system into a distributed network capable of serving remote users;
- publish a newsletter and establish a computerized bulletin board for communication among users;
- establish digital data transfer policies and procedures;
- develop a plan for future operation and support of LCGISN.

The key to the spatially indexed cataloging system is that a geographic area of interest can be defined interactively on a graphically displayed map. This location information is then combined with typical searches (e.g., subject, location, keyword) to retrieve database records documenting existing data (Figure 1). The user interacts with a menu interface that guides him/her through selection of search criteria. Spatial criteria are set by displaying a background map consisting of several familiar data sets, as well as a classified thematic mapper image. Then, the user interactively specifies location criteria using one of several options. These include using a mouse or cursor to draw a box on the map, keying in latitude and longitude values, and keying in or selecting from a list the names of USGS 7.5-min. quadrangle maps. Textual search criteria

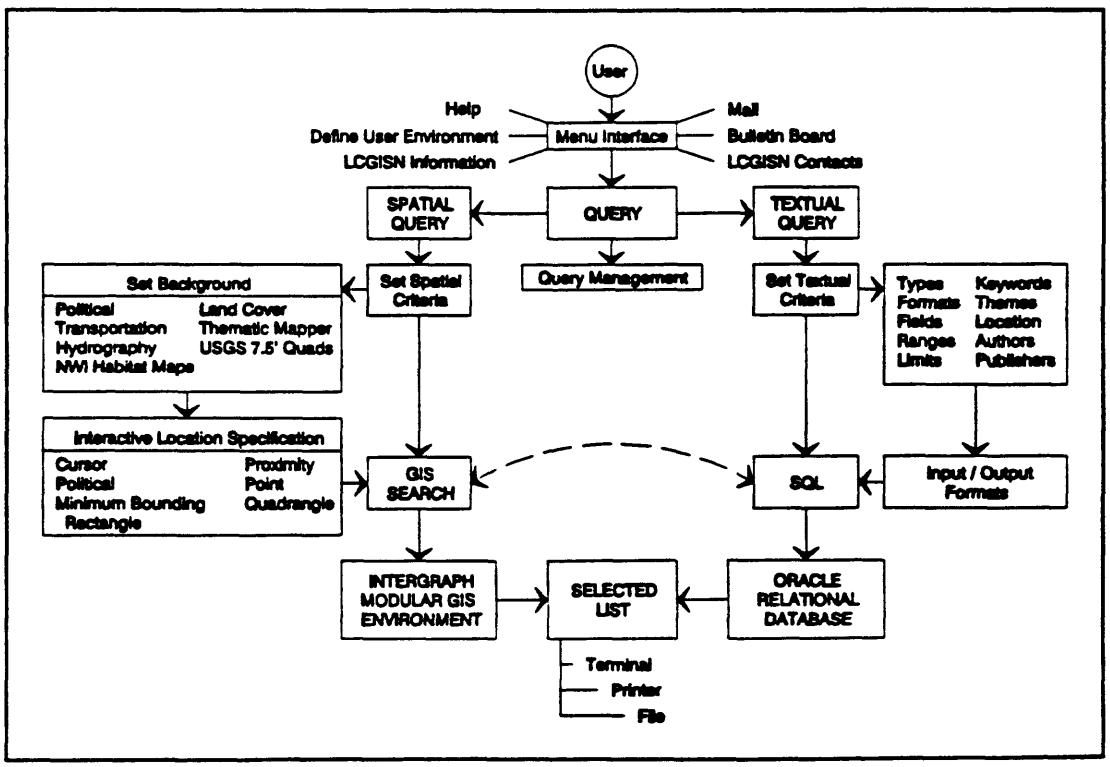

Figure 1. LCGISN Schematic Diagram

are set using a separate set of menus for each data type. Users define criteria such as author, publisher, subject, and date, as well as other media-specific criteria (Figure 2). This information is combined with location parameters set by the user, and an SQL statement is generated by the software and submitted to the Oracle relational data base. A set of records is then displayed for the user to browse through. In addition to references to data, there is an extensive data base of contacts. In the event no suitable references are available, persons or agencies involved with similar activities will be provided.

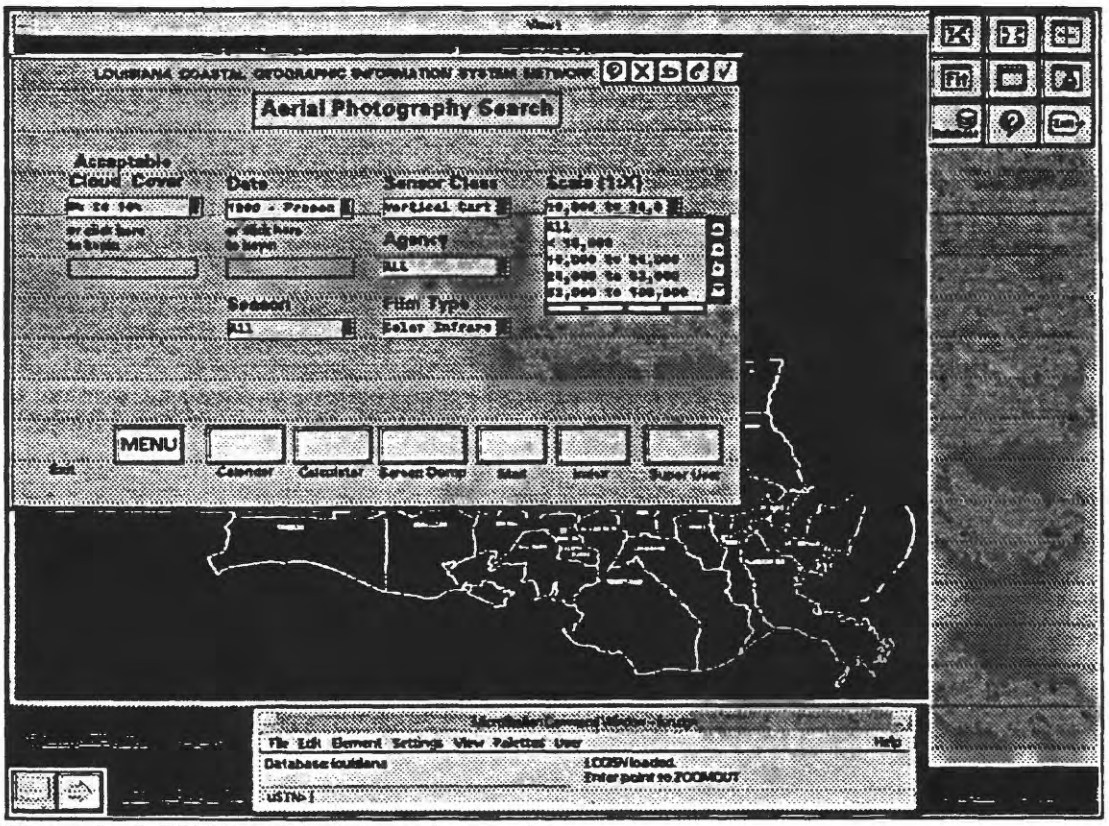

Figure 2. LCGISN aerial photography search menu

The design of the menu interface was intended to balance ease of use with a high level of detail in the information presented. A prototype menu system was developed that provided a comprehensive set of search criteria for each data type. These menu choices were then translated to database fields and combined with several other fields required for efficiency of the relational data base. Also, certain fields were needed to meet the requirements of the U.S. Machine Readable Cataloging (USMARC) format, a national library cataloging standard. Because the data base had as its origin a user-friendly interface, access should be simple and thorough enough to accomodate users of all skill levels. Also, the database design should balance simplicity, ease, and speed of data cataloging with the benefits derived from entering extensive data about each item. This is partially accomplished by defining mandatory, required, and optional fields that allow the cataloging organization to determine how much time should be spent on each item and the amount of detail needed for each item. Mandatory fields are those that must be populated to create a record. These include attributes such as title, author, and date. Required fields must be populated if the information is available or, if the information is unavailable, a statement to this effect must be entered. These include the main criteria by which users search for certain information. For example, type of film may be a required field for aerial photography. Optional fields provide additional information that affects the suitability of an item for a particular project. Some examples are the sources of information presented on a map and the percentage of cloud cover on a satellite image. Also, a notes field is provided to give general information on each item.

DATABASE DESIGN

The following sections present the seven basic data collection types that LCGISN has identified, database tables designed to catalog each, and fields required to locate data sets geographically. In addition to the seven main tables, there are several additional tables dealing with different storage formats of the same data set (hard copy, vector, and raster), multiple copies of the same data set (holdings), and linking data sets to organizations or people for acquisition information. Also, provisions are made for recording information about the creation of records, user login information, and user environment information.

Basic Data Types

Maps. Maps are representations of locations and spatial relationships on the earth. All maps have a scale, transformation (such as representing a curved surface on a flat surface), and symbology for representing reality (Robinson et al. 1984). Maps are probably the most basic and widely used form of geographic information, and although some people provide different definitions for printed and digital maps (Burrough 1986), most characteristics of maps are common to both.

Mandatory fields for a map record are title and author of the map. Required fields include publisher, theme or subject, scale, and geographic location. A full listing of the fields for the maps database table is given in Table 1. A further discussion of the geographic location fields is given below.

Photography. The distinction between photography and imagery was a topic of much discussion. The consensus is that photography includes all data captured on film as individual frames, while imagery implies data captured digitally. Therefore, a scanned aerial photograph is still cataloged as a photograph, with provisions made for specifying the storage format of the data.

The mandatory fields for photography are similar to those of maps. One important note is that the definition of author for photography can be confusing. The LCGISN defines the author of photography as the sponsoring organization, agency, or person. A separate field is supplied to record the organization actually taking the photographs. For example, if a federal agency hires a contractor to fly photography for a federal project, the federal agency is listed as the author and the contractor is listed as the photographer. Other important fields include percentage of cloud cover, altitude or scale, sensor class, type of film, and date or season (Table 2).

Linked to the photography table is the photograph frame table (Table 3). This allows cataloging of photography by roll of film or by individual frame. Information that is identical for every frame on a roll of film is recorded once in the photography table, and then each frame has a separate, smaller record.

Imagery. As mentioned above, imagery implies digitally captured data. This includes data captured by radar scanners, multi-spectral scanners, and digital cameras. Imagery also includes hard copies of multi-spectral data such as prints of TM scenes available from EOSAT.

The mandatory fields are similar to those for maps and photography. The author is defined as the sponsoring agency, with provisions made for identifying the actual source of the imagery. Some important fields are platform type, spatial resolution, number of spectral bands, and scale (Table 4).

Literature. In addition to geographic data, there is a large amount of literature pertinent to the Louisiana coastal zone that is not currently cataloged. These include conference papers, journal articles, and agency reports. Also, certain important books and articles concerning the coastal zone should be included, although they are already cataloged in libraries. The LCGISN table for cataloging literature is largely based on the USMARC standard, with additional fields added for geographic location. Mandatory fields include title and author. Other fields include edition statement, publication information, description of the item, and subject headings. Details of the literature table are still under development.

Audio/Visual. Audio/visual materials include videotape, slide shows, movies, overhead

projector plates, and television shows. The table for cataloging audio/visual items is also largely based on the existing USMARC format and still under development. Fields of note include a description of accompanying material, subject headings, and geographic location.

Geotechnical. The geotechnical table is intended to record the existence of various types of field-collected data such as vibracores, seismic tracklines, and sediment samples. The mandatory fields are similar to others. Some important fields include geographic location, subject headings, and others still under development.

Tabular. Many data sets pertinent to the coastal zone exist in a data base or spreadsheet format. Included in these are climate data, pollution records, and lease records. This table is also still under development. However, certain important characteristics have been identified such as number of records, frequency of update, and software used for database management.

Geographic Location

One of the most critical elements to the success of the LCGISN data base is the recording of geographic location information for each item cataloged. To assist the user in finding all information pertinent to a geographic area of interest, several methods of specifying the location represented or described by an item are needed. Also, the same set of geographic location fields should be included for each data type to insure consistency and efficiency in performing searches. The geographic location fields are illustrated in Table 1.

A minimum bounding rectangle (MBR) is the first level of geographic location. A separate field is given for the maximum northern, southern, eastern, and western extents of the cataloged item. A user draws a box on the background map to define an area of interest, and the coordinates of the geographic area of interest are compared to the coordinates stored in the database table.

Another method of specifying a MBR is by USGS 7.5-min. quadrangle maps. A quadrangle map table stores information about the maps and digitized quadrangle boundaries are available as a background map. Users will be able to select from a list, key in the names of, or select from the displayed map the quadrangle maps that cover their area of interest. The MBRs from the corresponding records will then be used to search for other records.

Work is in progress on utilizing the USGS Geographic Names Information System (GNIS) to assist in searching a geographic area. The GNIS is an index of all names occuring on USGS 7.5-min. quadrangle maps. It includes both jurisdictional names (cities, states, counties) and geographic names (rivers, islands, lakes) and has latitude and longitude values for each name. It is planned to allow users to select from a list of names, or key in a name, and then search the data base using the coordinates defined for that name. Other potential geographic search mechanisms include graphically selecting a political boundary from the map and defining a point and proximity range.

Data Storage Methods

There are three basic data formats for cataloged items: hard copy, vector, and raster. For example, an organization may have a published copy of a 7.5-min. quadrangle map. They also may have scanned this map for use as a raster backdrop for overlaying other maps. In addition, they may have a digitized vector copy. Each of these maps is the same map entity, representing identical information with identical symbology; however, there are differences that need to be recorded. To deal with this situation, LCGISN is implementing database tables that record information unique to the data format.

