

**Creation of a Geographic Information Systems (GIS) Program Plan
for the Congaree Swamp National Monument (COSW)**

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**Report for the Congaree Swamp National Monument
United States Department of Interior
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TABLE OF CONTENTS

I.	Summary	1
II.	Introduction.....	3
	Background and Description	3
	External Influences and Regional Perspective	5
	The Need for GIS Technology	6
III.	Creation of a GIS Program Plan for the COSW.....	6
	Background	6
	Data Inventory and GIS Needs Assessment	7
	Data Standards and Management.....	7
	Geo-Spatial Data Types.....	8
	Data Coordinate System.....	8
	Tabular Data.....	9
	Metadata.....	9
	COSW Training	10
	Hardcopy Map and Photo Inventory	11
	Theme Layer Development and Integration	11
	NPS Theme Manager.....	12
	Base Layer Category Development	12
	Special Layer Development.....	18
	Base Layers\Imagery Category Development	20
	Photo Index Summary.....	24
	Administrative Category Development.....	29
	Special Layer Development.....	29
	Maintenance Category Development	32
	Natural Resources Category Development.....	34
	Special Layer Development.....	37
	Cultural Resources Category Development	39
	Special Layer Development.....	40
	Archived Data Category Development	40
	Lacy Report	40
	Hardcopy Notebooks	42
IV.	GIS Plan Implementation	42
	Posting of Themes and Metadata	42
V.	Recommendations.....	44
VI.	Summary and Conclusion	45

VII. Acknowledgments.....	46
VIII. References and Literature Cited	47
VIV. Appendices.....	48
Appendix A NPS Theme Manager GIS Database and Inventory for the COSW	
Appendix B Hardcopy Map Inventory for the COSW	
Appendix C Metadata Extension Tool	
Appendix D Training Aid for filling Out FGDC Metadata Form	
Appendix E NPS Theme Manager Tool Help Information	

List of Tables

Table 1. NPS Theme Manager GIS Database for the Base Layers Category.....	12
Table 2. NPS Theme Manager GIS Database for the Base Layers/Imagery Category.....	21
Table 3. NPS Theme Manager GIS Database for the Administrative Category... 	29
Table 4. NPS Theme Manager GIS Database for the Maintenance Category.....	32
Table 5. NPS Theme Manager GIS Database for the Natural Resources Category.....	34
Table 6. NPS Theme Manager GIS Database for the Cultural Resources Category.....	39
Table 7. NPS Theme Manager GIS Database for the Archived Category	41
Table 8. COSW List of GIS Layers, Imagery, and Metadata to be posted with the NPS Clearinghouse.....	43

List of Figures

Figure 1. A regional perspective showing location of the Congaree Swamp Nat. Monument in the SC Midlands.....	4
Figure 2a-2b. Facilities and Utilities of the COSW.....	19-20
Figure 3a-3b. Imagery of the COSW	27-28
Figure 4a-4d. GPSd boundary points for the COSW.....	30-32
Figure 5. Soils of the COSW	36
Figure 6. TNC and USGS-BRD Vegetation Communities of the COSW	37
Figure 7. Location of the SAF Natural Area on the COSW	38
Figure 8. Wetlands of the COSW	39

1. Summary

The National Park Service (NPS) contracted with the Savannah River Ecology Laboratory's (SREL) Geographical Information System (GIS) and Remote Sensing Lab to develop a GIS Program Plan for the Congaree Swamp National Monument (COSW). The primary objective of this plan was to develop a comprehensive geo-spatial database and a multi-thematic approach to implementing a GIS program for the COSW. This program creates a consolidated GIS framework from which theme layers and their databases will be easy to manage, update, and overlay with the COSW boundary and other geo-referenced base layers. This framework is based on the utilization of the NPS Theme Manager (TM) Software and National Oceanic and Atmospheric Administration's (NOAA) automated metadata creation tools. An additional GIS objective was the development of base layers beyond the COSW boundary, creating a regional perspective of external influences and changes that might affect the COSW.

SREL and the COSW completed this project in several phases: base layer prioritization and GIS needs assessment, base layer development and integration, and specialized layer development. In addition, SREL worked with the COSW in defining spatial data standards including coordinate and projection standards and metadata documentation. SREL also acquired and rectified historical imagery and provided GIS training for COSW personnel. As part of this training, SREL provided guidance and training in GPS (Global Positioning System) data collection, data dictionary creation, metadata creation, and NPS TM software use. SREL modified this software by making it more user-friendly for data organization and access. In addition, SREL trained COSW personnel in writing Federal Geographic Data Committee (FGDC) compliant metadata and using the NOAA Metadata Collection Tool. ArcView software training was also provided at SREL.

SREL located, identified, inventoried and cataloged all available GIS data for the COSW. Data included any hardcopy or digital imagery or data layer available from the University of South Carolina (USC), the SC Department of Natural Resources (SCDNR), or that had been provided by the NPS Inventory and Monitoring (I&M) Group. An Internet search was conducted for online data layers or supportive documentation. Data layers were evaluated and verified for completeness, resolution, format, projection, attributes, and for best method of capturing/creating data. Inventories were then completed for these data layers and imagery.

Seven theme categories were developed to create theme lists, manage theme layers, and load themes with the NPS TM. Theme categories were Administrative, Base Layers and Imagery, Maintenance, Natural Resources, Cultural Resources, and Archived Data layers. Categories were further split into sub-categories tailored to fit the management needs of COSW personnel and department disciplines. SREL reviewed and cataloged over 550 data layers for the COSW, of which, over 140 were modified, enhanced, re-projected, or newly created by SREL. Layers containing similar features were merged and accompanying metadata documentation was written and verified.

