

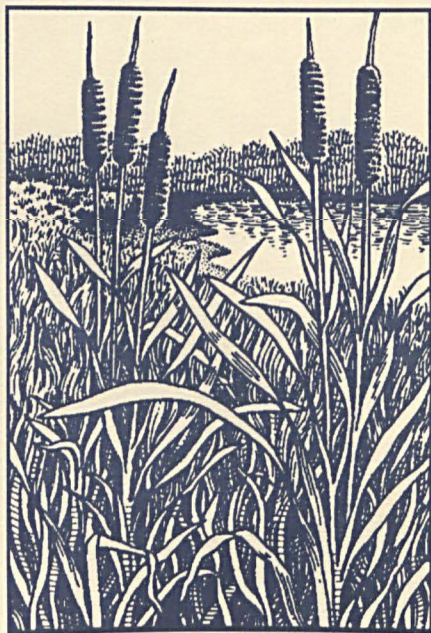
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Wetlands Research Program Technical Report WRP-SM-13

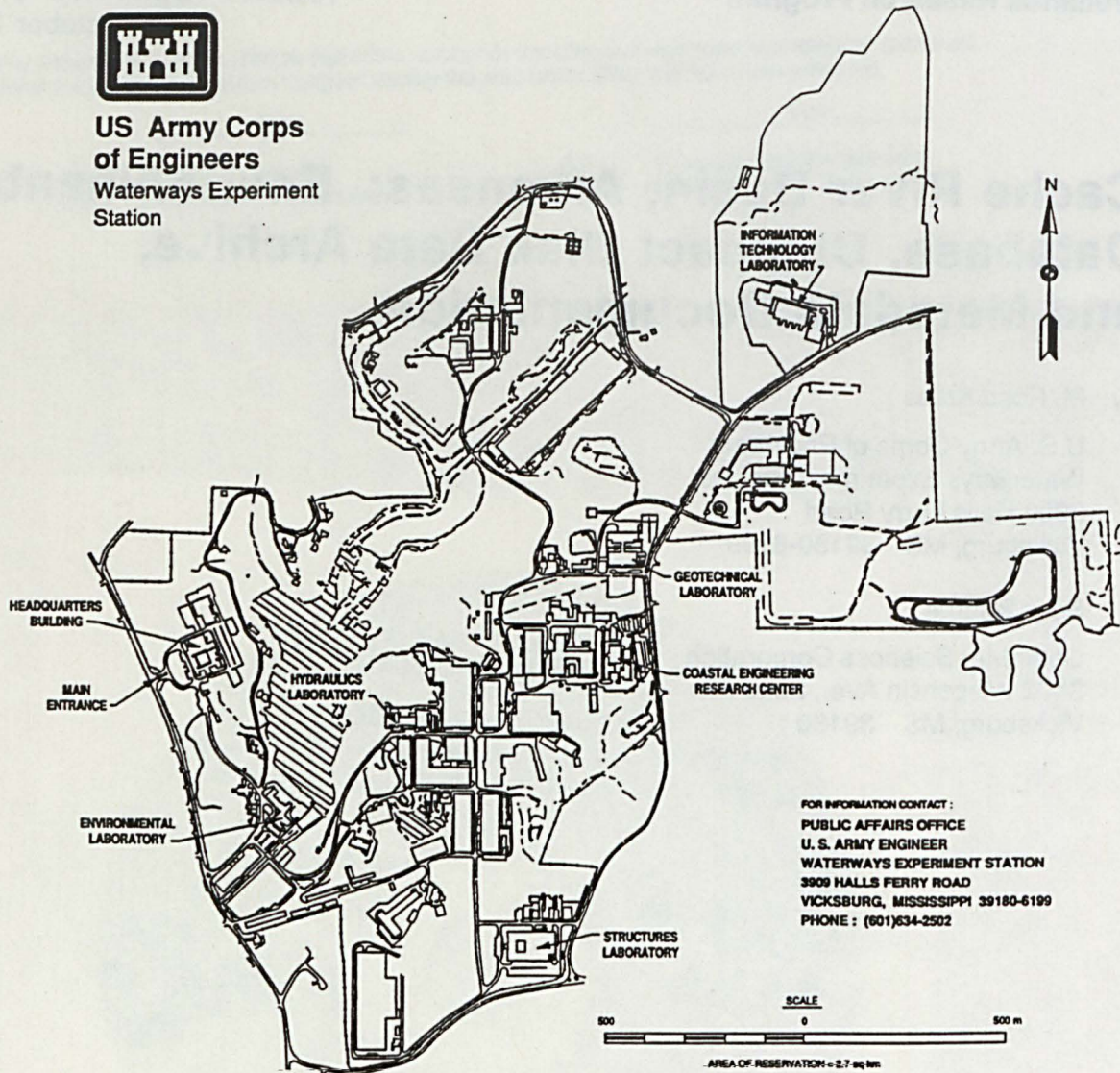
Cache River Basin, Arkansas: Environmental Database, Compact Disk Data Archive, and Metadata Documentation

by Rose Kress, Scott Bourne





**US Army Corps
of Engineers**
Waterways Experiment
Station



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Wetland Database

Cache River Basin, Arkansas: Environmental Database, Compact Disk Data Archive, and Metadata Documentation (TR WRP-SM-13)

ISSUE:

The Cache River environmental database serves two fundamental purposes. The database serves as a source of organized documented spatial and nonspatial data for scientific characterization of a forested wetland. It also serves as a long-term data archive.

RESEARCH:

A prototype database was developed for the Cache river watershed to monitor changes in the wetland environment and to catalog data collected by other researchers. Scientific research deals with technical issues of database documentation standards, storage formats, and new transfer regulations.

SUMMARY:

The Cache River comprehensive database will aid in future research conducted in the

Cache River forested wetland and associated watershed. All spatial and nonspatial data are available on CD-ROM.

AVAILABILITY OF REPORT:

This report is available on Interlibrary Loan Service from the U.S. Army Engineer Waterways Experiment Station (WES) Library, 3909 Halls Ferry Road, Vicksburg, MS 39180-6199, telephone (601) 634-2355.

To purchase a copy, call the National Technical Information Service (NTIS) at (703) 487-4650. For help in identifying a title for sale, call (703) 487-4780.

NTIS report numbers may also be requested from the WES librarians.

About the Authors:

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¹ A CD-ROM containing the Cache River Environmental Database/Archive is included with this report.

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Preface

The work described in this report was authorized by Headquarters, U.S. Army Corps of Engineers (HQUSACE), as part of the Stewardship and Management Task Area of the Wetlands Research Program (WRP). The work was performed under Work Unit 32763, Automated Analysis and Display of Information Bases for Wetland Systems, for which Dr. M. Rose Kress, U.S. Army Engineer Waterways Experiment Station (WES), was the Principal Investigator. Dr. William L. Klesch (CECW-PO) was the WRP Technical Monitor for this work.

Mr. David Mathis (CERD-C) was the WRP Coordinator at the Directorate of Research and Development, HQUSACE; Dr. Klesch served as the WRP Technical Monitor's Representative; Dr. Russell F. Theriot, WES, was the WRP Program Manager. Mr. Chester O. Martin, WES, was the Task Area Manager.

Mr. Mark Graves, Environmental Laboratory (EL), WES, contributed substantially to development of the geospatial data and the metadata documentation. This report was written by Dr. Kress, Environmental Characterization Branch (ECB), Natural Resources Division (NRD), EL, and Mr. Scott Bourne, Computer Sciences Corporation (CSC), under the direct supervision of Mr. Harold W. West, Chief, ECB; Dr. Robert Engler, Chief, NRD; and under the general supervision of Dr. Edward Theriot, Acting Assistant Director, EL, and Dr. John Keeley, Director, EL.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Bruce K. Howard, EN.