Hard Copy. The hard copy table is for use with printed materials. This may include film positives or negatives, photographic prints, printed maps, and printed satellite imagery scenes. The primary mandatory field is a link from this table to the map, photo, or image it represents. Some of the required fields are material of the copy, scale of the copy, projection, datum, and printing date (Table 5).

Vector. The vector table contains fields unique to vector copies of data. This can include digitized maps, vectorized raster data, and vector data generated from analysis. The primary

mandatory field is a link from this table to the map, photo, or image it represents. Some of the required fields are source scale, units of resolution, and vendor format (Table 6).

Raster. Raster data can include satellite imagery, scanned data, and rasterized vector data. Once again, the primary mandatory field is a link to the entity the raster data represents. Required fields include vendor format, pixel size, and number of bands (Table 7).

Holdings Tables

It may often be the case that copies of the same data set are owned by several organizations. It may also be helpful for a user to know ownership of these copies to facilitate acquisition of the data. The solution to this situation is in the LCGISN holdings tables.

Currently, there is a separate holdings table for hard copy, vector, and raster data (Tables 8,9,10). Holdings tables for other data types such as literature and tabular are still under development. The main mandatory field is a link from the holdings table to the data storage record it represents. In other words, if one agency digitized a map and gave a copy of the vector data to another agency, the map would be recorded in the data base once, with one vector copy record, and two vector holdings records. Other information recorded in the holdings tables includes sale status of an item, its cost, and a link to the organization that owns it.

Other Tables

Other tables used in LCGISN to enhance efficiency and utility include the subject, organization, people, user, terminal, and cataloger tables. The user and terminal tables record information unique to each user such as network address, billable time, and hardware configuration. Because the networking aspects of LCGISN are not yet in place, these tables are still under development. However, the organization, people, and cataloger tables have been defined in detail.

Subject. Recording of subject headings is a very difficult process. Determining an extensive authority list of subjects requires much time and effort, as well as coordination with the library science community. The concept currently being discussed is one that allows catalogers to key in a term, or select a term from a list, that describes the thematic content of an item. Up to six terms can be selected for each item. The subject fields for maps, photography, imagery, literature, audio/visual, geotechnical, people, and organization have a relational join to the subjects database table. Each term in the thesaurus has a record that contains such information as parent (broader) terms, child (narrower) terms, sibling terms, and synonyms. Thus, the hierarchical nature of the thesaurus is built into the relational database structure and is both efficient and easy to update.

Organization. The organization table is meant to contain detailed information about an organization. This includes federal, state, and local agencies, private companies, and educational institutions. Although the same organization may be referenced in several places within the system, only one record of that organization will be kept. For example, a state agency may be listed as a contact for information, the author of a map, and a location for vector data holdings. A unique code will be established for the organization and will be recorded in each table in a field that points to the same record in the organization table. Certain fields in the organization table are mandatory. These include a unique organization code and the name of the organization. Required fields include an address, phone number, type of organization, and divisions and subdivisions (Table 11). Organizational hierarchies are built into the data base by listing parent and child organizations in the table and linking these fields to other organization records. For example, the U.S. Geological Survey (USGS) is a division of the Department of the Interior. In the record for Department of the Interior, a link will be made to records for all of the agencies in the Department. In the record for USGS, a link will be made to the record for its parent organization. This allows a user to retrieve contacts records for USGS and related agencies when a search is performed on Department of the Interior.

People. The people table is similar in concept to the organization table, except that it records individuals rather than groups. A unique code for each person and the person's name

are mandatory, while required information includes address, phone number, and link to an organization (Table 12).

Another important aspect of the organization and people tables is the subject themes fields. When a user selects subjects for a data search, these themes are also used to search the people and organization tables. Then, in addition to any available data in the data base, the user also finds people and organizations involved in their subject of interest.

Cataloger. Finally, the cataloger table is used to record the creation of records in the LCGISN database (Table 13). The mandatory fields are a unique cataloging session number, the name of the person loading the records into the LCGISN data base, the date the records were entered, and the name of the person who created the records for submission to LCGISN. Every record in every table within LCGISN will contain the cataloging session number. The person responsible for locally cataloging the organization's data is recorded and linked to the people table. The person who actually enters the records into the LCGISN data base will also be recorded and linked to the people table. This allows for documentation and quality control of data entry. Figure 3 is a schematic diagram of the database tables and their relationships to each other. As stated above, all tables have a field that links to the cataloger table. Lines in the figure represent relational joins between tables.

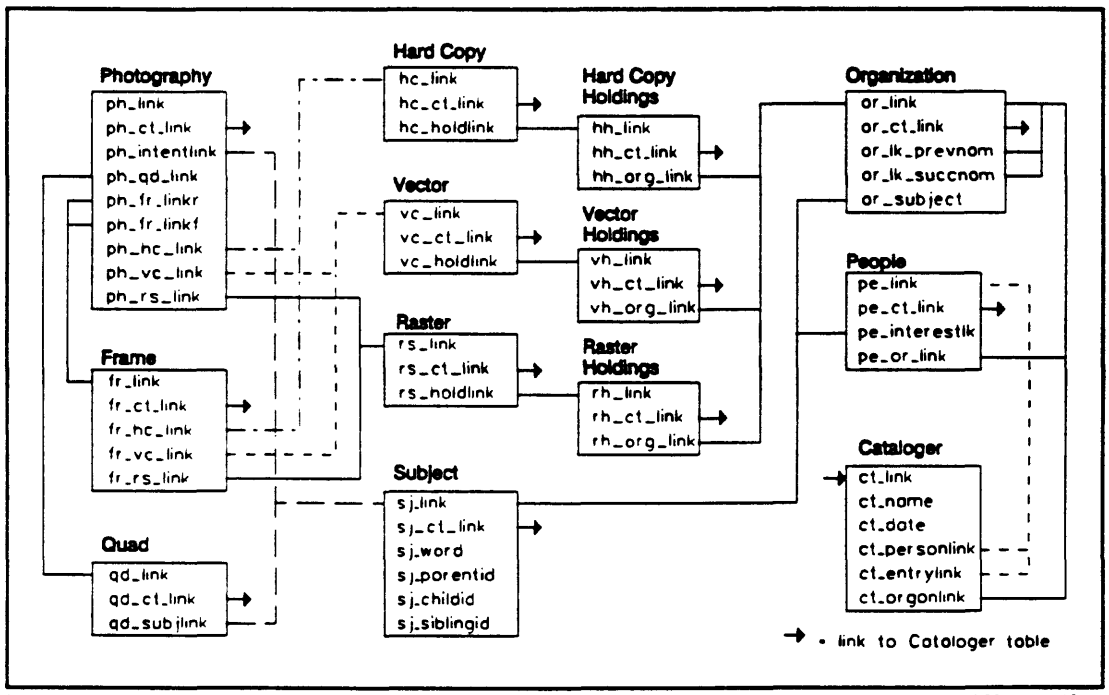

Figure 3. Schematic diagram illustrating relational joins between database tables. Different line styles are for clarity only.

NATIONAL METADATA STANDARDS

With the current proliferation of digital information, there is a growing emphasis on documenting the ancestry and quality of digital data. It is becoming apparent to many GIS users that, without proper documentation, the usefulness of digital data is greatly diminished and its susceptibility to misapplication is enhanced. To increase interagency cooperation and data sharing, it is important not only to have data format standards such as the Spatial Data Transfer Standard (SDTS) but also standards for digital data documentation, or metadata. The Federal Geographic Data Committee (FGDC) is currently leading the development of standards for metadata, and LCGISN is one of several organizations that participated in an Information Exhange Forum recently sponsored by FGDC. An *ad hoc* group was formed to develop a model for a set of essential metadata elements. In addition to the metadata model, the forum also

identified the need for coordination with the Library of Congress USMARC data elements, for a standardized keyword hierarchy, and for vendor cooperation in the development of tools to prompt for and/or automatically generate metadata. These issues will be addressed during future meetings to be held in association with URISA, American Congress on Surveying and Mapping, American Society for Photogrammetry and Remote Sensing, and GIS/LIS conferences.

The LCGISN staff has been working through metadata issues such as these since the program's inception. LCGISN will continue to be an active member of the FGDC's Metadata *Ad Hoc* Group to assist in the development of national policy, benefit from the shared experiences of other similar organizations, and stay at the forefront of emerging metadata standards.

CONCLUSION

LCGISN is currently at the end of the third year of a five-year study. Many components of the system have been addressed, but every detail is not complete. Continued interaction with potential users and peers in the GIS community will guide the evolution of the system in a positive direction. The initial implementation, or alpha version, of LCGISN is scheduled for completion in September 1992. This version will provide basic spatial and textual search capabilities on an Intergraph workstation accessing an Oracle data base over an ethernet network. The next step will be to refine the basic search mechanisms and move the software to X-Windows so that any workstation on the network will be able to access LCGISN. A beta version is due for completion in August 1993, and the first release of LCGISN to the Louisiana coastal community will be in August 1994.

Table 1. Relational database table for documenting maps. * indicates fields for identification of geographic location that are repeated in photography and imagery tables.

Field Name	Description	Field Type	M/R/O
mp_link	unique map sequence number	int	M
mp_ct_link	link to cataloger table	int	M
mp_ct_date	date of creation of this record	timestamp	M
mp_title	title of map	char(230)	M
mp_author	author of map	char(230)	M
mp_publisher	publisher of map	char(230)	R
mp_datepubs	starting date of publication	timestamp	R
mp_datepube	ending date of publication	timestamp	R
mp_type	type of map (plan, topographic, etc.)	char(12)	O
mp_extent	extent of item (number of sheets, volumes, etc.)	char(40)	O
mp_series	series statement	char(20)	O
mp_bulk	bulk catalog statement	char(20)	O
mp_subject	link to subject table (there may be up to six subjects, the exact number is yet to be determined)	int	R
mp_source1	source of map information	char(20)	O
mp_source2	source of map information	char(20)	O
mp_source3	source of map information	char(20)	O
mp_accuracy	accuracy statement	char(40)	O
mp_progress	is work in progress?	char(4)	O
mp_database	is there a database attached?	char(4)	O
mp_upatefreq	map update frequency	char(32)	O
mp_datecol	date of collection of map information	timestamp	O
mp_daterev	date of revision of map information	timestamp	O
mp_history	ancestry (description of compilation)	char(230)	O
mp_disclaim	disclaimer statement	char(230)	O
mp_edition	edition information	char(20)	O
mp_notes	general notes	char(230)	O
*mp_qd_link	link to quad table	int	O
*mp_country	country of the map area	char(40)	O
*mp_state	state of the map area	char(2)	O
*mp_parish	parish (county) of the map area	char(40)	O
*mp_otherref	other geographic reference	char(40)	O
*mp_placenam	general place name from Geographic Names Information System (GNIS)	char(40)	O
*mp_specnam	specific place name from GNIS	char(40)	O
*mp_regionup	next larger geographic region	char(40)	O
*mp_mbrunits	input units of minimum bounding rectangle (MBR)	char(4)	O
*mp_zone	zone of map (state plane or UTM)	char(8)	O
*mp_centx	x of centroid	int	O
*mp_centy	y of centroid	int	O
*mp_mbrwx	western-most x location	int	O
*mp_mbrex	eastern-most x location	int	O
*mp_mbrny	northern-most y location	int	O
*mp_mbrsy	southern-most y location	int	O
mp_hc_link	link to hard copy table	int	O
mp_vc_link	link to vector table	int	O
mp_rs_link	link to raster table	int	O

Table 2. Relational database table for documenting photography

Field Name	Description	Field Type	M/R/O
ph_link	unique photo sequence number	int	M
ph_ct_link	link to cataloger table	int	M
ph_ct_date	date of creation of this record	timestamp	M
ph_title	title of aerial photography	char(230)	M
ph_author	agency sponsoring aerial photography	char(230)	M
ph_publisher	where to obtain/purchase photos	char(40)	R
ph_pubcontact	contact person to obtain/purchase	char(40)	O
ph_phototaker	organization taking photos	char(40)	R
ph_orgcontact	phototaker contact person	char(40)	O
ph_datestart	start date of photos	timestamp	R
ph_dateend	ending date of photos	timestamp	R
ph_series	series statement	char(40)	O
ph_bulkcat	bulk catalog statement	char(40)	O
ph_generation	original or copy	char(10)	O
ph_intentlk	link to subject table (there may be up to six subjects, the exact number is yet to be determined)	int	R
ph_source1	source of photos	char(20)	O
ph_source2	source of photos	char(20)	O
ph_source3	source of photos	char(20)	O
ph_accuracy	accuracy statement	char(40)	O
ph_plattype	platform type	char(10)	O
ph_platname	platform name	char(64)	O
ph_project	project code or mission number	char(64)	O
ph_cloudcov	percentage of cloud cover	int	O
ph_compcov	holes in coverage?	char(4)	O
ph_quadctr	is photography quad centered?	char(4)	O
ph_pctqdcov	percentage of quad covered	char(4)	O
ph_sensclass	sensor class	char(30)	O
ph_stereo	is photography stereo?	char(4)	O
ph_sideover	percentage of side overlap	int	O
ph_fwdover	percentage of forward overlap	int	O
ph_numrolls	number of rolls	int	O
ph_numframes	number of frames	int	O
ph_filmtype	film type (BW, color IR, etc.)	char(20)	O
ph_camerainfo	camera information	char(128)	O
ph_corrinfo	correction information	char(128)	O
ph_foclength	focal length	char(20)	O
ph_altitude	altitude	int	O
ph_altdim	dimensions of altitude	char(4)	O
ph_origscale	original scale of photography	char(20)	O
ph_ratioscale	ratio scale (1:x)	int	O
ph_relscale	scale relative to original	int	O
ph_history	ancestry	char(230)	O
ph_disclaim	disclaimer statement	char(230)	O
ph_notes	general notes	char(230)	O
ph_fr_linkr	link to frame table if this record is for a roll of film	int	O
ph_fr_linkf	link to frame table if this record is for a specific frame	int	O