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Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI units as follows:

Multiply	By	To Obtain
feet	0.3048	meters

1 Introduction

Background

Scientific research and investigations of the Cache River, Arkansas, bottomland hardwood forested wetland and the associated watershed have generated a wide variety of environmental data. Field measurements, laboratory data, numerical modeling output, maps, and digital images from satellites are some of the types of data used to characterize and understand the Cache River wetland system.

As part of the U.S. Army Corps of Engineers' Wetlands Research Program (WRP), the U.S. Army Engineer Waterways Experiment Station (WES) investigated methods for compiling, organizing, storing, and accessing this diverse set of environmental data. The objective of the investigation was to design a digital database suitable for numerical and spatial analysis of a wetlands system. The database was also to serve as an archive for data collected during the WRP. The research addressed technical issues of database design, storage formats, documentation, data standards, and data transfer. A prototype database was developed for the Cache River watershed in eastern Arkansas (Figure 1).¹ The database is archived on compact disc - read only memory, CD-ROM and is included with this report.

The Cache River environmental database serves two primary functions: as a source of organized documented spatial and nonspatial data for scientific investigations and as a long-term data archive. Some of the requirements needed to fulfill these functions are listed below:

- a. Accommodate data from a variety of sources and measurement techniques.
- b. Provide easy access and retrieval.
- c. Be hardware and software independent.

¹ A table of factors for converting non-SI units of measurement to SI units is presented on page viii.

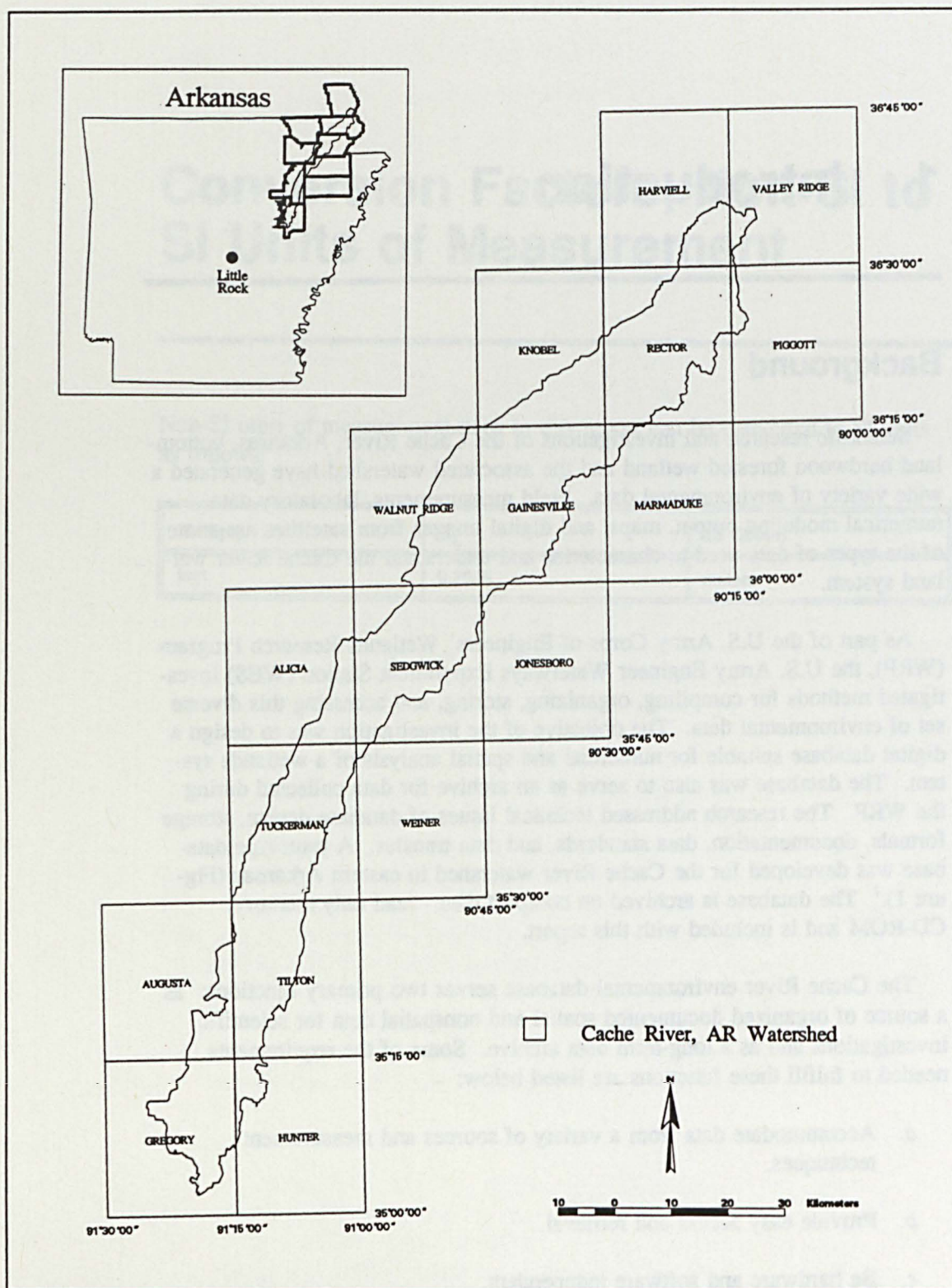


Figure 1. Location and geographic extent of the WRP Cache River wetland environmental database (Grids represent 15- by 15-min blocks used to subset large files for the data archive)

- d. Be usable by DOS-based personal computers with access to a CD-ROM reader.
- e. Comply with applicable Federal regulations and standards.
- f. Use consistent documentation.
- g. Allow for vector, raster, and tabular data.
- h. Allow for spatial and nonspatial data.

Purpose

This report provides a general description of the WRP Cache River environmental database and sufficient information for data retrieval. Detailed documentation of individual data files is provided on the CD-ROM. All documentation presented in this report is also contained on the CD-ROM.

2 Environmental Database Design

Database design criteria were developed into five categories:

- a.* Organization.
- b.* File formats.
- c.* Retrieval protocol.
- d.* Standards compliance.
- e.* Documentation.

These criteria are interdependent and were developed in parallel. Each is discussed below.

Organization

The Cache River database consists of a large number of individual files in various formats. The three criteria selected for organization of the Cache River data are environmental topic (subject or theme), geographic extent, and file format. These three criteria were applied in the order listed to develop the directory structure for file storage.

The basic organization of the Cache River Wetland Environmental Database is shown in Figure 2. This figure also shows the general content of the database. An hierarchical directory structure is used to organize data around environmental categories (e.g., topography, vegetation). For large files, a further subdivision based on geographic extent was used to store data in files small enough to be easily handled by a personal computer. These geographic subdivisions correspond to the boundaries of the U.S. Geological Society (USGS) 1:62,500 topographic maps as shown in Figure 1 and are reflected in sub-directories with the same name. Some data are stored in more than one format, and additional directories are used for this purpose. For example, the

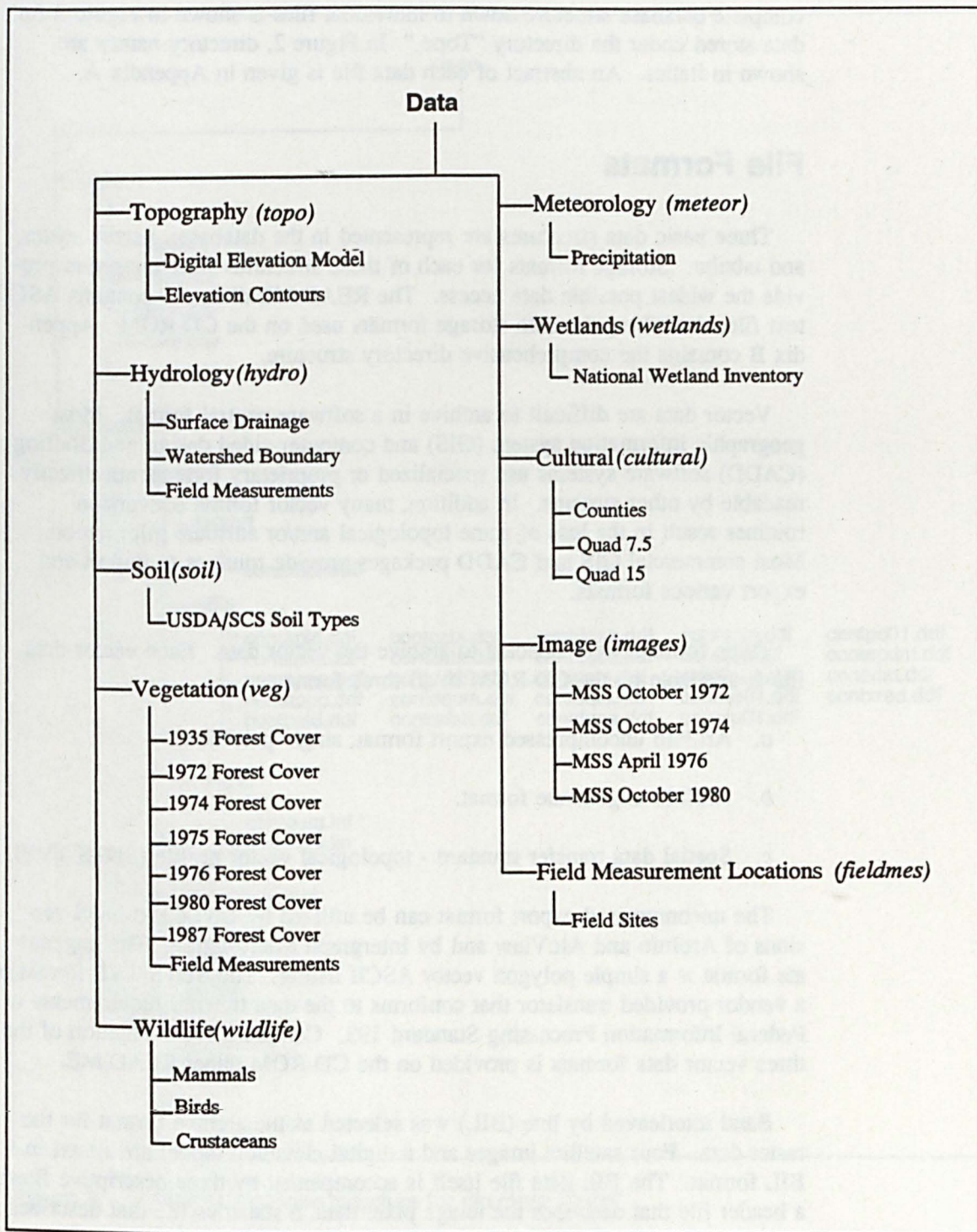


Figure 2. Basic directory structure and general content of the WRP Cache River wetland environmental database

complete database structure down to individual files is shown in Figure 3 for data stored under the directory "Topo." In Figure 2, directory names are shown in *italics*. An abstract of each data file is given in Appendix A.

File Formats

Three basic data structures are represented in the database: vector, raster, and tabular. Storage formats for each of these structures were chosen to provide the widest possible data access. The READ.ME directory contains ASCII text files describing the data storage formats used on the CD-ROM. Appendix B contains the comprehensive directory structure.

Vector data are difficult to archive in a software-neutral format. Most geographic information system (GIS) and computer-aided design and drafting (CADD) software systems use specialized or proprietary formats not directly readable by other systems. In addition, many vector format conversion routines result in the loss of some topological and/or attribute information. Most commercial GIS and CADD packages provide routines to import and export various formats.

Three formats were selected to archive the vector data. Each vector data file is available on the CD-ROM in all three formats:

- a. ArcInfo uncompressed export format, single precision.
- b. ArcInfo ungenerate format.
- c. Spatial data transfer standard - topological vector profile (SDTS-TVP).

The uncompressed export format can be utilized by UNIX and DOS versions of ArcInfo and ArcView and by Intergraph Microstation. The ungenerate format is a simple polygon vector ASCII listing. The SDTS-TVP format is a vendor-provided translator that conforms to the data transfer requirements of Federal Information Processing Standard 193. Complete documentation of the three vector data formats is provided on the CD-ROM under READ.ME.

Band interleaved by line (BIL) was selected as the archive format for the raster data. Four satellite images and a digital elevation model are stored in BIL format. The BIL data file itself is accompanied by three descriptive files: a header file that describes the image pixel data, a statistics file that describes the image statistics for each band, and a coordinate file that describes the image coordinate system and pixel cell size.

Tabular data are stored in row major, comma delimited ASCII format. Tabular data include field measurements and observations, results of laboratory tests, and numerical model output. They were collected or generated by various scientists using established and/or experimental methods. The row major,