*geographic location fields are same as specified in Table 1

Table 3. Relational database table for documenting individual photography frames

Field Name	Description	Field Type	M/R/O
fr_link	unique sequence number	int	M
fr_ct_link	link to cataloger table	int	M
fr_ct_date	date of creation of this record	timestamp	M
fr_rollnum	roll number	int	R
fr_framenum	frame number	int	R
rf_datecoll	date of collection	timestamp	R
fr_notes	general notes	char(230)	O
fr_hc_link	link to hard copy table	int	O
fr_vc_link	link to vector table	int	O
fr_rs_link	link to raster table	int	O

*geographic location fields are same as specified in Table 1

Table 4. Relational database table for documenting imagery

Field Name	Description	Field Type	M/R/O
0Uim_link	unique sequence number	int	M
im_ct_link	link to cataloger table	int	M
im_ct_date	date of creation of this record	timestamp	M
	title of imagery	char(230)	M*p291Xim_title
im_author	organization sponsoring imagery	char(230)	M
im_taker	organization collecting imagery	char(230)	R
im_publisher	organization distributing imagery	char(40)	R
im_plattype	type of platform	char(10)	O
im_platname	name of platform	char(64)	O
im_type	type of imagery	char(40)	O
im_datestart	start date of collection	timestamp	R
im_dateend	end date of collection	timestamp	R
im_series	series statement	char(40)	O
im_bulk	bulk catalog statement	char(40)	O
im_intentlk	link to subject table (there may be up to six subjects, the exact number is yet to be determined)	int	R
im_source1	source of imagery (if compiled from more than one)	char(20)	O
im_source2	source of imagery	char(20)	O
im_source3	source of imagery	char(20)	O
im_accuracy	accuracy statement	char(40)	O
im_header	header information	char(80)	O
im_id	image ID	char(13)	R
im_path	path	char(4)	R
im_row	row	char(4)	R
im_numbands	number of bands	int	R
im_scale	scale (regional, local, etc.)	char(8)	O
im_spares	spatial resolution - IFOV	int	O
im_sparesunit	units of spatial resolution	char(4)	O
im_tempres	temporal resolution	char(32)	O
im_specres	spectral resolution	char(32)	O
im_cloudcov	percentage of cloud cover	int	O
im_quality	NASA band quality	int	O
im_format	image format	char(20)	O
im_history	ancestry (description of compilation)	char(230)	O

Table 4. (continued)

Field Name	Description	Field Type	M/R/O
im_disclaim	disclaimer statement	char(230)	O
im_ntoes	general notes	char(230)	O
im_hc_link	link to hard copy table	int	O
im_vc_link	link to vector table	int	O
im_rs_link	link to raster table	int	O

*geographic location fields are same as specified in Table 1

Table 5. Relational database table for documenting printed (hard copy) version of data sets.

Field Name	Description	Field Type	M/R/O
hc_link	unique sequence number	int	M
hc_ct_link	link to cataloger table	int	M
hc_date	date of creation of this record	timestamp	M
hc_publisher	publisher of printed material	char(40)	R
hc_printed	date printed	timestamp	O
hc_revised	date revised	timestamp	O
hc_material	material of copy (paper, film, etc.)	char(12)	O
hc_color	color, sepia, b&w, etc.	char(12)	O
hc_sizecat	size category (common sheet sizes)	char(8)	O
hc_size	dimensions of item	char(12)	O
hc_units	units for dimensions of itme	char(12)	O
hc_ident	local name for item	char(20)	O
hc_hdatum	horizontal datum	char(40)	O
hc_vdatum	vertical datum	char(40)	O
hc_projection	map projection	char(40)	O
hc_ellipsoid	ellipsoid	char(40)	O
hc_corrected	method of geographic correction	char(64)	O
hc_scaletype	type of scale on item	char(4)	O
hc_scaletext	written scale	char(20)	O
hc_ratioscale	ratio scale	int	R
hc_notes	general notes	char(230)	O
hc_holdlink	link to hard copy holdings table	int	O

Table 6. Relational database table for documenting vector version of data sets

Field Name	Description	Field Type	M/R/O
vc_link	unique sequence number	int	M
vc_ct_link	link to cataloger table	int	M
vc_ct_date	date of creation of this record	timestamp	M
vc_type	type of vector data	char(4)	O
vc_numpoly	number of polygons	int	O
vc_numline	number of lines	int	O
vc_numpt	number of points	int	O
vc_numbits	number of bits per coordinate	int	O
vc_scale	source scale	int	R
vc_filesize	size of file in bytes	int	O
vc_resolution	units of resolution	char(10)	O
vc_vendor	vendor format	char(20)	O
vc_dbatt	database attached?	char(4)	O
vc_structure	data structure	char(20)	O

Table 6. (continued)

Field Name	Description	Field Type	M/R/O
vc_hdatum	horizontal datum	char(40)	O
vc_vdatum	vertical datum	char(40)	O
vc_projection	map projection	char(40)	O
vc_ellipsoid	ellipsoid	char(40)	O
vc_corrected	method of geographic correction	char(64)	O
vc_notes	general notes	char(230)	O
vc_progress	work in progress?	char(2)	O
vc_hlink	link to vector holdings table	int	O

Table 7. Relational database table for documenting raster version of data sets

Field Name	Description	Field Type	M/R/O
rs_link	unique sequence number	int	M
rs_ct_link	link to cataloger table	int	M
rs_ct_date	date of creation of this record	timestamp	M
rs_rast	rasterized from vector?	char(4)	R
rs_header	header/description	char(230)	O
rs_filesize	size of file in bytes	int	O
rs_numbands	number of bands	int	O
rs_numrows	number of rows	int	O
rs_cols	number of columns	int	O
rs_numbits	number of bits per pixel	int	R
rs_pixelx	x pixel size	int	O
rs_pixely	y pixel size	int	O
rs_pixelunit	units of pixel size	char(12)	O
rs_hdatum	horizontal datum	char(40)	O
rs_vdatum	vertical datum	char(40)	O
rs_projection	map projection	char(40)	O
rs_ellipsoid	ellipsoid	char(40)	O
rs_corrected	method of geographic correction	char(64)	O
rs_resamp	resampled?	char(4)	O
rs_class	classified?	char(4)	O
rs_numclass	number of classes	int	O
rs_classmeth	method of classification	char(20)	O
rs_vendor	vendor format	char(20)	O
rs_type	type of raster data (LAN,COT,etc.)	char(20)	O
rs_pixelt	pixel type (disc., cont., dicot.)	char(20)	O
rs_notes	general notes	char(230)	O
rs_progress	work in progress?	char(4)	O
rs_hlink	link to raster holdings table	int	O

Table 8. Relational database table for recording holdings of printed (hard copy) data sets

Field Name	Description	Field Type	M/R/O
hh_link	unique sequence number	int	M
hh_ct_link	link to cataloger table	int	M
hh_ct_date	date of creation of this record	timestamp	M
hh_org_link	link to organization table (place that owns this item)	int	M
hh_pubdate	date item was created if locally produced	timestamp	R
hh_avail	availability of item	char(40)	O
hh_location	item location (specific location of item for local use)	char(40)	O
hh_salestatus	item sale status	char(40)	O
hh_cost	cost of item	char(10)	O

Table 9. Relational database table for recording holdings of vector data sets

Field Name	Description	Field Type	M/R/O
vh_link	unique sequence number	int	M
vh_ct_link	link to cataloger table	int	M
vh_ct_date	date of creation of this record	timestamp	M
vh_org_link	link to organization table (place that owns this item)	int	M
vh_pubdate	date item was created if locally produced	timestamp	R
vh_avail	availability of item	char(40)	O
vh_location	item location (specific location of item for local use)	char(40)	O
vh_salestatus	item sale status	char(40)	O
vh_cost	cost of item	char(10)	O

Table 10. Relational database table for recording holdings of raster data sets

Field Name	Description	Field Type	M/R/O
rh_link	unique sequence number	int	M
rh_ct_link	link to cataloger table	int	M
rh_ct_date	date of creation of this record	timestamp	M
rh_org_link	link to organization table (place that owns this item)	int	M
rh_pubdate	date item was created if locally produced	timestamp	R
rh_avail	availability of item	char(40)	O
rh_location	item location (specific location of item for local use)	char(40)	O
rh_salestatus	item sale status	char(40)	O
rh_cost	cost of item	char(10)	O

Table 11. Relational database table for recording organization information

Field Name	Description	Field Type	M/R/O
or_link	unique sequence number	int	M
or_ct_link	link to cataloger table	int	M
or_ct_date	date of creation of this record	timestamp	M
or_name	name of organization	char(230)	M
or_division	name of division	char(230)	R
or_subdiv	name of subdivision	char(230)	R
or_unit	name of work unit	char(230)	R
or_parent	link to a parent organization	int	R
or_numchild	number of child organizations	int	O
or_type	type of organization (federal, state, private, etc.)	char(20)	R
or_profile	description of organization	char(230)	O
or_abbrev	official abreviation of organization	char(20)	O
or_moniker	moniker used for system reference	char(4)	R
or_lk_prevnam	link to previous organization name	int	O
or_lk_succnam	link to succeeding organization name	int	O
or_address	street address	char(40)	O
or_box	post office box number	char(20)	O
or_city	city	char(40)	O
or_parish	parish (county)	char(40)	O
or_state	state	char(2)	O
or_zip	zip code	char(10)	O
or_phone	phone number	char(20)	O
or_fax	fax number	char(20)	O
or_attention	person of attention	char(40)	O
or_email	email address	char(30)	O
or_geocoord	geographic coordinates of organization	char(20)	O
or_histinfo	historical information	char(230)	O
or_firstlog	first login from organization	timestamp	O
or_lastlog	last login from organization	timestamp	O
or_defloc	default location	char(16)	O
or_defscript	default script	char(128)	O
or_environ	login environmental information	char(128)	O
or_tottime	total time used	real	O
or_curtime	current billable time	real	O
or_cursess	current number of sessions	int	O
or_update	last update of record	timestamp	O
or_notes	general notes	char(230)	O
or_subject	link to subject table (there may be up to six subjects, the exact number is yet to be determined)	int	R

Table 12. Relational database table for recording information about people

Field Name	Description	Field Type	M/R/O
pe_link	unique sequence number	int	M
pe_ct_link	link to cataloger table	int	M
pe_ct_date	date of creation of this record	timestamp	M
pe_lname	last name	char(30)	M
pe_fname	first name, middle name or initial	char(30)	M
pe_courtitle	courtesy title (mr., ms., dr., etc.)	char(5)	O
pe_born	birth date	timestamp	O
pe_jobtitle	job title	char(40)	O
pe_duties	function/duties	char(40)	O
pe_interest	link to subject table (there may be up to six subjects, the exact number is yet to be determined)	int	R
pe_reason1	reason person is in database	char(20)	O
pe_reason2	reason person is in database	char(20)	O
pe_reason3	reason person is in database	char(20)	O
pe_reason4	reason person is in database	char(20)	O
pe_reason5	reason person is in database	char(20)	O
pe_org	organization to which person belongs, link to organization table	int	R
pe_deptunit	person's department or unit	char(40)	O
pe_address1	primary street or box address	char(40)	O
pe_city1	primary city	char(40)	O
pe_parish1	primary parish (county)	char(40)	O
pe_state1	primary state	char(2)	O
pe_zip1	primary zip code	char(10)	O
pe_phone1	primary phone number	char(20)	O
pe_other1	primary phone is Home/Work/Other	char(1)	O
pe_geocoord1	primary geographic coordinates	char(20)	O
pe_address2	secondary street or box address	char(40)	O
pe_city2	secondary city	char(40)	O
pe_parish2	secondary parish (county)	char(40)	O
pe_state2	secondary state	char(2)	O
pe_zip2	secondary zip code	char(10)	O
pe_phone2	secondary phone number	char(20)	O
pe_other2	secondary phone is Home/Work/Other	char(1)	O
pe_geocoord2	secondary geographic coordinates	char(20)	O
pe_wrkphone	work phone (if not already listed)	char(20)	O
pe_workfax	work fax (if not already listed)	char(20)	O
pe_workemail	email address	char(30)	O
pe_othernum	other phone number	char(30)	O
pe_history	historical personal information	char(230)	O
pe_parentorg	organization contributing record	char(40)	O
pe_update	date of last update	timestamp	R

Table 13. Relational database table for recording cataloger and data entry information

Field Name	Description	Field Type	M/R/O
ct_link	unique sequence number	int	M
ct_namelk	person entering records into database, link to people table	int	M
ct_date	date information was entered	timestamp	M
ct_personlk	person cataloging data on location, link to people table	int	M
ct_entrylk	person entering data on location, link to people table	int	M
ct_orglk	organization cataloging data, link to organization table	int	M

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REFERENCES

Burrough, P.A. 1986, Principles of Geographical Information Systems for Land Resources Assessment. Oxford University Press, New York. p. 181.