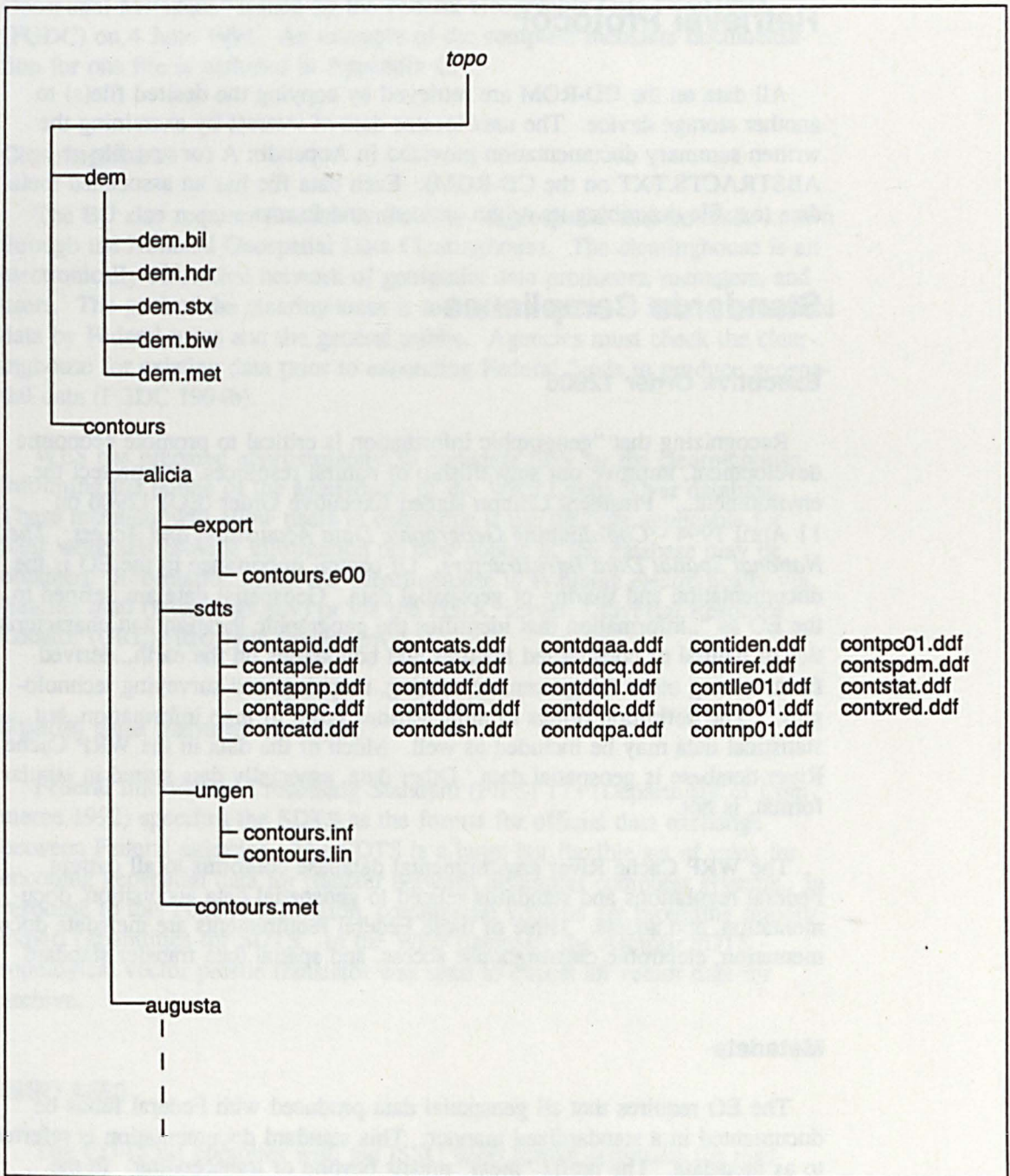


Figure 3. Detail of database structure for directory "Topo"

comma delimited ASCII format is a simple, portable format that can be imported by most commercially available statistical, spreadsheet, database, and graphic software packages.

All narrative information such as READ.ME files is stored as ASCII text.

Retrieval Protocol

All data on the CD-ROM are retrieved by copying the desired file(s) to another storage device. The user locates data of interest by examining the written summary documentation provided in Appendix A (or text file ABSTRACTS.TXT on the CD-ROM). Each data file has an associated meta-data text file describing its origin, content, and format.

Standards Compliance

Executive Order 12906

Recognizing that "geographic information is critical to promote economic development, improve our stewardship of natural resources, and protect the environment..." President Clinton signed Executive Order (EO) 12906 on 11 April 1994 - *Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure*. Of central importance in the EO is the documentation and sharing of geospatial data. Geospatial data are defined in the EO as "...information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth...derived from, among other things, remote sensing, mapping, and surveying technologies." The definition brings to mind various types of map information, but statistical data may be included as well. Much of the data in the WRP Cache River database is geospatial data. Other data, especially data stored in tabular format, is not.

The WRP Cache River environmental database conforms to all current Federal regulations and standards related to geospatial data acquisition, documentation, and access. Three of these Federal requirements are metadata documentation, electronic clearinghouse access, and spatial data transfer standard.

Metadata

The EO requires that all geospatial data produced with Federal funds be documented in a standardized manner. This standard documentation is referred to as metadata. The prefix "meta" means beyond or transcending. In the current context, "metadata" are supporting information used to document important characteristics of a file and the data contained in the file. Metadata document the content, quality, condition, and source of the geospatial data. They document who, how, when, and sometimes why the data were collected or produced.

In the WRP Cache River database, every data file has an associated metadata file. These files are identified by a .met extension and are stored in the same directory location as the data they support. The metadata are stored as ASCII text and follow guidance found in "Content Standards for Digital

Geospatial Metadata," issued by the Federal Geographic Data Committee (FGDC) on 4 June 1994. An example of the complete metadata documentation for one file is included in Appendix C.

Clearinghouse

The EO also requires that the availability of geospatial data be made known through the National Geospatial Data Clearinghouse. The clearinghouse is an electronically connected network of geospatial data producers, managers, and users. The goal of the clearinghouse is to improve access to Federal geospatial data by Federal users and the general public. Agencies must check the clearinghouse for existing data prior to expending Federal funds to produce geospatial data (FGDC 1994b).

WES has prepared approximately 30 metadata files for the clearinghouse informing the public of the availability of the WRP Cache River database. These metadata will allow users to determine if the data are applicable for their work and provide information on how copies of the database may be obtained. Information about the Clearinghouse is available electronically via Internet mail (gdc@usgs.gov) or via the FGDC server, Universal Resource Locator (URL) (<ftp://fgdc.er.usgs.gov/>).

Spatial data transfer standard

Federal Information Processing Standard (FIPS) 173 (Department of Commerce 1992) specifies the SDTS as the format for official data exchange between Federal agencies. The SDTS is a large but flexible set of rules for encoding geospatial data for transfer between dissimilar computer systems. In response to this Federal regulation, commercial vendors are providing import/export capabilities for SDTS. In the WRP database, the ArcInfo SDTS - topological vector profile translator was used to export all vector data for archive.

ISSO 9660

The CD-ROM complies with the ISSO 9660 format standards for read-only-memory compact discs.

Documentation

Complete written documentation of scientific data is common professional practice. Digital databases require extra care to ensure the required documentation is easily available and not overlooked or lost by the recipient. The term "metadata" is used to refer to the documentation describing the content, origin,

and format of a digital data file. An example geospatial metadata file is given in Appendix C.

The metadata content standards issued by the FGDC were not intended to apply to tabular data. WES, however, developed metadata files for tabular data in the Cache database. These files follow the style and content of the geospatial metadata whenever possible. An example tabular metadata file is given in Appendix D.

3 Database Content

The content reflects the data collected during various scientific studies in the Cache River watershed. The data included in each top level directory shown in Figure 2 are discussed below.

Topography

The database contains two representations of topography in the Cache River watershed: elevation contours in vector format and a digital elevation model (DEM) in raster format.

The contour lines from USGS 1:24,000-scale topographic maps were manually digitized for the southern half of the Cache River watershed. Contour lines are an excellent way of depicting elevation changes on maps, and they are easy to interpret by visual inspection. These contour lines are often the only source of elevation information for the geographic area.

Contour lines are often difficult to use directly in numerical modeling. For modeling, an interpolation algorithm is used to fit a surface to the contour line data. This surface more fully represents the topographic elevation surface in the wetland. A DEM was developed for the southern half of the Cache River watershed. The DEM is stored in a raster format using a 20-m grid cell size.

Hydrology

Data are included in the database to describe the hydrology of the area. The spatial data are the watershed boundary and the surface drainage features (streams, lakes, etc.). The watershed boundary was interpreted from drainage patterns and topography as shown on USGS 1:24,000-scale topographic maps. The surface drainage features were manually digitized from the same maps.

Two types of tabular data related to hydrology are included in the database: daily river stage readings from two gauges, and weekly water quality characterizations from two sites.

Soils

Data describing surface soils in the Cache River watershed were obtained from U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) soil survey reports for five Arkansas counties: Woodruff (Maxwell et al. 1968), Jackson (Gore 1974), Craighead (Ferguson 1979), Poinsett (Gray and Ferguson 1977), and Lawrence (Gore, Brown, and Fielder 1978). The mapping units used in these soil survey reports represent the soil classification system adopted by the National Cooperative Soil Survey (SCS 1960). Each soil survey report contains a set of uncontrolled, black and white photomosaics (approximate scale 1:20,000) upon which the soil units are delineated and labeled. Soil unit boundaries were manually digitized from these photomosaics and coregistered with other spatial data in the database.

The soil survey reports also provide information on the physical and engineering properties of soils and the soils suitability of a variety of uses. A subset of this information was included in the database as descriptive information and is defined in the respective metadata files.

The list of hydric soils of the United States was obtained from the USDA (USDA 1991). Each soil series in the Cache River watershed database was designated as either hydric or nonhydric as determined from this publication.

Vegetation

Extensive field measurements characterizing vegetation in the Cache River bottomland hardwood forest are included in the database. These data are stored in tabular format. The data quantify the ground cover, subcanopy, and canopy characteristics. The geographic coordinates of the field sample sites are included in the metadata.