Hiland, M.W., R.A. McBride, D.W. Davis, D. Braud, Jr., H.R. Streiffer, F.W. Jones, A.J. Lewis, S.J. Williams, 1991. "Louisiana Coastal GIS Network: Graphical User Interface for Access to Spatial Data." In: GIS/LIS '91 Proceedings, Vol. 2, American Society for Photogrammetry and Remote Sensing, Bethesda, MD.

McBride, R.A., D.W. Davis, F.W. Jones, D. Braud, Jr., A.J. Lewis, H.R. Streiffer, S. Penland, N.S.N. Lam, S.J. Williams 1990, "Louisiana Coastal Geographic Information System Network." Meridian 5:57-59.

McBride, R.A., D.W. Davis, F.W. Jones, M.R. Byrnes, D. Braud, M.W. Hiland, A.J. Lewis, H.R. Streiffer 1991, "Louisiana Coastal Geographic Information System Network (LCGISN): Access to Spatial Data." Meridian 6:29-43.

Robinson, A.H., R.D. Sale, J.L. Morrison, P.C. Muehrcke, 1984. Elements of Cartography. John Wiley & Sons, New York. p. 4-6.

Tosta, N. 1992, "The Digital Data Wave." Geo Info Systems Volume 2, Number 6. p. 24-27.

Tosta, N. 1992, "Data Sharing." Geo Info Systems Volume 2, Number 7. p. 32-34.

APPENDIX B

LCGISN DATABASE TABLES

LCGISN Audio/Visual DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1	???			M	av_Link	Unique Audio/Visual Link		A	40	40		0	
2	???			R	av_ct_Link	Cataloger Link	√	A	40	40		40	
3	???			R	av_ct_Date	Cataloger Date	C	D	8	10		80	
4	020		--		av_ISBN	ISBN Number	C	N	4	10		88	
5	074		--		av_GPONum	GPO Item Number		?		?		92	
6	086		$a		av_GovDoc	Govt. Doc. Classification Number		?		?		92	
7	245		$a	M	av_Title	Title		A	256	256		92	
8	1xx		--	R	av_Author	Author-How handle 100,110,111		A	256	256		348	
9	260		$b	R	av_Publisher	Publisher		A	256	256		604	
10	260		$c	R	av_DatePubS	Date of Publication Start (Y/M/D	C	D	8	10		860	
11					av_DatePubE	Date of Publication End (Y/M/D)	C	D	8	10		868	
12	???			R	av_Type	Audio/Visual Type Type	C	A	4	4		876	
13					av_Extent	Extent ??	T	A	32	32		880	
14	440/9		--	R	av_Stmt	Series Statement		A	20	20		912	
15					av_Bulk	Bulk Catalogs		A	20	20		932	
16					av_Theme1	Theme 1 Statement		A	20	20		952	
17					av_Source1	Source 1 Statement		A	20	20		972	
18					av_Accuracy	Accuracy Statement	T	A	20	20		992	
19					av_Progress	Work in Progress		A	3	3		1012	
20	300		$e		av_AccMateri	Accompany Material		A	128	128		1015	
21					av_Update	Update Frequency		A	32	32		1143	
22					av_Keywords	Lookup Keywords		A	20	20		1175	
23	033		$a	I	av_DateCol	Date Collected (Y/M/D)	C	D	8	10		1195	
24	033		$a	I	av_TimeCol	Time Collected (H:M:S)	C	T	6	8		1203	
25					av_DateRev,	Date Revised (Y/M/D)	C	D	8	10		1209	
26					av_DatePrint	Date Printed (Y/M/D)	C	D	8	10		1217	
27					av_Ground	GROUND COORDINATES	C	L	509	509		1225	
28	???				av_History	History / Ancestry		A	256	256		1734	
29	???				av_Disclaim	Disclaimer		A	256	256		1990	
30	250		$a		av_Edition	Edition Information		A	20	20		2246	
31	5xx		??		av_Notes	General Notes		A	80	80		2266	
32	950		--		av_Subject	Subject Headings-650 or 950		A	80	80		2346	
33	???				av_hc_link	Hard Copy Link	√	L	8	8		2426	
34	???				av_vc_link	Vector Link	√	L	8	8		2434	
35	???				av_rs_link	Raster Link	√	L	8	8		2442	
35	105	70	35	210	MARC Codes	Total Not Counting MARC Codes			2450	2470		2450	

LCGISN Audio/Visual DATABASE FORMAT 03-11-92

NOTES on LCGISN Audio/Visual DATABASE:	
Unique Audio/Visual Link	
ISBN Number	
GPO Item Number	
Govt. Doc. Classification #	
Title	Title of audio/visual
Author	Creator of A/V - Can be Organization or person - LINK??
Publisher	Where to obtain A/V - Could be same as Author - LINK??
Date of Pub. Start (Y/M/D)	
Date of Publ. End (Y/M/D)	
A/V Type	Video, slide, overhead
Extent of Item	Aerial Chart,Birds-eye view,chart,hydrographic chart,map,map profile,map section
Series Statement	
Bulk Catalogs	
Theme 1 Statement	How many of these - vs Subject
Source 1 Statement	How many of these - Need to expand if more than 1 ??? (Matt)
Accuracy Statement	Rough guide
Work In Progress	
Accompanying Material	
Update Frequency	
Lookup Keywords	vs LC Subjects(650) vs Subject Terms(950)
Date Collected (Y/M/D)	vs Date Published
Time Collected (H:M:S)	Time is important in COLLECTION
Date Revised (Y/M/D)	Do we need this for Audio/Visual?
Date Printed (Y/M/D)	Do we need this for Audio/Visual?
GROUND COORDINATES	
History/Ancestry	Text describing A/V compilation - Link to a text field ???? (Matt)
Disclaimer	For LCGISN or Author ?? - Link to a text field ???? (Matt)
Edition Information	
General Notes	
Subject Headings	
Hard Copy Link	
Vector Link	
Raster Link	

LCGISN Cataloger DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A/R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					C.LINK	Unique Cataloger Link		L	40	40		0	
2					ct_link	LCGISN Cataloger	√	A	40	40		40	
3					ct_date	Date of Record	C	D	8	8		80	
4					ct_personlink	Local Catalog Person Link	√	L	40	40		88	
5					ct_entrylink	Local Entry Person Link	√	L	40	40		128	
6					ct_organlink	Organization/Indiv Link	√	L	40	40		168	
6	18	12	6	36	MARC Codes	Total Not Counting MARC Codes			208	208		208	

LCGISN Cataloger DATABASE FORMAT 03-11-92

NOTES on LCGISN Cataloger DATABASE:

MARC:Field Tag	3 digits
MARC:First Indicator	2 digits
MARC:Sub-Field	1 Character - Letter or Number
MARC:Man/Req/Opt	1 Character - Mandatory(MUST have) vs. Required(Put if appropriate) vs. Optional(Put if want)
	Required = MUST be there if it exists
	Mandatory = MUST be there even if it DOESN'T exist
	Optional = Doesnot have to be entered
	Important = Items LCGISN consider important
	This field is for CATALOGING - Do we want one for LCGISN ??
A/R = A	Authority Record For This Field
A/R = √	Check Field against another table
A/R = T	Table Lookup for field
A/R = C	Consistency or Limit Check
LCGISN Cataloger	Person entering this data into the LLCGISN system
Date of Record	Date information was entered into LCGISN system
Cataloger Person Link	Person cataloging data
Entry Person Link	Person entering data locally
Organization Link	Corp/Agency/Indiv Link

Disclaimer	"Not for Navigation" for instance		
Checkout	Place for "Checked Out" info - Organization,person,, date ...		
Location vs Organization	Which for Holdings ??		
First MARC Indicator for Title is number on non-filing characters			
How we want to catalog 'Holding as Stock'?			
Randy to catalog some maps			
Tony & DeWitt to catalog some photos & imagery			
Various Number Formats		Alphabetic	B
Special Formats - Additional Info.		Alphanumeric	A
Things indexed for Lookup		Integer	I
Things would like to know		Link - Lookup	L
Extra Things		Date	D
Date & Time Ranges		Time	T
Interpolate Video For Instance		Floating Point	F
		Dollar Amount	$
		Coordinate (Lat / Lon)	C
		Logical - Dichotomus - Boolean	

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LCGISN Disk File DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					ds_link	Unique DISK LINK		L	40	40		0	
2					ds_ct_link	Cataloger Link	√	A	40	40		40	
3					ds_ct_date	Date of Record	C	D	8	10		80	
4					ds_owner	Owner Organization	√	A	40	40		88	
5					cs_contact	Contact Person		A	40	40		128	
6					ds_datecre	Date File Created	C	D	8	10		168	
7					ds_computer	Computer Created on		A	30	30		176	
8					ds_intlabel	Internal Label		A	30	30		206	
9					ds_extlabel	External Label		A	30	30		236	
10					ds_type	Type of disk		A	10	10		266	
11					ds_name	Disk Name or #		A	12	12		276	
12					ds_path	Pathname on disk		A	64	64		288	
13					ds_location	Location of disk		A	64	64		352	
14					ds_compress	Compressed		A	16	16		416	
15					ds_writemeth	Disk writing method		A	8	8		432	
16					ds_filesize	File size		N	4	8		440	
17					ds_ascii	ASCII or Binary		A	1	1		444	
18					ds_available	Available to LCGISN	C	A	3	3		445	
19					ds_??_link	Pointer back to Holdings Record	√	L	8	8		448	
20					ds_history	History, notes ...		A	256	256		456	
21					ds_backup	Backed up: Tape, Disk, Cartridge,...		A	20	20		712	
21	63	42	21	126	MARC Codes	Total Not Counting MARC Codes			732	740		732	

NOTES on LCGISN Disk File DATABASE:

Owner Organization

Contact Person

Date File Created

Machine Created on

Internal Label

External Label

Type of disk (hard, 3 1/2 diskette)

Disk Name or #

Pathname on disk

Location of disk Expand: Use Location DB & more specific information

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Compressed		If Compressed, indicate what method										
Disk writing method												
File size		In bytes										
ASCII or Binary		Can to use also for transfer method										
Available to LCGISN												
Pointer back to Holdings Record		Need so don't have to search whole Holdings DB										
Backed up: Tape, Disk, Cartridge,...		More for local use than anything else										

LCGISN Frame DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					fr_Link	Unique Frame Link		A	40	40		0	
2					fr_ct_Link	Cataloger link	√	A	40	40		40	
3					fr_ct_Date	Cataloger Date	C	D	8	10		80	
4					fr_rollnum	Roll Number	C	N	4	6		88	
5					fr_framenum	Frame Number	C	N	4	7		92	
6					fr_datecoll	Date Collected (Y/M/D)	C	D	8	10		96	
7						GROUND COORINATES	√	L	509	509		104	
8		500			fr_notes	General Notes		A	80	80		613	
10					fr_hc_link	Hard Copy Link	√	A	40	40		693	
11					fr_vc_link	Vector Link	√	A	40	40		733	
12					fr_rs_link	Raster Link	√	A	40	40		773	
12	36	24	12	72	MARC Codes	Total Not Counting MARC Codes			813	822		813	

LCGISN Frame DATABASE FORMAT 03-11-92

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NOTES on LCGISN Frame DATABASE:

Collections will point here once for whole collection

Roll Number	Roll Number
Frame Number	Frame Number
Date Collected (Y/M/D)	
Time Collected (H:M:S)	
GROUND COORINATES	**See Separate Table**
General Notes	**Do we need this in 'FRAME'**
Hard Copy Link	
Raster Link	
Vector Link	

LCGISN Ground Coordinates DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					gc_link	Unique Ground Link		L	40	40		0	
2					gc_ct_link	Cataloger link	√	A	40	40		40	
3					gc_ct_date	Cataloged Date	C	A	8	10		80	
4					gc_desc	Extent of Item (Many in list)		A	20	20		88	
5					gc_lname	Local Map Name		A	20	20		108	
6					gc_ident	Map Ident - Common Area name	C	A	20	20		128	
7					gc_datum	Geocoded Datum (Code choices)	T	I	4	2		148	
8		255			gc_proj	Projection (Code choices)	T	I	4	2		152	
9					gc_ellipsoid	Ellipsoid (Code choices)	T	I	4	2		156	
10					gc_corrected	Corrected- Geo, Radio, ...		A	64	64		160	
11					gc_stdquad	Standard Quad Reference	√	L	16	16		224	
12		052			gc_country	Country	C	A	20	20		240	
13		052			gc_state	State	T	A	2	2		260	
14		052			gc_parish	Parish / County	C	A	16	16		262	
15		052			gc_otherref	Other Geographic reference		A	20	20		278	
16					gc_placename	Place Name	C	A	40	40		298	
17					gc_specname	Specific Name		A	40	40		338	
18					gc_regionup	Next Region Up	C	A	40	40		378	
19					gc_mbrunits	MBR&Centroid Units (LL,UTM.SP...)	T	A	4	4		418	
20					gc_zone	Zone	C	C	4	4		422	
21					gc_centy	Centroid - Y	C	C	7	12	2	426	
22					gc_centx	Centroid - X	C	C	8	13	2	433	
23					gc_centys	Centroid Decimal Seconds - Y	C	N	4	6	6	441	
24					gc_centxs	Centroid Decimal Seconds - X	C	N	4	6	6	445	
25		034			gc_mbrney	MBR - NorthEast Y - UR Y	C	C	7	12	2	449	
26		034			gc_mbrnex	MBR - NorthEast X - UR X	C	C	8	12	2	456	
27		034			gc_mbrsey	MBR - SouthEast Y - LR Y	C	C	7	12	2	464	
28		034			gc_mbrsex	MBR - SouthEast X - LR X	C	C	8	12	2	471	
29		034			gc_mbrswy	MBR - SouthWest Y - LL Y	C	C	7	12	2	479	
30		034			gc_mbrswx	MBR - SouthWest X - LL X	C	C	8	12	2	486	
31		034			gc_mbrnwy	MBR - NorthWest Y - UL Y	C	C	7	12	2	494	
32		034			gc_mbrnwx	MBR - NorthWest X - UL X	C	C	8	12	2	501	
												509	
32	96	64	32	192	MARC Codes	Total Not Counting MARC Codes			509	555		509	

LCGISN Ground Coordinates DATABASE FORMAT 03-11-92

NOTES on LCGISN Ground DATABASE:														
Extent of Item (Many in list)				?? Discuss - seem to have many definitions										
Local Map Name														
Map Ident - Common Area name														
Geocoded Datum (Code choices				Pre-NAD (<1899),NAD (1899-1927),NAD27(1927-1983),NAD83										
Projection (Code choices)				UTM,Polyconic, Lambert Conformal, Other, Unavailable, Don't Know										
Ellipsoid (Code choices)				Clarke 1866, Bessel 1841, GRS 1980, Other, Unavailable, Don't Know										
Corrected- Geo, Radio, ...				Geometrically and/or Radiometrically										
Standard Quad Reference														
Country														
State														
Parish / County														
Other Geographic reference														
Place Name														
Specific Name														
Next Region Up														
MBR&Centroid Units(LL,UTM,SP)														
Zone														
Centroid - Y				Use centroid to record point data										
Centroid - X				Use centroid to record point data										
Centroid Decimal Seconds - Y														
Centroid Decimal Seconds - X														
MBR - NorthEast Y - UR Y				Have provision to only enter 2 corners if Rectangle										
MBR - NorthEast X - UR X														
MBR - SouthEast Y - LR Y														
MBR - SouthEast X - LR X														
MBR - SouthWest Y - LL Y														
MBR - SouthWest X - LL X														
MBR - NorthWest Y - UL Y														
MBR - NorthWest X - UL X														
	652		--		LC Geographic Subject Headings									
	952		--		Location Terms									
	033		$b		Geographic Classification Area Code									
	033		$c		Gepgraphic Classification subarea code									
	043		--		Geographic Area Code (From USMARC Code List)									

LCGISN Hard Copy DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					hc_Link	Unique Hard Copy Link		A	40	40		0	
2					hc_ct_link	Cataloger Link	√	A	40	40		40	
3					hc_ct_date	Cataloger Date	C	D	8	10		80	
4					hc_publisher	Publisher		L	40	40		88	
5					hc_revised	Date Revised (Y/M/D)	C	D	8	10		128	
6					hc_printed	Date Printed (Y/M/D)	C	D	8	10		136	
7					hc_material	Material	T	A	12	12		144	
8					hc_color	Color	T	A	12	12		156	
9					hc_sizecat	Size Category		A	10	10		168	
10		300			hc_size	Dimensions (why not 3 ?)		F	12	18	2	178	
11		300			hc_units	Units for above dimensions		F	12	18	2	190	
12					hc_ident	Local Map Ident		A	20	20		202	
13					hc_datum	Geocoded Datum (Code choices)	T	I	4	2		222	
14					hc_projection	Projection (Code choices)	T	I	4	2		226	
15					hc_ellipsoid	Ellipsoid (Code choices)	T	I	4	2		230	
16					hc_corrected	Corrected- Geo, Radio, ...		A	64	64		234	
17		034			hc_scaletype	Type of Scale / Graphic		A	4	4		298	
18		034			hc_scaletext	Written Scale - Text		A	20	20		302	
19		255			hc_scale	Ratio Scale	C	I	4	7		322	
20		500			hc_notes	General Notes		A	80	80		326	
21		650			hc_subject	Subject Headings		A	80	80		406	
22					hc_mp_link	Link Back to Map	√	L	40	40		486	
23					hc_im_link	Link Back to Imagery	√	L	40	40		526	
24					hc_ph_link	Link Back to Photograph	√	L	40	40		566	
25					hc_hh_link	Link to Hard Copy Holdings	√	A	40	40		606	
25	75	50	25	150	MARC Codes	Total Not Counting MARC Codes			646	661		646	

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LCGISN Hard Copy DATABASE FORMAT 03-11-92	
NOTES on LCGISN Hard Copy DATABASE:	
Proj., Datum,Ellipsoid & Corrected here or in Ground Table ??	
Publisher	Who can you buy product from
Date Revised (Y/M/D)	Date product was revised
Date Printed (Y/M/D)	Date product was printed
Material	Paper, Negative, Positive, Mylar, bromide, stable ...
Color	Color, Sepia, Black&White, ...
Size Category	Common sheet sizes A,B,C,D,E
Dimensions (why not 3 ?)	Physical dimensions (or dimensions in neat lines
Units for above dimensions	Units used in above dimensions (inches, mm , cm , ...
Local Map Ident	Name that can be used for local Use - Fred's map ...
Geocoded Datum	Pre-NAD (<1899),NAD (1899-1927),NAD27(1927-1983),NAD83
Projection	UTM,Polyconic, Lambert Conformal, Other, Unavailable, Don't Know
Ellipsoid	Clarke 1866, Bessel 1841, GRS 1980, Other, Unavailable, Don't Know
Corrected- Geo, Radio, ...	Geometrically and/or Radiometrically
Type of Scale - Graphic	Bar, Visual, Graphic, Ratio, Interval, None, Not Scaled, Other or UNKNOWN(just not specified)
	Single indeterminate, Single Scale, Range of Scales
Written Scale - Text	Ratio 1:N Interval 1in=100f
Ratio Scale	Omit 1:
General Notes	
Subject Headings	
Link Back to Map	
Link Back to Imagery	
Link Back to Photograph	
Link to Hard Copy Holdings	What do we do about many ??????????????

LCGISN Hard Copy Holdings DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					hh_Link	Unique HC Holdings Link		A	40	40		0	
2					hh_ct_link	Cataloger Link	√	A	40	40		40	
3					hh_ct_date	Cataloger Date	C	D	8	8		80	
4					hh_or_link	Organization Link (Lowest Level)	√	A	40	40		88	
5					hh_publicatio	Date of Publication	C	D	8	8		128	
6					hh_available	Item Availablity		A	40	40		136	
7					hh_location	Item Location - Local Use		A	40	40		176	
8					hh_salestatus	Item Sale Status		A	4	12		216	
9					hh_cost	Item Cost		$	4	7	2	220	
10					hh_hc_link	Link Back to HC Record	√	L	40	40		224	
10	30	20	10	60	MARC Codes	Total Not Counting MARC Codes			264	275		264	

LCGISN Hard Copy Holdings DATABASE FORMAT 03-11-92

NOTES on LCGISN Hard Copy Holdings DATABASE:

Unique HC Holdings Link	**IS THIS UNIQUE ???????????? - Matt "Not Here - Unique in HC Table"**
Cataloger Link	Link to person who cataloged this item
Cataloger Date	Date this item was cataloged
Organization Link	Link to Organization Database - Lowest level - or Location Link ??
Publication/Creation Date	Date item was published or created in case of local products
Item Availability	Available - when - how
Item Location	Locally defined & used to catalog holdings
Item Sale Status	Accquisition cost status
Item Cost	The cost of the item
Link Back to H.C. Record	Needed to match HC record with this - Discuss with Farrell

LCGISN Imagery DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					lm_link	Unique Imagery Link		L	40	40		0	
2					im_ct_link	Cataloger link	√	A	40	40		40	
3					im_ct_date	Cataloged Date	C	A	8	10		80	
4					im_Title	Title		A	256	256		88	
5					im_Publisher	Publisher	√	A	256	256		344	
6					im_Organizat	Organization	√	L	40	40		600	
7					im_TakeGroup	Taking Group	√	L	40	40		640	
8					im_PlatType	Platform Type (Aircarft/Satellite	T	A	40	40		680	
9					im_Platform	Platform Name	T	A	40	40		720	
10					im_ImageType	Imagery Type	T	A	40	40		760	
11		260			im_DatePubS	Date of Acquisition Start (Y/M/D	C	D	8	10		800	
12		260			im_DatePubE	Date of Acquisition End (Y/M/D)	C	D	8	10		808	
13					im_Stmt	Series Statement		A	20	20		816	
14					im_Bulk	Bulk Catalogs		A	20	20		836	
15					im_Theme1	Theme 1 Statement		A	20	20		856	
16					im_Source1	Source 1 Statement		A	20	20		876	
17					im_Accuracy	Accuracy Statement		A	20	20		896	
18					im_Keywords	Lookup Keywords		A	20	20		916	
19					im_DateCol	Date Collected (Y/M/D)	C	D	8	10		936	
20					im_TimeCol	Time Collected (H:M:S)	C	T	6	8		944	
21					im_header	Header Information		A	80	80		950	
22					im_id	ID	C	A	13	13		1030	
23					im_path	Path	C	N	4	4		1043	
24					im_row	Row	C	N	4	4		1047	
25					im_numbands	Number of Bands	C	N	4	4		1051	
26					im_scale	Scale (Regional,Sub-Reg,,Local...	T	A	3	3		1055	
27					im_spaceres	Spatial Resolution - IFOV	C	N	4	7		1058	
28					im_tempres	Temperal Resolution		A	32	32		1062	
29					im_spectres	Spectral Resolution		A	32	32		1094	
30					im_cloudcov	Percentage Cloud Cover	C	A	16	16		1126	
31					im_season	Season (Sum.,Fall,Winter,Spring)	C	A	16	16		1142	
32					im_quality	Quality	C	N	4	1		1158	
33					im_format	Format	C	A	16	16		1162	

LCGISN Imagery DATABASE FORMAT 03-11-92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt.	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
34					im_ground	GROUND COORDINATES	C	A	509	509		1178	
35					im_History	History		A	256	256		1687	
36					im_Edition	Edition Information		A	20	20		1943	
37					im_Disclaime	Disclaimer		A	256	256		1963	
38		500			im_Notes	General Notes		A	80	80		2219	
39		650			im_Subject	Subject Headings		A	80	80		2299	
40					im_hc_link	Hard Copy Link	√	A	8	8		2379	
41					im_vc_link	Vector Link	√	A	8	8		2387	
42					im_rs_link	Raster Link	√	A	8	8		2395	
42	126	84	42	252	MARC Codes	Total Not Counting MARC Codes			2403	2413		2403	

LCGISN Imagery DATABASE FORMAT 03-11-92

NOTES on LCGISN Imagery DATABASE:

Do we want to have a separate table for such things as temporal & spatial resolution ??

Separate table for Minutia - Index stuff vs lookup stuff

Can an Image have an attached Database ?

Title

Publisher

Organization

Taking Group

Platform Type (Aircarft/Satellite)

Platform Name

Imagery Type

Date of Acquisition Start (Y/M/D)

Date of Acquisition End (Y/M/D)

LCGISN Imagery DATABASE FORMAT 03-11-92	
Series Statement	
Bulk Catalogs	
Theme 1 Statement	Land/Water - Level 1
Source 1 Statement	
Accuracy Statement	
Lookup Keywords	
Date Collected (Y/M/D)	
Time Collected (H:M:S)	
Number of Bands	
Header Information	
ID	
Path	
Row	
Number of Bands	
Scale	Regional,Sub-Regional,Local,...
Spatial Resolution-IFOV	Is this the same as miniimum resolution ?
Temperal Resolution	Daily/ Weekly ...
Spectral Resolution	# Bands & Band Width
Platform Type	Aircraft vs Satellite
Platform	Aircraft: NASA,USDA,USFS,LaDOTD,COE, Private ...
Platform	Satellite: Landsat 4, Landsat 5,MIMBUS,SPOT,SEASAT,Soyuz...
Imagery Type	RBV,MSS,TM,VHRR,AVHRR
Spatial Resolution - IFOV	
Temperal Resolution	
Spectral Resolution	
Cloud Cover	
Season (Sum.,Fall,Winter,Spring)	
Quality	NASA Band Quality
Format	
GROUND COORDINATES	
History	
Edition Information	
Disclaimer	
General Notes	
Subject Headings	
Hard Copy Link	
Vector Link	
Raster Link	

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LCGISN DATA Location DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					lo_link	Unique Location Link		A	30	30		0	
2					lo_ct_link	Cataloger Link	√	A	40	40		30	
3					lo_ct_date	Individual Completing Worksheet	C	D	8	10		70	
4					lo_name	Location Name		B	30	30		78	
5					lo_contact	Location Contact Person		L	40	40		108	
6					lo_moniker	3 Letter Holdings Moniker		A	3	3		148	
7					lo_address	Location Address		A	30	30		151	
8					lo_office	Building & Room/Office Number		A	32	32		181	
9					lo_city	Location City		A	20	20		213	
10					lo_state	Location State	C	B	2	2		233	
11					lo_zip	Location Zip	C	A	10	10		235	
12					lo_phone	Location Phone Number	C	A	15	15		245	
13					lo_modem	Dialup Phone number	C	A	15	15		260	
14					lo_faxnum	Fax Number	C	A	15	15		275	
15					lo_email	email Address		A	30	30		290	
16					lo_baud	Baud	C	N	4	4		320	
17					lo_profile	Default Profile		A	256	256		324	
18					lo_computer	Computer System		A	128	128		580	
19					lo_magmedia	Magnetic Media		A	128	128		708	
20					lo_gis	Mapping System(s)		A	128	128		836	
21					lo_database	DataBase System(s)		A	128	128		964	
22					lo_software	Software Systems		A	128	128		1092	
22	66	44	22	132	MARC Codes	Total Not Counting MARC Codes			1220	1222		1220	