Data documenting the extent of forest cover in the watershed over time are also included. These are spatial data stored in vector format. Seven dates of forest cover from 1935 to 1987 are represented. These forest cover data were developed from various sources, and each is documented in the appropriate metadata file.

Wildlife

Data characterizing the wildlife of the Cache River watershed are included. Data pertaining to mammals, reptiles, birds, and crustaceans are included. The geographic coordinates of the field data collection sites are included in the metadata.

Meteorology

Daily precipitation measured at four sites within and near the watershed are included. These data are stored in tabular format. The locations of the precipitation gauges are included in the metadata.

Wetlands

National Wetland Inventory (NWI) data were acquired from the U.S. Fish and Wildlife Service (USFWS) in the form of 1:24,000-scale maps on mylar media. The wetland polygons and linear wetland features depicted on these maps were manually digitized. The complete NWI classification for each wetland feature is included in the database.

Cultural

Four relevant boundary files are included:

- a.* State boundaries.
- b.* County boundaries.
- c.* 15- by 15-min topographic map boundaries.
- d.* 7.5- by 7.5-min topographic map boundaries.

Satellite Images

Four satellite images covering the southern half of the watershed are included. They are data collected by the multispectral scanner (MSS) on board the Landsat satellites. The collection dates of the four images are October 1972, October 1974, April 1976, and October 1980. They have been georeferenced to align properly with the other spatial data. These data are not copyrighted.

Field Measurement Locations

The location of field sample sites are included in several places and formats. They are included as spatial data identifying the location of stream gauges, rainfall gauges, groundwater well locations, and transects. The x,y coordinates of field sample sites are also included in the appropriate metadata files.

4 Summary

As part of the Corps of Engineers' Wetlands Research Program, methods for compiling, organizing, storing, and accessing digital wetland environmental databases were investigated. These investigations addressed technical issues of database design, storage formats, documentation, archive requirements, and electronic data transfer. A prototype database was developed for a portion of the Cache River watershed in eastern Arkansas. The database is archived on CD-ROM and distributed with this report. The WRP Cache River database is one of the first Department of Defense environmental databases to conform to several new Federal regulations and standards addressing geographic data acquisition, storage, and access.

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Appendix A

Geospatial Data File Abstracts

This appendix includes an abstract of each geospatial file in the archive. The abstracts are arranged by the directory structure given in Figure 2. Directory names are in bold print and file names are underlined.

topo

dem

This file contains a raster representation of the topographic elevation within the Cache River, Arkansas, watershed as interpolated from 10-ft interval contour lines and spot elevations taken from USGS 1:24,000-scale topographic maps. The coordinate system is Universal Transverse Mercator (UTM) zone 15. The cell size is 20 m by 20 m. Elevations are in feet as referenced to mean sea level (msl).

contours

These files contain a vector representation of the elevation contours within the Cache River, Arkansas, watershed digitized from USGS 1:24,000-scale topographic maps. The coordinate system is UTM zone 15. The contour interval is 10 ft. Elevation contours for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Similar elevation data are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

hydro

streams

These files contain a vector representation of the surface hydrographic features (streams, lakes, etc.) within the Cache River, Arkansas, watershed digitized from USGS 1:24,000-scale topographic maps. The coordinate system is UTM zone 15. Portions of the data were taken from existing USGS 1:24,000-scale

digital line graphs. Hydrographic data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Similar hydrographic data are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gainesville, Gregory, Harviell, Hunter, Jonesboro, Knobel, Marmaduke, Piggott, Rector, Sedgwick, Tilton, Tuckerman, Walnut Ridge, Valley Ridge, and Weiner. Available data formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

basin

This file contains a vector representation of the watershed boundary of the Cache River, Arkansas, as interpreted and digitized from USGS 1:24,000-scale topographic maps. The coordinate system is UTM zone 15.

soil

soils

These files contain a vector representation of the USDA/SCS soil series within the Cache River, Arkansas, watershed digitized from USDA/SCS county soil surveys. The coordinate system is UTM zone 15. Descriptive attributes from the soil survey are included. Soil series data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Similar soil series data are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

veg

forest35

These files contain a vector representation of the forest cover within the Cache River, Arkansas, watershed as depicted on and digitized from USGS 1:62,500-scale topographic maps dated 1935 to 1941. The coordinate system is UTM zone 15. Forested land data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1930 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gainesville, Gregory, Harviell, Hunter, Jonesboro, Knobel, Marmaduke, Piggott, Rector, Sedgwick, Tilton, Tuckerman, Walnut Ridge, Valley Ridge, and Weiner. Available data formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate. Data are stored in files corresponding to USGS 15-ft topographic map boundaries.

forest72

These files contain a vector representation of the forest cover within the Cache River, Arkansas, watershed as determined from October 1972 Landsat multi-spectral scanner digital data. Forest cover was interpreted by WES using an

unsupervised classification algorithm. The coordinate system is UTM zone 15. The 1972 forest cover data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1972 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

forest74

These files contain a vector representation of the forest cover within the Cache River, Arkansas, watershed as determined from October 1974 Landsat multi-spectral scanner digital data. Forest cover was interpreted by WES using an unsupervised classification algorithm. The coordinate system is UTM zone 15. The 1974 forest cover data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1974 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

forest75

These files contain a vector representation of forest cover within the Cache River, Arkansas, watershed as depicted on and digitized from USGS 1:24,000-scale topographic maps dated 1964 to 1984. The coordinate system is UTM zone 15. Forest cover data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1975 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gainesville, Gregory, Harviell, Hunter, Jonesboro, Knobel, Marmaduke, Piggott, Rector, Sedgwick, Tilton, Tuckerman, Walnut Ridge, Valley Ridge, and Weiner. Available data formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

forest76

These files contain a vector representation of the forest cover within the Cache River, Arkansas, watershed as determined from April 1976 Landsat multi-spectral scanner digital data. Forest cover was interpreted by WES using an unsupervised classification algorithm. The coordinate system is UTM zone 15. The 1976 forest cover data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1976 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

forest80

These files contain a vector representation of the forest cover within the Cache River, Arkansas, watershed as determined from October 1980 Landsat multi-spectral scanner digital data. Forest cover was interpreted by WES using an unsupervised classification algorithm. The coordinate system is UTM zone 15. The 1980 forest cover data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1980 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

forest87

These files contain a vector representation of the forest cover within the Cache River, Arkansas, watershed as determined from March 1987 Landsat thematic mapper digital satellite data. Forest cover was interpreted by WES using an unsupervised classification algorithm. The coordinate system is UTM zone 15. The 1987 forest cover data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. Forest cover data from 1987 are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Hunter, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

wetlands

nwi1990

These files contain a vector representation of the USFWS National Wetland Inventory (NWI) of the Cache River, Arkansas, watershed dated 1990. The data were digitized by WES from 1:24,000-scale NWI maps. The coordinate system is UTM zone 15. The NWI data for the Cache River watershed are stored in a series of files each containing data for a 15- by 15-min area. These NWI data are available for the following USGS 1:62,500-scale topographic maps: Alicia, Augusta, Gregory, Sedgwick, Tilton, Tuckerman, and Weiner. Available data exchange formats are ArcInfo uncompressed export, ArcInfo generated SDTS-TVP, and ArcInfo ungenerate.

cultural

counties

This file contains a vector representation of the boundaries of counties in Arkansas and Missouri that include part of the Cache River, Arkansas, watershed. The coordinate system is UTM zone 15.

quad7.5

This file contains a vector representation of a map index of the USGS 1:24,000-scale (7.5-min) topographic maps that cover the Cache River, Arkansas, watershed. The names and publication dates of the maps are included as attributes. The coordinate system is UTM zone 15.