NOTES on LCGISN Location DATABASE :

Unique Location Link — **LOCATION OF DATA ??????**

Location Name

Contact Person

3 Letter Holdings Moniker — To be allocated by LCGISN - reference OCLC ...

Location Address

Building/Room/Office #

Location City

Location State

Location Zip

NOTES on LCGISN Location DATABASE Continued :													
Location Phone #													
Dialup Phone #													
Fax Number													
email Address													
Baud													
Default Profile													
Computer System		Mac,SUN,IBM,AViiON											
Magnetic Media		(-Track Tape, 525 Cartrigde, 120MB Cartridge, 8 mm Cassette											
Mapping System(s)		Arc/Info/Oracle, Ingegraph, MOSS, Atlas, ERDAS, ELAS, GRASS, InFoCAD, AutoCad											
DataBase System(s)		Oracle, INFO, SAS, SPSS, DBASE, FileMaker											
Software Systems		UNIX,DOS,VMS,XWindows,SUN View,											

LCGISN Mag Tape DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INmt_ LEN.	EXmt_ LEN.	# DEC	OFF SET	?
1					mt_link	MAG TAPE LINK		L	12	12		0	
2					mt_ct_link	Cataloger Link	√	A	40	40		12	
3					mt_ct_date	Individual Completing Worksheet	C	D	8	10		52	
4					mt_organ	Organization Link	√	L	40	40		60	
5					mt_owner	Owner / Contact Person Link		L	40	40		100	
6					mt_datecre	Date Created	C	D	8	10		140	
7					mt_computer	Computer Created on		A	30	30		148	
8					mt_intlabel	Internal Label		A	30	30		178	
9					mt_extlabel	External Label		A	30	30		208	
10					mt_type	Type of tape write (tar, dump, ...)		A	10	10		238	
11					mt_dataform	Data Format (BIL, BSQ, ...)		A	20	20		248	
12					mt_tapenum	Tape: Tape Number		N	4	8		268	
13					mt_volid	Tape: Volid		A	8	8		272	
14					mt_format	Tape: Format		A	8	8		280	
15					mt_medium	Tape: Tape Medium		A	8	8		288	
16					mt_density	Tape: Tape Density		A	8	8		296	
17					mt_filesize	Tape: Tape File Size		N	4	8		304	
18					mt_blocksize	Tape: Blocksize		N	4	8		308	
19					mt_filenumbe	Tape: File Number (start with 1)		N	4	3		312	
20					mt_generatio	Tape: Original or Copy		A	3	3		316	
21					mt_available	Available to LCGISN	C	A	3	3		319	
22					mt_??_link	Pointer back to Holdings Record	√	L	8	8		322	
23					mt_history	History, notes ...		A	256	256		330	
24					mt_backedup	Backed up: Tape, Disk, Cartridge,...		A	20	20		586	
24	72	48	24	144	MARC Codes	Total Not Counting MARC Codes			606	621		606	

NOTES on LCGISN Mag Tape DATABASE:	
Organization	Organization Link
Owner	Owner / Contact Person Link
Datecre	Date Created
Computer	Computer Created on
Internal Label	Magnetically encoded information
External Label	Human readable information on reel, cartridge, cassette,,
Type of tape write	tar, dump, ...
Data Format	BIL, BSQ, ...
Tape: Tape Number	Labeled tape identification
Tape: Volid	Labeled tape identification
Tape: Format	IBM information such as Blocked, Variable, ...
Tape Medium:	8 mm, 9 track, 525 cartridge
Tape: Tape File Size	Number of bytes
Tape: Blocksize	Blocksize in bytes if blocked file
Tape: File Number	(start with 1)
Tape: Original or Copy	Generation or backup set number
Available	Tape contents is available to LCGISN
??_link	Pointer back to Holdings Record
history	History, notes ...
Backed up:	Tape, Disk, Cartridge,...

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LCGISN Map DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					mp_Link	Unique Map Link		A	40	40		0	
2					mp_ct_link	Cataloger Link	√	A	40	40		40	
3					mp_ct_date	Cataloger Date	C	D	8	10		80	
4					mp_title	Title		A	256	256		88	
5					mp_author	Author		A	256	256		344	
6					mp_publisher	Publisher		A	256	256		600	
7	260				mp_datepubs	Date of Publication Start (Y/M/D	C	D	8	10		856	
8	260				mp_datepube	Date of Publication End (Y/M/D)	C	D	8	10		864	
9	008				mp_type	Map Type	C	A	4	4		872	
10					mp_extent	Map Extent	T	A	32	32		876	
11					mp_stmt	Series Statement		A	20	20		908	
12					mp_bulk	Bulk Catalogs		A	20	20		928	
13					mp_theme1	Theme 1 Statement		A	20	20		948	
14					mp_source1	Source 1 Statement		A	20	20		968	
15					mp_accuracy	Accuracy Statement	T	A	20	20		988	
16					mp_progress	Work in Progress		A	3	3		1008	
17					mp_database	Database Attached		A	3	3		1011	
18					mp_structure	Database Structure		A	64	64		1014	
19					mp_update	Update Frequency		A	32	32		1078	
20					mp_keywords	Lookup Keywords		A	20	20		1110	
21					mp_datecol	Date Collected (Y/M/D)	C	D	8	10		1130	
22					mp_timecol	Time Collected (H:M:S)	C	T	6	8		1138	
23					mp_daterev	Date Revised (Y/M/D)	C	D	8	10		1144	
24					mp_dateprint	Date Printed (Y/M/D)	C	D	8	10		1152	

LCGISN Map DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt.	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
25						GROUND COORDINATES	C	L	509	509		1160	
26					mp_history	History / Ancestry		A	256	256		1669	
27					mp_disclaim	Disclaimer		A	256	256		1925	
28					mp_edition	Edition Information		A	20	20		2181	
29		500			mp_notes	General Notes		A	80	80		2201	
30		650			mp_subject	Subject Headings		A	80	80		2281	
31					mp_linkhardc	Hard Copy Link	√	L	8	8		2361	
32					mp_linkvecto	Vector Link	√	L	8	8		2369	
33					mp_linkraste	Raster Link	√	L	8	8		2377	
34					Don	Sheet Name - See Place Name ??		A	32	32		2385	
35					Don	Sheet Number		A	32	32		2417	
36					Don	Credit Note		A	32	32		2449	
37					Don	Index to Adjoining Sheets		A	32	32		2481	
38					Don	Index to Boundaries ??		A	32	32		2513	
39					Don	Projection Note ?		A	32	32		2545	
40					Don	Grid Note ?		A	32	32		2577	
41					Don	Declanation Note		A	32	32		2609	
42					Don	Contour Intervals		A	32	32		2641	
43					Don	Special Note ?		A	32	32		2673	
44					Don	Last Revision		A	32	32		2705	
45					Don	AMS Number ?		A	32	32		2737	
45	135	90	45	270	MARC Codes	Total Not Counting MARC Codes			2769	2783		2769	

LCGISN Map DATABASE FORMAT 03-11-92	
NOTES on LCGISN Map DATABASE:	
Unique Map Link	
Title	Title of map
Author	Creator of map - Can be Organization or person - LINK??
Publisher	Where to obtain map - Could be same as Author - LINK??
Date of Pub. Start (Y/M/D)	
Date of Publ. End (Y/M/D)	
Map Type	Single map, Map series, Map serial
	Plan,topographic drawing,topographic print,other appropriate term
Extent of Item	Aerial Chart,Birds-eye view,chart,hydrographic chart,map,map profile,map section
Series Statement	
Bulk Catalogs	
Theme 1 Statement	How many of these - Need to expand if more than 1 ??? (Matt)
Source 1 Statement	How many of these - Need to expand if more than 1 ??? (Matt)
Accuracy Statement	
Work In Progress	
Database Attached	
Database Structure	
Update Frequency	
Lookup Keywords	
Date Collected (Y/M/D)	
Time Collected (H:M:S)	
Date Revised (Y/M/D)	
Date Printed (Y/M/D)	
GROUND COORDINATES	

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LCGISN Map DATABASE FORMAT 03-11-92																
NOTES on LCGISN Map DATABASE Continued:																
History/Ancestry			Text describing map compilation - Link to a text field ???? (Matt)													
Disclaimer			For LCGISN or Author ?? - Link to a text field ???? (Matt)													
Edition information																
General Notes																
Subject Headings																
Hard Copy Link																
Vector Link																
Raster Link																
Sheet Name - See Place Name ??																
Sheet Number																
Credit Note																
Index to Adjoining Sheets																
Index to Boundaries ??																
Projection Note ?																
Grid Note ?																
Declanation Note																
Contour Intervals																
Special Note ?																
Last Revision																
AMS Number ?																

LCGISN Organization DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					or_Link	Unique Organization Link		L	40	40		0	
2					or_ct_link	Cataloger Link	√	A	40	40		40	
3					or_ct_date	Cataloger Date	C	D	8	10		80	
4					or_name	Name		A	256	256		88	
5					or_division	Division		A	256	256		344	
6					or_subdiv	Sub-Division		A	256	256		600	
7					or_unit	Unit		A	256	256		856	
8					or_parentlink	Parent Link	√	A	40	40		1112	
9					or_usecount	Use Count (# Children)	C	N	4	6		1152	
10					or_orgtype	Organization Type	T	A	16	16		1156	
11					or_profile	Profile		A	256	256		1172	
12					or_abrev	Abreviation		A	20	20		1428	
13					or_moniker	3 Lettter Holdings Moniker	T	A	3	3		1448	
14					or_linkprevious	Link to Previous Organ. Name	√	L	40	40		1451	
15					or_linksucced	Link to Succeeding Organ. Name	√	L	40	40		1491	
16					or_address	Street Address		A	40	40		1531	
17					or_city	City		B	20	20		1571	
18					or_parish	Parish / County	C	B	20	20		1591	
19					or_state	State	C	B	2	2		1611	
20					or_zip	Zip Code	C	N	10	10		1613	
21					or_box	P.or_ Box Number	C	A	20	20		1623	
22					or_boxzip	Zip Code	C	N	10	10		1643	
23					or_phone	Phone Number	C	N	15	15		1653	
24					or_fax	Fax Number	C	N	15	15		1668	
25					or_attention	Person of ATTN		A	40	40		1683	
26					or_email	email address		A	30	30		1723	
27					or_primarygc	Primary Geographic Coordinates	C	C	14	24		1753	
28					or_histinfo	Historical Information		L	6	6		1767	
29					or_firstlog	Date First Logged On	C	D	8	10		1773	
30					or_lastlog	Date of Last Logon	C	D	8	10		1781	
31					or_dlocation	Default Location		L	16	16		1789	
32					or_dscript	Default Script		A	128	128		1805	
33					or_environ	Environmental Information		A	128	128		1933	
34					or_ttime	Total time Used - For Billing ??	C	N	4	6		2061	
35					or_tsessions	Total Sessions	C	N	4	6		2065	
36					or_ctime	Current Billable Time	C	N	4	6		2069	
37					or_sessions	Current Billable Number of Sessions	C	N	4	6		2073	
38					or_update	Date Record Last Updated	C	D	8	10		2077	
38	114	76	38	228	MARC Codes	Total Not Counting MARC Codes			2085	2113		2085	

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LCGISN Organization DATABASE FORMAT 03-11-92

NOTES on LCGISN Organization DATABASE:	
Unique Organization Link	
Name	LSU
Division	
Sub-Division	CER
Unit	LGS
Parent Link	Parent for LGS would be CER
Use Count (# Kids)	How many children
Organization Type	As per menu - Federal, State, Private, NON-Profit, Foundation, ...
Profile	
Abreviation	
3 Lettter Holdings Moniker	
Previous Name Link	
Succeeding Name Link	
Street Address	
City	
Parish / County	
State	
Zip Code	
P.or_ Box	
Box Zip	
Phone Number	
Fax Number	
Person of ATTN	
email address	
Primary Geor_ Coord.	
Historical Information	**Do we want this to be a link ???**
Date First Logged On	
Date of Last Logon	
Default Location	
Default Script	
Environmental Information	
Total time Used - For Billing ??	
Total Sessions	
Current Billable Time	
Current Billable # of Sessions	
Date Record Last Updated	

LCGISN People DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					pe_Link	Unique Person Link		L	40	40		0	
2					pe_ct_link	Cataloger Link	√	A	40	40		40	
3					pe_ct_date	Cataloger Date	C	D	8	10		80	
4					pe_lname	Last Name		B	30	30		88	
5					pe_fname	First Name , Middle name or initial		B	20	20		118	
6					pe_ctitle	Courtesy Title		A	5	5		138	
7					pe_born	Date born	C	D	8	10		143	
8					pe_jtitle	Job Title		A	40	40		151	
9					pe_duties	Function / Duties	T	A	40	40		191	
10					pe_interest	Areas of Interest	T	A	80	80		231	
11					pe_reason	Reason Here **10	T	A	5	5		311	
12					pe_organizat	Organization - Lowest Level Link	√	L	40	40		316	
13					pe_deptunit	Department / Unit	√	A	40	40		356	
14					pe_1address	Primary Street or Box Address		A	40	40		396	
15					pe_1city	Primary City	C	B	20	20		436	
16					pe_1parish	Primary Parish / County	C	B	20	20		456	
17					pe_1state	Primary State	C	B	2	2		476	
18					pe_1zip	Primary Zip Code	C	N	10	10		478	
19					pe_1phone	Primary Phone Number	C	N	15	15		488	
20					pe_1other	Primary is Home/Work/Other/Box		B	1	1		503	
21					pe_1gc	Primary Geographic Coordinates	C	C	14	24		504	
22					pe_2address	Secondary Street or Box Address		A	40	40		518	
23					pe_2city	Secondary City	C	B	20	20		558	
24					pe_2parish	Secondary Parish / County	C	B	20	20		578	
25					pe_2state	Secondary State	C	B	2	2		598	
26					pe_2zip	Secondary Zip Code	C	N	10	10		600	
27					pe_2phone	Secondary Phone Number	C	N	15	15		610	
28					pe_2other	Secondary is Home/Work/Other/Box		B	1	1		625	
29					pe_2gc	Secondary Geographic Coordinates	C	C	14	24		626	

LCGISN People DATABASE FORMAT 03-11-92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
30					pe_workphone	Work Phone Number	C	N	15	15		640	
31					pe_workfax	Fax Number	C	N	15	15		655	
32					pe_workemail	email Address at Work		A	30	30		670	
33					pe_othernum	Pager / Car Phone / Other Number	C	N	15	15		700	
34					pe_historical	Historical Information		L	6	6		715	
35					pe_parentorgan	Organization Contributing Record	√	L	40	40		721	
36					pe_updated	Date Record Last Updated	C	D	8	10		761	
												769	
35	171	114	57	342	MARC Codes	Total Not Counting MARC Codes			769	785		769	

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LCGISN People DATABASE FORMAT 03-11-92

NOTES on LCGISN PEOPLE DATABASE (or BATABASE as Randy likes to call it):				
Unique Person Link				
Last Name				
First, Middle name or initial				
Courtesy Title	Mr., Mrs, Ms, Prof ...			
Date Born	Used for cataloging			
Job Title	Might be Research Scientist - doesn't tell what person does			
Function / Duties	Might be Statistician - doesn't tell what person does it to - NSF Publishes list of Disciplines			
Areas of Interest	Might be Water Fowl - may have to code as Birds as per Authority			
	Is it possible to have these be the same as "Theme" ?			
Reason Here **10	Reason person is in the database - reasons might be:			
	LCGISN Design Team, User, Author, Cataloger, Indexer ...			
Organ.-Lowest Level Link	Solves problem of which USGS for instance			
Department / Unit				
Two addresses	One should be a mailing and one a street address			
	Naming possibilities are Home, Work, Primary, Secondary and Mailing			
	An address can be home - I think it good to specify what the address is of			
	An address could be street or PO Box			
Work Phone Number				
Fax Number				
email Address at Work				
Pager / Car Phone / Other Number				
History	IF USER: Default Loc. & Script, First logon,last logon,total time, ...			
Agency Contrib.	Here so an Agency can get copy of it's own contributed records			
Date Record Last Updated				
Removed for now but want to track		Scanned Image Link-can use number	L	
Removed for now but want to track		Permanent Location Information	A	80 80
Removed for now but want to track		Flag for or type of student	A	10 10

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LCGISN Photograph DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt.	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					ph_Link	Unique Photograph Link		A	40	40		0	
2					ph_ct_Link	Cataloger link	√	A	40	40		40	
3					ph_ct_Date	Cataloger Date	C	D	8	10		80	
4					ph_title	Title		A	256	256		88	
5					ph_author	Author/Organization/Person	√	A	256	256		344	
6					ph_publisher	Publisher	√	A	256	256		600	
7					ph_pubcontac	Publisher Contact Person	√	L	40	40		856	
8					ph_phototake	Organization Taking Photographs	√	L	40	40		896	
9					ph_orgcontac	Organization Contact Person		A	40	40		936	
10		260			ph_datestart	Date of Start (Y/M/D)	C	D	8	10		976	
11		260			ph_dateend	Date of End (Y/M/D)	C	D	8	10		984	
12					ph_series	Series Statement		A	20	20		992	
13					ph_bulkcat	Bulk Catalogs		A	20	20		1012	
14					ph_generation	Generation		A	8	8		1032	
15					ph_intentlink	Intent of Photos (link to Subjects)		A	20	20		1040	
16					ph_source1	Source 1 Statement		A	20	20		1060	
17					ph_source2	Source 2 Statement		A	20	20		1080	
18					ph_source3	Source 3 Statement		A	20	20		1100	
19					ph_accuracy	Accuracy Statement	T	A	20	20		1120	
20		255			ph_plattype	Camera Platform Type	C	I	4	7		1140	
21					ph_platname	Camera Platform Name		A	64	64		1144	
22					ph_project	Project (NHAP,NASA High Alt.)		A	64	64		1208	
23					ph_generation	Generation		A	8	8		1272	
24					ph_cloudcov	Cloud Coverage		I	4	1		1280	
25					ph_compcov	Complete Coverage	C	A	3	3		1284	
26					ph_qd_link	Link to Quad Table		L	40	40		1287	
27					ph_quadctr	Quadrangle Centered	C	A	3	3		1327	
28					ph_pctqdcov	Percent Quadrangle Covered	C	N	3	3		1330	

LCGISN Photograph DATABASE FORMAT 03-11-92												1333	
#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt.	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.		1333	?
29					ph_oblique	Oblique vs Vertical	T	A	3	3		1333	
30					ph_sensclass	Sensor Class		C	3	3		1336	
31					ph_stereo	Stereo Coverage		A	3	3		1339	
32					ph_sideover	Percentage Side Overlap		N	4	2		1342	
33					ph_fwdover	Percentage Forward Overlap		N	4	2		1346	
34					ph_numrolls	Number of Rolls	C	N	4	6		1350	
35					ph_numframe	Number of Frames	C	N	4	7		1354	
36					ph_filmtype	Film Type (Color,B&W, Color IR ...)	T	A	20	20		1358	
37					ph_camerainf	Camera Information		A	128	128		1378	
38					ph_corrinfo	Correction Information		A	128	128		1506	
39					ph_foclength	Lens Focal Length	C	N	4	2		1634	
40					ph_altitude	Altitude	C	N	4	6		1638	
41					ph_altdim	Altitude-Dimensions	C	A	3	3		1642	
42					ph_origscale	Original Scale	C	N	4	7		1645	
43		255			ph_ratioscale	Ratio Fraction	C	I	4	7		1649	
44					ph_relscale	Scale relative to Original	C	I	4	20		1653	
45					ph_ground	GROUND COORDINATES	C	L	509	509		1657	
46					ph_history	History		A	256	256		2166	
47					ph_disclaime	Disclaimer		A	256	256		2422	
48		500			ph_Notes	General Notes		A	80	80		2678	
49					ph_fr_linkr	Frame Pointer for Roll(s)	√	A	40	40		2758	
50					ph_fr_linkf	Frame Pointer for Frames	√	A	40	40		2798	
50	150	100	50	300	MARC Codes	Total Not Counting MARC Codes			2838	2867		2838	

LCGISN Photograph DATABASE FORMAT 03-11-92			
NOTES on LCGISN Photograph DATABASE:			
Unique Photograph Link			
Title	Could auto-fill from other fields w/ override		
Author	Sponsor Organization/Agency/Person -- COE		
Publisher	Where to obtain/purchase "original" ---EROS Data Center		
Publisher Contact Person			
Organ. Taking Photographs	Organization/Person Taking Photos --- AeroData (Took Pictures)		
Organization Contact Perso	Lee Barras with AeroData		
Date of Start (Y/M/D)			
Date of End (Y/M/D)			
Series Statement			
Bulk Catalogs			
Generation			
Theme 1 Statement			
Source 1 Statement			
Accuracy Statement			
Camera Platform Type	Aircraft or Satellite		
Camera Platform Name - Satellite		Skylab,	
Camera Platform Name - Aircraft		SR-71	
Flight Information	**OMITTED** Flight Direction, Heading,		
Project(NHAP,NASAHigh Al	Project Code or Mission Number ...NHAP, USGS has code		
Flight Number			
Generation	**OMITTED** Original or Copy - First Gen, Second Gen ... or Unknown		
Cloud Coverage	Percentage or APSRS Catagories -		
Complete Coverage	No holes in coverage		
Quadrangle Centered	Photograph is quad centered		
% Quadrangle Covered			
Oblique vs Vertical	**OMITTED**		
Stereo Coverage			
Percentage Side Overlap			
Percentage Forward Overlap			
Number of Rolls			
Number of Frames			

Film Type			**Color,B&W, Color IR ...**									
Camera Information			Type, Model of camera, 9"9 Format ...									
Correction Information			Corrected, Ortho Photo, ...									
Lens Focal Length			Focal length of the lens (mm?)									
Altitude - Dimensions												
Altitude												
Original Scale			(Focal Length) / (Altitude) ?? Tony Negative Size ??									
Ratio Factor												
Scale relative to Original			**???? Move to Hard Copy Info ???**									
GROUND COORDINATES												
History												
Edition Information ???												
Disclaimer												
General Notes												
Subject Headings												
Roll Frame Pointer			Frame DB Points to HardCopy which points Holdings Record(s)									
Frame Pointer			Frame DB Points to HardCopy which points Holdings Record(s)									

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LCGISN Quad DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					qd_Link	Unique Quad Link		A	40	40		0	
2					qd_ct_Link	Cataloger Link	√	A	40	40		40	
3					qd_ct_Date	Cataloged Date	C	D	8	10		80	
4					qd_Type	Map Type (7.5',15'1-100,...)	T	A	4	4		88	
5					qd_Stmt	Series Statement		A	20	20		92	
6					qd_usgsnum	USGS Quad Identifier	C	A	10	10		112	
7					qd_usgscatnu	USGS Catalog Number	C	A	20	20		122	
8					qd_stdname	Standard Quad Name	C	A	40	40		142	
9		052			qd_LaDOTD	La DOTD Quad Number	C	A	5	5		182	
10		052			qd_DNRmonik	DNR Quad Moniker	C	A	5	5		187	
11		052			qd_Border_E	Border Quad - East	C	A	5	5		192	
12		052			qd_Border_SE	Border Quad - South East	C	A	5	5		197	
13		052			qd_Border_S	Border Quad - South	C	A	5	5		202	
14		052			qd_Border_SW	Border Quad - South West	C	A	5	5		207	
15		052			qd_Border_W	Border Quad - West	C	A	5	5		212	
16		052			qd_Border_NW	Border Quad - North West	C	A	5	5		217	
17		052			qd_Border_N	Border Quad - North	C	A	5	5		222	
18		052			qd_Border_NE	Border Quad - North East	C	A	5	5		227	
19					qd_mbrwx	Western-most X Location	C	N	8	16		232	
20					qd_mbrex	Eastern-most X Location	C	N	8	16		240	
21					qd_mbrny	Northern-most Y Location	C	N	8	16		248	
22					qd_mbrsy	Southern-most Y Location	C	N	8	16		256	
23		052			qd_Othergeo	Other Geographic reference	C	A	20	20		264	
24					qd_Parishes	Parishes to which Quad belongs	C	A	64	64		284	
25					qd_smaller	Smaller Quads in this Ref. Quad	C	A	64	64		348	
26					qd_smaller2	Smaller Quads in this Ref. Quad	C	A	64	64		412	
27					qd_smaller3	Smaller Quads in this Ref. Quad	C	A	64	64		476	
28					qd_smaller4	Smaller Quads in this Ref. Quad	C	A	64	64		540	
27		255			qd_larger	Larger Quad this Quad is in	C	A	16	16		604	
28					qd_larger2	Larger Quad this Quad is in	C	A	16	16		620	
29						GROUND COORDINATES	C	L	509	509		636	
30		500			qd_Notes	General Notes	C	A	230	230		1145	
31		650			qd_Subject	Subject Headings		A	80	80		1375	
31	93	62	31	186	MARC Codes	Total Not Counting MARC Codes			1455	1489		#REF!	

LCGISN Quad DATABASE FORMAT 03-11-92														
NOTES on LCGISN Quad DATABASE:														
			Do we want Lat/Lon, State Plane & UTM Coordinates ????											
Unique Quad Link														
USGS Quad Number														
La DOTD Quad Number														
DNR Quad Moniker														
Border Quad - East														
Border Quad - South East														
Border Quad - South														
Border Quad - South West														
Border Quad - West														
Border Quad - North West														
Border Quad - North														
Border Quad - North East														
Other Geographic reference														
Parishes to which Quad belongs														
Smaller Quads in this Ref. Quad			For two series											
Smaller Quads in this Ref. Quad			For two series											
Larger Quad this Quad is in			For two series											
Larger Quad this Quad is in			For two series											
GROUND COORDINATES														
General Notes														
Subject Headings														

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LCGISN Raster Holdings DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					rh_Link	Unique Raster Holdings Link		A	40	40		0	
2					rh_ct_link	Cataloger Link	√	A	40	40		40	
3					rh_ct_date	Cataloger Date	C	D	8	8		80	
4					rh_organiz	Organization Link	√	A	40	40		88	
5					rh_available	Item Availablity		A	40	40		128	
6					rh_location	Item Location		A	40	40		168	
7					rh_salestatus	Item Sale Status		A	4	12		208	
8					rh_itemcost	Item Cost	C	$	4	7	2	212	
9					rh_rs_link	Link Back to Raster Record	√	L	40	40		216	
10					rh_filesize	Filesize	C	N	4	8		256	
11					rh_compress	Compressed ? / Method	T	A	10	10		260	
12					rh_backedup	Backed up Info.		A	64	64		270	
12	36	24	12	72	MARC Codes	Total Not Counting MARC Codes			334	349		334	

LCGISN Raster Holdings DATABASE FORMAT 03-11-92

NOTES on LCGISN Raster Holdings DATABASE:

Unique Raster Holdings Link

Cataloger Link	Link to person doing cataloging	
Cataloger Date	Date item was cataloged	
Organization Link	Link to Organization	
Item Availability	For Sale, Prioritary, In Progress, Loaned out	
Item Location	Split this into several fields ?????	
Item Sale Status	Describes conditions for sale of item	
Item Cost	Cost of the item	
Link Back to Raster Record	Link to raster record	
Filesize	Filesize in bytes	
Compressed ? / Method	Whether file is compressed and how if it is	
Backed Up Info	Backed up Info.	