quad15

This file contains a vector representation of a map index of the USGS 1:62,500-scale (15-min) topographic maps that cover the Cache River, Arkansas, watershed. The names and publication dates of the maps are included as attributes. The coordinate system is UTM zone 15.

images

mssoct72

This file contains a Landsat multispectral scanner image of a portion of the Cache River, Arkansas, watershed dated 2 October 1972. It is a four-channel image geographically referenced to the UTM coordinate system, zone 15. The image was acquired from EOSAT, Inc., and is not copyrighted. The data format is BIL.

mssoct74

This file contains a Landsat multispectral scanner image of a portion of the Cache River, Arkansas, watershed dated 10 October 1974. It is a four-channel image geographically referenced to the UTM coordinate system, zone 15. The image was acquired from EOSAT, Inc., and is not copyrighted. The data format is BIL.

mssapr76

This file contains a Landsat multispectral scanner image of a portion of the Cache River, Arkansas, watershed dated 2 April 1976. It is a four-channel image geographically referenced to the UTM coordinate system, zone 15. The image was acquired from EOSAT, Inc., and is not copyrighted. The data format is BIL.

mssoct80

This file contains a Landsat multispectral scanner image of a portion of the Cache River, Arkansas, watershed dated 23 October 1980. The four-channel image is geographically referenced to the UTM coordinate system, zone 15. The image was acquired from EOSAT, Inc., and is not copyrighted. The data format is BIL.

fieldmes

fld site

This file contains a digital representation of the locations of field measurement sites in and near the Cache River, Arkansas, watershed. Sites include precipitation and stream gauge locations and field sampling sites established along transects. These locations were used by numerous investigators to collect environmental data characterizing the Cache River, Arkansas, watershed. These are point data in the UTM coordinate system, zone 15.

Appendix B Comprehensive Directory Structure

```

data
|_topo
|_|dem
|_|_|dem.bil
|_|_|dem.bilw
|_|_|dem.hdr
|_|_|dem.stx
|_|_|dem.met
|_|_contours
|_|_|alicia
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|augusta
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|gregory
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|hunter
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|sedgwick
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|tilton
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|tucker
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met
|_|_|weiner
|_|_|_|export
|_|_|_|sdts
|_|_|_|ungen
|_|_|_|contours.met

```



```

data
|_hydro
|_streams
|_alicia
|_export
|_sdts
|_ungen
|_streams.met
|_augusta
|_export
|_sdts
|_ungen
|_streams.met
|_gainsvil
|_export
|_sdts
|_ungen
|_streams.met
|_gregory
|_export
|_sdts
|_ungen
|_streams.met
|_harviell
|_export
|_sdts
|_ungen
|_streams.met
|_hunter
|_export
|_sdts
|_ungen
|_streams.met
|_joneboro
|_export
|_sdts
|_ungen
|_streams.met
|_knobel
|_export
|_sdts
|_ungen
|_streams.met
|_marmduke
|_export
|_sdts
|_ungen
|_streams.met
|_piggott
|_export
|_sdts
|_ungen
|_streams.met
|_rector
|_export
|_sdts
|_ungen
|_streams.met
|_sedgwick
|_export
|_sdts
|_ungen
|_streams.met
|_tilton
|_export
|_sdts
|_ungen
|_streams.met
|_tucker
|_export
|_sdts
|_ungen
|_streams.met
|_val_ridg
|_export
|_sdts
|_ungen
|_streams.met
|_wal_ridg
|_export
|_sdts
|_ungen
|_streams.met
|_weiner
|_export
|_sdts
|_ungen
|_streams.met
|_basin
|_export
|_sdts
|_ungen
|_basin.met
|_fieldmes
|_watqual
|_wq_qual1.dat
|_wq_qual1.met
|_wq_qual2.dat
|_wq_qual2.met
|_st_gauge
|_gauge.dat
|_gauge.met

```



```

data
|_soil
|_alicia
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_augusta
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_gregory
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_hunter
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_sedgwick
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_tilton
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_tucker
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met
|_weiner
|_  _export
|_  _sdts
|_  _ungen
|_  _soils.met

```



```

data
|_veg
|_|_forest35
|_|_|_alicia
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_augusta
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_gainsvil
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_gregory
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_harviell
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_hunter
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_joneboro
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_knobel
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_marmduke
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_piggott
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_rector
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_sedgwick
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_tilton
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_tucker
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_val_ridg
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_wal_ridg
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met
|_|_|_weiner
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest35.met

```



```
data
|_veg
|_forest75
```

alicia	joneboro	tilton
export	export	export
sdts	sdts	sdts
ungen	ungen	ungen
forest75.met	forest75.met	forest75.met
augusta	knobel	tucker
export	export	export
sdts	sdts	sdts
ungen	ungen	ungen
forest75.met	forest75.met	forest75.met
gainsvil	marmduke	val_ridg
export	export	export
sdts	sdts	sdts
ungen	ungen	ungen
forest75.met	forest75.met	forest75.met
gregory	piggott	wal_ridg
export	export	export
sdts	sdts	sdts
ungen	ungen	ungen
forest75.met	forest75.met	forest75.met
harviell	rector	weiner
export	export	export
sdts	sdts	sdts
ungen	ungen	ungen
forest75.met	forest75.met	forest75.met
hunter	sedgwick	
export	export	
sdts	sdts	
ungen	ungen	
forest75.met	forest75.met	


```

data
|_veg
|_forest72
|_alicia
|_export
|_sdts
|_ungen
|_forest72.met
|_augusta
|_export
|_sdts
|_ungen
|_forest72.met
|_gregory
|_export
|_sdts
|_ungen
|_forest72.met
|_hunter
|_export
|_sdts
|_ungen
|_forest72.met
|_sedgwick
|_export
|_sdts
|_ungen
|_forest72.met
|_tilton
|_export
|_sdts
|_ungen
|_forest72.met
|_tucker
|_export
|_sdts
|_ungen
|_forest72.met
|_weiner
|_export
|_sdts
|_ungen
|_forest72.met
|_forest74
|_alicia
|_export
|_sdts
|_ungen
|_forest74.met
|_augusta
|_export
|_sdts
|_ungen
|_forest74.met
|_gregory
|_export
|_sdts
|_ungen
|_forest74.met
|_hunter
|_export
|_sdts
|_ungen
|_forest74.met
|_sedgwick
|_export
|_sdts
|_ungen
|_forest74.met
|_tilton
|_export
|_sdts
|_ungen
|_forest74.met
|_tucker
|_export
|_sdts
|_ungen
|_forest74.met
|_weiner
|_export
|_sdts
|_ungen
|_forest74.met

```



```

data
|_veg
|_forest76
|_alicia
|_export
|_sdts
|_ungen
|_forest76.met
|_augusta
|_export
|_sdts
|_ungen
|_forest76.met
|_gregory
|_export
|_sdts
|_ungen
|_forest76.met
|_hunter
|_export
|_sdts
|_ungen
|_forest76.met
|_sedgwick
|_export
|_sdts
|_ungen
|_forest76.met
|_tilton
|_export
|_sdts
|_ungen
|_forest76.met
|_tucker
|_export
|_sdts
|_ungen
|_forest76.met
|_weiner
|_export
|_sdts
|_ungen
|_forest76.met
|_forest80
|_alicia
|_export
|_sdts
|_ungen
|_forest80.met
|_augusta
|_export
|_sdts
|_ungen
|_forest80.met
|_gregory
|_export
|_sdts
|_ungen
|_forest80.met
|_hunter
|_export
|_sdts
|_ungen
|_forest80.met
|_sedgwick
|_export
|_sdts
|_ungen
|_forest80.met
|_tilton
|_export
|_sdts
|_ungen
|_forest80.met
|_tucker
|_export
|_sdts
|_ungen
|_forest80.met
|_weiner
|_export
|_sdts
|_ungen
|_forest80.met

```



```

data
|_veg
|_|_forest87
|_|_|_alicia
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_augusta
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_gregory
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_hunter
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_sedgwick
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_tilton
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_tucker
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met
|_|_|_weiner
|_|_|_|_export
|_|_|_|_sdts
|_|_|_|_ungen
|_|_|_|_forest87.met

```



```

data
|_veg
|_|_fieldmes
|_|_|_treeden
|_|_|_|_treed.dat
|_|_|_|_treed.met
|_|_|_herbac
|_|_|_|_herbs.dat
|_|_|_|_herbs.met
|_|_|_loglen
|_|_|_|_logln.dat
|_|_|_|_logln.met
|_|_|_breast
|_|_|_|_treeb.dat
|_|_|_|_treeb.met
|_|_|_periph
|_|_|_|_perp.dat
|_|_|_|_perp.met
|_|_|_mtree
|_|_|_|_mtree.dat
|_|_|_|_mtree.met
|_|_|_canopy
|_|_|_|_subcp.dat
|_|_|_|_subcp.met
|_|_|_seedling
|_|_|_|_seed.dat
|_|_|_|_seed.met
|_|_|_sapling
|_|_|_|_saplg.dat
|_|_|_|_saplg.met
|_|_|_snags
|_|_|_|_snags.dat
|_|_|_|_snags.met
|_|_|_grcov
|_|_|_|_grcov.dat
|_|_|_|_grcov.met
|_|_|_numspec
|_|_|_|_numsp.dat
|_|_|_|_numsp.met

```



```

data
- wildlife
  - mammals
    - mherp.dat
    - mherp.met
  - birds
    - birds.dat
    - birds.met
  - crustaceans
    - crawf.dat
    - crawf.met

- meteor
  - precip
    - precip.dat
    - precip.met

- wetlands
  - nwi1990
    - alicia
      - export
      - sdts
      - ungen
      - nwi1990.met
    - augusta
      - export
      - sdts
      - ungen
      - nwi1990.met
    - gregory
      - export
      - sdts
      - ungen
      - nwi1990.met
    - hunter
      - export
      - sdts
      - ungen
      - nwi1990.met
    - sedgwick
      - export
      - sdts
      - ungen
      - nwi1990.met
    - tilton
      - export
      - sdts
      - ungen
      - nwi1990.met
    - tucker
      - export
      - sdts
      - ungen
      - nwi1990.met
    - weiner
      - export
      - sdts
      - ungen
      - nwi1990.met

- cultural
  - counties
  - quad7.5
  - quad15

```



```
data
  _images
    _mssapr76
      _mssapr76.bil
      _mssapr76.bilw
      _mssapr76.hdr
      _mssapr76.stx
      _mssapr76.met
    _mssoct72
      _mssoct72.bil
      _mssoct72.bilw
      _mssoct72.hdr
      _mssoct72.stx
      _mssoct72.met
    _mssoct74
      _mssoct74.bil
      _mssoct74.bilw
      _mssoct74.hdr
      _mssoct74.stx
      _mssoct74.met
    _mssoct80
      _mssoct80.bil
      _mssoct80.bilw
      _mssoct80.hdr
      _mssoct80.stx
      _mssoct80.met
  _fieldmes
    _gauges
      _export
      _sdts
      _ungen
      _gauges.met
```


Appendix C

Example Geospatial Metadata File

Example Geospatial Metadata File

***** Identification Information *****

Citation Information

Originator:	US Army Corps of Engineers Waterways Experiment Station Environmental Laboratory
Publication Date:	10/1/94
Title:	forest35
Publication Information	
Publication Place:	Vicksburg, Mississippi
Publisher:	US Army Corps of Engineers Waterways Experiment Station Environmental Laboratory

Description

Abstract: This data set is a polygon coverage of 1935 forest stands within the Cache River, Arkansas Basin. The forest polygons were collected by manually digitizing the Tuckerman (1935) 15 minute Corps of Engineers quadrangle. This data set represents forest cover within the Cache River Basin only (forest polygons were digitized only within the Cache River watershed boundary).

Purpose: This data layer was developed as part of a comprehensive study of the Cache River, Arkansas basin. These data depict the bottomland hardwood cover of the watershed. Data collection was conducted under the Corps of Engineers Wetlands Research Program (WRP).

Time Period of Content

Single Date:	1994
--------------	------

Status

Progress:	complete
Maintenance and Update Frequency:	none planned

Spatial Domain

Bounding Coordinates	
West Bounding Coordinate:	-91.250
East Bounding Coordinate:	-91.000
North Bounding Coordinate:	35.750
South Bounding Coordinate:	35.500

Data Set G-Polygon

Inside(35.90, -90.89 36.39, -90.23 36.33, -90.33 36.25, -90.41
36.17, -90.54 36.03, -90.62 35.90, -90.77 35.69, -91.01 35.47, -91.10
35.28, -91.19 35.18, -91.22 35.05, -91.32 35.14, -91.38 35.30, -91.32
35.37, -91.27 35.58, -91.21 35.91, -91.02 36.25, -90.75 36.47, -90.37
36.52, -90.34)

Keywords

Theme	
Theme Keyword:	forest
Theme Keyword:	vegetation
Theme Keyword:	landcover
Place	
Place Keyword:	Arkansas
Place Keyword:	Cache
Place Keyword:	Tuckerman

Access Constraints: none

Use Constraints: none. Acknowledgement of the U.S. Army Corps of Engineers is desired in products derived from these data.

Native Data Set Environment: Processed in ARC/INFO version 6.1.2 on Sun UNIX workstations under SunOS 4.1.3 (Solaris 1.0)

 Data Quality Information

Attribute Accuracy --

Attribute Accuracy Report: Attribute accuracy was tested by manual comparison of the source material with hard copy overlays. Attributes were also verified by visual inspection to detect any attributes that may have been omitted or mislabeled.

Completeness Report: Features which have been digitized have not been changed in any way. The data reflect the original content of the source materials.

Positional Accuracy

Horizontal Positional Accuracy

Horizontal Positional Accuracy Report: Accuracy of these digital data is based upon source materials which comply with US National Map Accuracy Standards (NMAS). However, the data were digitized from a non-stable paper media. Every attempt was made to insure a root mean square error of less than 0.003 inches when registering the source materials on the digitizing tablet. Manual digitizing methods may also introduce errors which may degrade the final product. No statistical analysis was conducted to insure the final product complies with US National Map Accuracy Standards.

Lineage

Source Information

Source Citation

Originator: Mississippi River Commission
 Publication Date: 1935
 Title: Tuckerman
 Type of Map: topographic map

Publication Information

Publication Place: Army Map Service, U.S Army, Washington, D.C. Note - These data are no longer available for distribution.
 Publisher: Prepared under the direction of the President, Mississippi River Commission.

Source Scale Denominator:

Type of Source Media:

Source Time Period of Content:

Source Currentness Reference:

Source Citation Abbreviation:

Source Contribution:

Process Step

Process Description:

This 1935 forest cover was digitized from Mississippi River Commission Tuckerman 15 minute series quadrangle. These data were captured manually from source material using a digitizing tablet. Attributes were recorded as each forest polygon was being digitized. These data were digitized in tablet coordinates. Four control points corresponding to the four corners of the

quadrangle were used for data registration. The four points recorded in geographic coordinates were projected to stateplane coordinates. A transformation to stateplane coordinate system was preformed on the digitized forest data. These data were then check by plotting the data and comparing the plots to the source material. These data were then projected to UTM coordinate system and edgematch to the adjacent digitized forest quadrangle.