LCGISN Raster DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					rs_Link	Unique Raster Link		L	40	40		0	
2					rs_ct_link	Cataloger Link	√	A	40	40		40	
3					rs_ct_date	Individual Completing Worksheet	C	D	8	10		80	
4					rs_rasterized	Rasterized from Vector	C	Y/N	1	1		88	
5		300			rs_NumPolys	Vector: Number of Polygons	C	I	4	7		89	
6					rs_NumLines	Vector: Number of Lines	C	I	4	7		93	
7					rs_NumPoint	Vector: Number of Points	C	I	4	7		97	
8					rs_NumBits	Vector: Number Bits per Coordina	C	I	4	2		101	
9					rs_header	Header / Description		A	256	256		105	
10					rs_extent	Extent of Item		A	128	128		361	
11					rs_material	Material		A	32	32		489	
12					rs_filesize	Filesize in Bytes	C	I	4	7		521	
13					rs_NumBands	Number of Bands	C	I	4	6		525	
14					rs_NumRows	Number of Rows	C	I	4	6		529	
15					rs_NumCols	Number of Columns	C	I	4	6		533	
16					rs_NumBits	Number of Bits/Pixel	C	I	4	2		537	
17					rs_PixSize	Pixel Size - X	C	I	4	2		541	
18					rs_PixSize	Pixel Size - Y	C	I	4	2		545	
19					rs_ReSamp	Re-sampled	C	I	4	2		549	
20					rs_Classified	Classified	C	A	20	20		553	
21					rs_numclass	Number of Classes	C	I	4	4		573	
22					rs_ClassMeth	Classification Method		A	20	20		577	
23					rs_vendor	Vendor Format	T	A	20	20		597	
24		255			rs_type	Type (Lan,Gis,Grd,Cot)	T	A	20	20		617	
25					rs_pixel	Pixel Type(Disc,Cont,Dicot)	T	A	20	20		637	
26		500			rs_Notes	General Notes		A	80	80		657	
27					rs_inprog	Work in Progress		Y/N	1	1		737	
28		650			rs_Subject	Subject Headings		A	80	80		738	
29					rs_mp_link	Link Back to Map	√	L	40	40		818	
30					rs_im_link	Link Back to Imagery	√	L	40	40		858	
31					rs_ph_link	Link Back to Photograph	√	L	40	40		898	
32					rs_rs_link	Link to Raster Holdings	√	A	40	40		938	
32	96	64	32	192	MARC Codes	Total Not Counting MARC Codes			978	988		978	

LCGISN Raster DATABASE FORMAT 03-11-92	
NOTES on LCGISN Raster DATABASE:	
Rasterized from Vector	
Vector: Number of Polygons	Matt didn't like this
Vector: Number of Lines	Matt didn't like this
Vector: Number of Points	Matt didn't like this
Vector: Number Bits per Coordinat	Matt didn't like this
Header / Description	
Extent of Item	Aerial Photo, Photo Mosiac(Controlled or UnCont.), Photomap, Other
Material	Paper, Digital Tape, Disk, Transparency, Glass
Filesize	Filesize in bytes
Number of Bands	Number of Bands
Number of Rows	Number of Rows
Number of Columns	Number of Columns
Number of Bits/Pixel	Number of Bits/Pixel
Pixel Size - X	Pixel Size - X
Pixel Size - Y	Pixel Size - Y
Re-sampled	Information if the raster file has been re-sampled to a new pixel size
Classified	Used to indicate the raster file has been classified
Number of Classes	Number of classes ifg classified file
Classification Method	Classification method information
Vendor Format	TIFF,GIF,PCX,Raw,ERDAS,Intergraph,Grass,ELAS,EROS,PICT
Type	Lan, Gis, Grd, Cot
Pixel Type	Dichotomus, Discrete, Continuous, 3D, 2 1/2 D
General Notes	
Work In Progress	
Subject Headings	
Link to Raster Holdings	
??? Do we want Datum, Ellipsoid & Projection as In Hard Copy ???	

LCGISN Terminal DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INtr_ LEN.	EXtr_ LEN.	# DEC	OFF SET	?
1					tr_LInk	Unique Terminal LInk		L	40	40		0	
2					tr_ct_link	Cataloger link	√	A	40	40		40	
3					tr_ct_date	Cataloged Date	C	A	8	10		80	
4					tr_Terminal	Terminal		B	30	30		88	
5					tr_Manufacturer	Manufacturer		A	30	30		118	
6					tr_Lookalike	Look alike / Compatability		A	30	30		148	
7					tr_Model	Model Number		A	30	30		178	
8					tr_Color	Color/Black & White		A	30	30		208	
9					tr_Emulator	Emulators		A	30	30		238	
10					tr_Baud	Baud	T	A	30	30		268	
11					tr_Parity	Parity	T	A	4	4		298	
12					tr_Bits	# Bits	T	N	4	1		302	
13					tr_Stop	# Stop Bits	T	N	4	1		306	
14					tr_Duplex	Half / Full Duplex	T	A	4	4		310	
15					tr_Network	Network Information		A	30	30		314	
15	45	30	15	90	MARC Codes	Total Not Counting MARC Codes			344	340		344	

LCGISN Terminal DATABASE FORMAT 03-11-92

NOTES on LCGISN Terminal DATABASE :

Terminal	Terminal
Manufacturer	Manufacturer
Look alike / Compatability	Look alike / Compatability
Model Number	Model Number
Color/Black & White	Color/Black & White
Emulators	Emulators
Baud	Baud
Parity	Parity
# Bits	# Bits
# Stop Bits	# Stop Bits
Half / Full Duplex	Half / Full Duplex
Network	Network Information

LCGISN USER DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION		FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					ur_llink	Unique User Link		L	40	40		0	
2					ur_ct_link	Cataloger link	√	A	40	40		40	
3					ur_ct_date	Cataloged Date	C	A	8	10		80	
4					ur_pe_link	Person Link		L	40	40		88	
5					ur_firstname	First Name , Middle name or initial		B	20	20		128	
6					ur_title	Courtesy Title		A	5	5		148	
7					ur_or_link	Organization - Link to Lowest Level	√	L	40	40		153	
8					ur_billtoa	Bill To Street or Box Address		A	40	40		193	
9					ur_billtoc	Bill To City		B	20	20		233	
10					ur_billtop	Bill To Parish / County	T	B	20	20		253	
11					ur_billtos	Bill To State	T	B	2	2		273	
12					ur_billtoz	Bill To Zip Code	C	N	10	10		275	
13					ur_billtot	Bill To Telephone Number	C	N	15	15		285	
14					ur_billtof	Bill To Fax Number	C	N	15	15		300	
15					ur_billtoatn	Bill To Person of ATTN		A	40	40		315	
16					ur_coord	Primary Geographic Coordinates	C	C	14	24		355	
17					ur_history	Historical Information		L	6	6		369	
18					ur_logon1	Date First Logged On	C	D	8	10		375	
19					ur_logonlast	Date of Last Logon	C	D	8	10		383	
20					ur_defloc	Default Location		L	16	16		391	
21					ur_defterm	Default Terminal	T	A	16	16		407	
22					ur_defsoft	Default Software	T	A	32	32		423	
23					ur_defscript	Default Script		A	128	128		455	
24					ur_lastloc	Last Location		L	16	16		583	
25					ur_lastterm	Last Terminal	T	A	16	16		599	
26					ur_lastsoft	Last Software	T	A	32	32		615	
27					ur_lastscript	Last Script		A	128	128		647	
28					ur_envinfo	Environmental Information		A	128	128		775	
29					ur_tottime	Total time Used	C	N	4	6		903	
30					ur_totsessions	Total Sessions	C	N	4	6		907	
31					ur_curbill	Current Billable Time	C	N	4	6		911	
32					ur_cursessions	Current Billable Number of Sessions	C	N	4	6		915	
33					ur_dateenter	Date Record Entered	C	D	8	10		919	
34					ur_dateupdate	Date Record Last Updated	C	D	8	10		927	
35					ur_termlink	Terminal Link	T	L	30	30		935	
35	138	92	46	276	MARC Codes	Total Not Counting MARC Codes			965	993		965	

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LCGISN USER DATABASE FORMAT 03-11-92

NOTES on LCGISN USER DATABASE	
Unique User Link	
Person Link	User will be in the Organization/Person Table
First , Middle name or Initial	
Courtesy Title	Mr., Mrs, Ms, Prof ...
Organ. - Link to Lowest Level	Includes Department/Sub-Department/Unit ...
Bill To Stuff	
Historical Information	IF USER: Default Loc. & Script, First logon,last logon,total time, ...
Date First Logged On	
Date of Last Logon	
Default Location	
Default Terminal	
Default Software	
Default Script	
Last Location	
Last Terminal	
Last Software	
Last Script	
Environmental Information	
Total time Used	
Total Sessions	
Current Billable Time	
Current Billable Number of Sessions	
Date Record Entered	
Date Record Last Updated	
Terminal Link	

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LCGISN Vector Holdings DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					vh_link	Unique Vector Holdings Link		A	40	40		0	
2					vh_ct_link	Cataloger Link	√	A	40	40		40	
3					vh_ct_date	Cataloger Date	C	D	8	8		80	
4					vh_location	Location Link	√	A	40	40		88	
5					vh_available	Item Availablity		A	40	40		128	
6					vh_location	Item Location		A	40	40		168	
7					vh_salestat	Item Sale Status		A	4	12		208	
8					vh_cost	Item Cost	C	$	4	7	2	212	
9					vh_vc_link	Link Back to Vector Record	√	L	40	40		216	
10					vh_backedup	Backed up Info.	√	A	64	64		256	
10	30	20	10	60	MARC Codes	Total Not Counting MARC Codes			320	331		320	

LCGISN Vector Holdings DATABASE FORMAT 03-11-92

NOTES on LCGISN Vector Holdings DATABASE:

Unique Vector Holdings Link

Cataloger Link

Cataloger Date

Organization Link

Item Availability

Item Location

Item Sale Status

Item Cost

Link Back to Vector Record

Backed Up Info

LCGISN Vector DATABASE FORMAT 03-11-92

3/25/92

#	MARC Field Tag	MARC First Indic.	MARC Sub-Field	MARC Man/Req Opt/Imp	FIELD NAME	FIELD DESCRIPTION	A R	FIELD FMT	INT. LEN.	EXT. LEN.	# DEC	OFF SET	?
1					vc_link	Unique Vector Link		A	40	40		0	
2					vc_ct_link	Cataloger Link	√	A	40	40		40	
3					vc_ct_date	Cataloger Date	C	D	8	10		80	
4					vc_	Vector Type (poly,line...	C	A	4	4		88	
5						Vectorized from Raster	C	A	3	3		92	
6					vc_NumPolys	Vector: Number of Polygons	C	N	4	7		95	
7					vc_NumLines	Vector: Number of Lines	C	N	4	7		99	
8					vc_NumPoint	Vector: Number of Points	C	N	4	7		103	
9					vc_NumBits	Vector: Number Bits per Coordina	C	N	4	7		107	
10					vc_scale	Source Scale		A	4	4		111	
11					vc_filesize	File Size	C	I	4	7		115	
12					vc_resolution	Units of Resolution, Precision	C	I	4	20		119	
13					vc_vendor	Vendor Format	C	I	4	20		123	
14					vc_dbattach	Data Base Attached		A	64	64		127	
15					vc_structure	Data Structure		I	4	20		191	
16		500			vc_notes	General Notes		A	80	80		195	
17					vc_progress	Work in Progress		Y/N	1	1		275	
18		650			vc_subject	Subject Headings		A	80	80		276	
19					vc_mp_link	Link Back to Map	√	L	40	40		356	
20					vc_im_link	Link Back to Imagery	√	L	40	40		396	
21					vc_ph_link	Link Back to Photograph	√	L	40	40		436	
22					vc_vh_link	Link to Vector Holdings	√	A	40	40		476	
22	66	44	22	132	MARC Codes	Total Not Counting MARC Codes			516	581		516	

LCGISN Vector DATABASE FORMAT 03-11-92	
NOTES on LCGISN VECTOR DATABASE:	
Unique Vector Link	
Vector Type	Polygon, Line and/or Point, network, 2D, 2 1/2 D, 3D, Tin ...
Vectorized from Raster	
Vector: Number of Polygons	
Vector: Number of Lines	
Vector: Number of Points	
Vector: # Bits per Coordinate	
Source Scale	Scale of map from which was obtained
File Size	In bytes
Units of Resolution	Precision - Number of decimal places
Vendor Format	DXF,DLG,ICES,MOSS32,InFoCAD,ICES,Arc/Info,DIME,TIGER,ETAK,Intergraph,InFoCAD
Dasa Base Attached	File name of Attached Database - blank if none
Data Structure	Shape, Arc/Node, Point-Dict
General Notes	
Work In Progress	
Subject Headings	
Link Back to Map	
Link Back to Imagery	
Link Back to Photograph	
Link to Hard Copy Holdings	