Process Date: 1994
Source Produced Citation Abbreviation: MRC

Spatial Data Organization Information

Direct Spatial Reference Method: vector

Spatial Reference Information

Horizontal Coordinate System Definition

Planar

Grid Coordinate System

Grid Coordinate System Name: Universal Transverse Mercator
UTM Zone Number: 15

Planar Coordinate Information

Planar Coordinate Encoding Method: coordinate pairs
Planar Distance Units: meters

Geodetic Model

Horizontal Datum Name: North American Datum of 1927
Ellipsoid Name: Clarke 1866

Vertical Coordinate System Definition

Altitude System Definition

Altitude Datum Name: Mean Gulf Level at Biloxi
Mississippi

Altitude Resolution: 5
Altitude Distance Units: feet

Entity and Attribute Information

Detailed Description

Attribute

Attribute Label: cover
Attribute Definition: Polygon attribute contains
entry of "forest" or "non-forest"
Attribute Definition Source: MRC 1:62500 quadrangles

Distribution Information

Distributor

Contact Organization Primary

Contact Organization: Corps of Engineers Wetlands
Research Technology Center (WRTC)

Contact Address

Address Type: mailing address
Address: US Army Engineer Waterways
Experiment Station
3909 Halls Ferry Road
(ATTN: CEWES-EP-W)

City:
State or Province:
Postal Code:

Vicksburg
Mississippi
39180

Distribution Liability:

Standard Order Process

Digital Form

Digital Transfer Information

Format Name:

SDTS

Format Specification:

Topological Vector Profile

Digital Transfer Option

Offline Option

Offline Media:

CD-ROM

Recording Capacity

Recording Format:

ISO 9660

Digital Form

Digital Transfer Information

Format Name:

ARCE

Format Specification:

standard

Digital Transfer Option

Offline Option

Offline Media:

CD-ROM

Recording Capacity

Recording Format:

ISO 9660

Digital Form

Digital Transfer Information

Format Name:

ARCG

Format Specification:

standard

Digital Transfer Option

Offline Option

Offline Media:

CD-ROM

Recording Capacity

Recording Format:

ISO 9660

Metadata Reference Information

Metadata Date:

09/30/94

Metadata Contact

Contact Organization Primary

Contact Organization:

Corps of Engineers Wetlands
Research Technology Center (WRTC)

Contact Address

Address Type:

mailing address

Address:

US Army Engineer Waterways
Experiment Station
ATTN: CEWES-EP-W
3909 Halls Ferry Road

City:

Vicksburg

State or Province:

Mississippi

Postal Code:

39180

Contact Voice Telephone:

(601)634-2733

Metadata Standard Name:

Content Standards for Digital
Geospatial Metadata

Metadata Standard Version:

06/08/94

Appendix D

Example Tabular Metadata File

Birds

Data File Name: birds.dat

Identification Information

Citation Information

Originator: US Army Corps of Engineers
Waterways Experiment Station
Environmental Laboratory
10/1/94
birds.dat

Publication Date:
Title:
Publication Information
Publication Place: Vicksburg, Mississippi
Publisher: US Army Corps of Engineers
Waterways Experiment Station
Environmental Laboratory

Description

Abstract: This file contains tabular data collected in the Cache River, Arkansas Basin. Data were collected at sample sites located along transects that originate at the river and extend out to the forest edge. The data file format is row major, comma delimited ascii file.

Purpose: These data were developed as part of a comprehensive study of the Cache River watershed in Eastern Arkansas. The Cache River database was developed to support modeling and analysis of the bottomland hardwood wetland system. The database also serves as an archive of scientific data collected in the Cache River watershed under The US Army Corps of Engineers Wetland Research Program.

Time Period of Content

Beginning Date of Information: April 3, 1988
Ending Date of Information: March 11, 1989

Status

Progress: complete
Maintenance and Update Frequency: none planned

Keywords

Theme
Theme: bird diversity
Theme: bird populations
Theme: wildlife habitat
Place
Place Keyword: Arkansas
Place Keyword: Cache River

Access Constraints:

none

Use Constraints:

none. Acknowledgement of the U.S. Army Corps of Engineers would be appreciated in products derived from these data.


```

*****
Data Quality Information
*****
Completeness Report: The data reflect the original content of the
source materials.

Lineage
Source Information
Source Citation
Originator: James S. Wakeley, Thomas H. Roberts
Publication Date: 1994
Title: Avian Distribution Patterns
Across the Cache River
Floodplain, Arkansas

Publication Information
Publication Place: Vicksburg, Mississippi
Publisher: U.S. Army Corps of Engineers
Source Time Period of Content: 1988 - 1989
Source Currentness Reference: publication date
Source Citation Abbreviation: USACE
Source Contribution: field measurments

```

```

*****
Data Information
*****

```

Detailed Description

Listed under data parameters is the information needed to define the data fields. The data parameters are: column name, column description, column type (choices are "integer" for integer numbers, "real" for real numbers, "character" for ascii characters, and "date" for day, month, and year), and column width. Column width describes the size of the data field and also the number of decimal places needed for real numbers (number after the comma).

Data Parameters:

Column Name	Column Description	Type	Width
1. REPLICATE	Replicate	Integer	8
2. DATE	Sample Date	Date	8
3. TRANS	Transect Location	Character	4
4. PLOT	Plot Location	Integer	8
5. SPECIES	Bird species	Character	8
6. TOT	Out of the total number of birds of each species counted on the plot	Integer	8
7. GROUND	Number of birds detected on the ground	Integer	8
8. UNDERSTORY	Number of birds detected on vegetation (up to about 1 meter tall vegetation)	Integer	8
9. MIDSTORY	Number of birds detected on vegetation (approximately 1 - 5 meters tall vegetation)	Integer	8
10. OVERSTORY	Number of birds detected on vegetation (approximately > 5 meters tall vegetation)	Integer	8

Field Measurement Site

Site Description: Each sample site, river guage, and rainfall guage is described by a x,y coordinate. The coordinates system of the points is UTM zone 15.

Field Measurment Sites	X-Coordinate UTM, zone 15	Y-Coordinate
A1	657136	3894654
A2	657222	3894634
A3	657368	3894625
A4	657450	3894615
A5	657587	3894636
A6	657729	3894628
A7	657954	3894620
A8	658414	3894638
B8	654714	3889984
B7	654794	3889918
B6	654911	3889860
B5	655018	3889807
B4	655191	3889705
B3	655274	3889655
C8	655612	3887294
C7	655222	3887302
C6	654680	3887293
C5	654473	3887333
C3	654216	3887328
D1	656100	3883154
D2	656097	3882970
D7	655670	3882917
D6	655072	3882959
D4	654627	3883075
Patterson (PT)	660314	3904149
Egypt (EG)	686614	3969946
Cotton Plant (CP)	653070	3878044
James Ferry (JF)	655096	3883658
Rain Guage (ST)	655016	3891112

Distribution Information

Distributor

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Standard Order Process

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6. AUTHOR(S) M. Rose Kress, Scott Bourne

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12a. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.	12b. DISTRIBUTION CODE
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13. ABSTRACT (Maximum 200 words) The objective of the Cache River environmental database was to design a digital database suitable to characterize and understand the Cache River wetlands system. The database was also to serve as an archive for data collected during the Wetlands Research Program. The data archive complies with Executive Order 12906 on data documentation and access. The Cache River environmental database is one of the first comprehensive environmental databases to conform to several new Federal regulations and standards addressing geographic data acquisitions, storage, and access.

14. SUBJECT TERMS Data archive Environmental database Forested wetland	Geospatial data Metadata National Geospatial Data Clearinghouse Spatial Data Transfer Standard	15. NUMBER OF PAGES 53
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