SREL was tasked to develop specialized or desired future layers for the COSW. As part of developing these layers, much of the COSW infrastructure was GPSd and layouts were developed for maintenance personnel and map display. Portions of the COSW boundary were GPSd to improve theme layer overlay

and boundary line and area accuracy. Inaccurate theme layers were corrected and enhanced when requested. Hardcopy notebooks with layouts of data layers and imagery were compiled and delivered to the COSW for research support and theme manager verification. A report on floodplain canopy and surface elevation using Light Detection and Ranging (LIDAR) technology was finalized as a special layer for this project. Finalized digital copies of theme layers, imagery, and metadata were populated into the seven categories and loaded on COSW GIS computers along with modified TM software for testing and verification. In addition, SREL provided on CD and DVD formats, digital and hardcopies of all data layers to include ArcView shape files, imagery and any accompanying metadata. Appendices are included which are database spreadsheets of both inventoried hardcopy maps and digital GIS databases. Additional appendices included are training aids for using the TM software and metadata creation tools.

This final report describes the development of a comprehensive GIS program plan and the infrastructure to support it. Inventoried lists of COSW imagery and theme layers as well as sample illustrations of these data are included in this document. GIS plan implementation is discussed and data management recommendations are made. Nine additional layers were recommended for completion as future layers for the COSW GIS database. SREL will submit selected theme layers and associated metadata to the NPS GIS Clearinghouse at the request of the COSW. By this product report, the COSW has made a significant commitment to the development of a comprehensive GIS database and program plan. By creating a foundation for the implementation of this GIS plan, the COSW will be facilitating the use of this technology in determining and planning for the stewardship demands on the Monument's resources and recreational needs.

II. Introduction

Background

America's national parks and monuments are testaments to the wisdom and legacy of preserving our nation's natural and cultural heritage. Considered national treasures, millions of visitors flock to these areas each year from congested, urbanized landscapes in search of solitude, beauty, and wildness. Research scientists regularly visit them to conduct biological inventories and to study their rich flora and fauna. Environmental regulators routinely collect data from their air and water to monitor ecosystem health and sustainability. Archaeologists return to these places to unearth features in hopes of interpreting past human events that occurred there. Taken as a whole, these public lands serve as remnant reminders of this country's once vast, unspoiled lands and waters; they also provide a connection of space and time to one's ancestral past: Where else does one stand under the same tree that shaded his forefathers and experience nature at her finest?

As custodians of America's national parks and monuments, the NPS is responsible for the stewardship management of the natural and cultural resources of these areas. For units of the NPS such as the COSW, additional custodial responsibilities may include supporting scientific research and biological monitoring, maintaining infrastructure and facilities, and providing for the public's educational and recreational needs. Furthermore, it is required of these NPS units to use the latest technologies and science based management practices to perform these management and support functions. Performing these functions are often a challenge when budgets are constrained despite steady increases in public and academic usage of these areas. Moreover, encroaching urban development, airborne pollutants, and industrial effluents outside the boundaries and control of these areas continue to pose environmental threats, compounding efforts for the NPS to maintain these areas in relatively undisturbed condition. To address these issues, the COSW has recently begun utilizing GIS technology as a tool to manage its geographic data and to aid in making management and support decisions for the Monument.

COSW Description

Located in the South Carolina Midlands, the COSW is approximately 20 miles (13 km) southeast of the state capitol, Columbia (Fig.1). Columbia is a major metropolitan city and lies in an area joining the industrial piedmont and the more rural upper coastal plain. The COSW is situated in the southeast corner of Richland County along the north banks of the Congaree River in an area primarily characterized by agriculture and timber production. The majority of the Monument lies within the floodplain of the Congaree River, which is the life-blood of the Monument flooding it on average 10 times a year (Patterson et al., 1985). Upstream from the COSW, the Congaree is formed in Columbia at the confluence of the Saluda and Broad Rivers; Lake Murray, a large hydroelectric impoundment, is located on the Saluda River. A general description of the Congaree River watershed can be found at Web site <http://www.scdhec.net/water/shed/text/50110-010.pdf>.

COSW is a unit of the NPS, one of seven USDI land holdings in South Carolina and one of twenty-four within the NPS's Southeastern Coastal Network. Over 100,000 people visit the Monument each year and

approximately 15 researchers representing various institutions study the Monument annually. The COSW was established in 1976 when Congress set aside 15,138 acres (6,126 ha) to protect an outstanding example of an old-growth bottomland hardwood forest. Considered the largest remaining intact tract of its kind in the United States, this unique wetland ecosystem was preserved for scientific, educational, and recreational purposes. In 1988, Congress funded the expansion of the COSW boundaries designating 15,010 acres (6,075 ha) as wilderness and 6,840 acres (2,768 ha) as potential wilderness, bringing the total acreage of the Monument to approximately 22,000 acres (8,900 ha). Most recently, the South Carolina delegation introduced legislation to elevate the status of the COSW from its current Monument designation to a National Park, the sole one in South Carolina and 1 of only 57 in the country. In addition, the legislation would approve expanding the COSW on its eastern boundary by 4,600 acres (1,862 ha), stretching southeast of the current federal holdings to the confluence of the Congaree and Wateree Rivers.

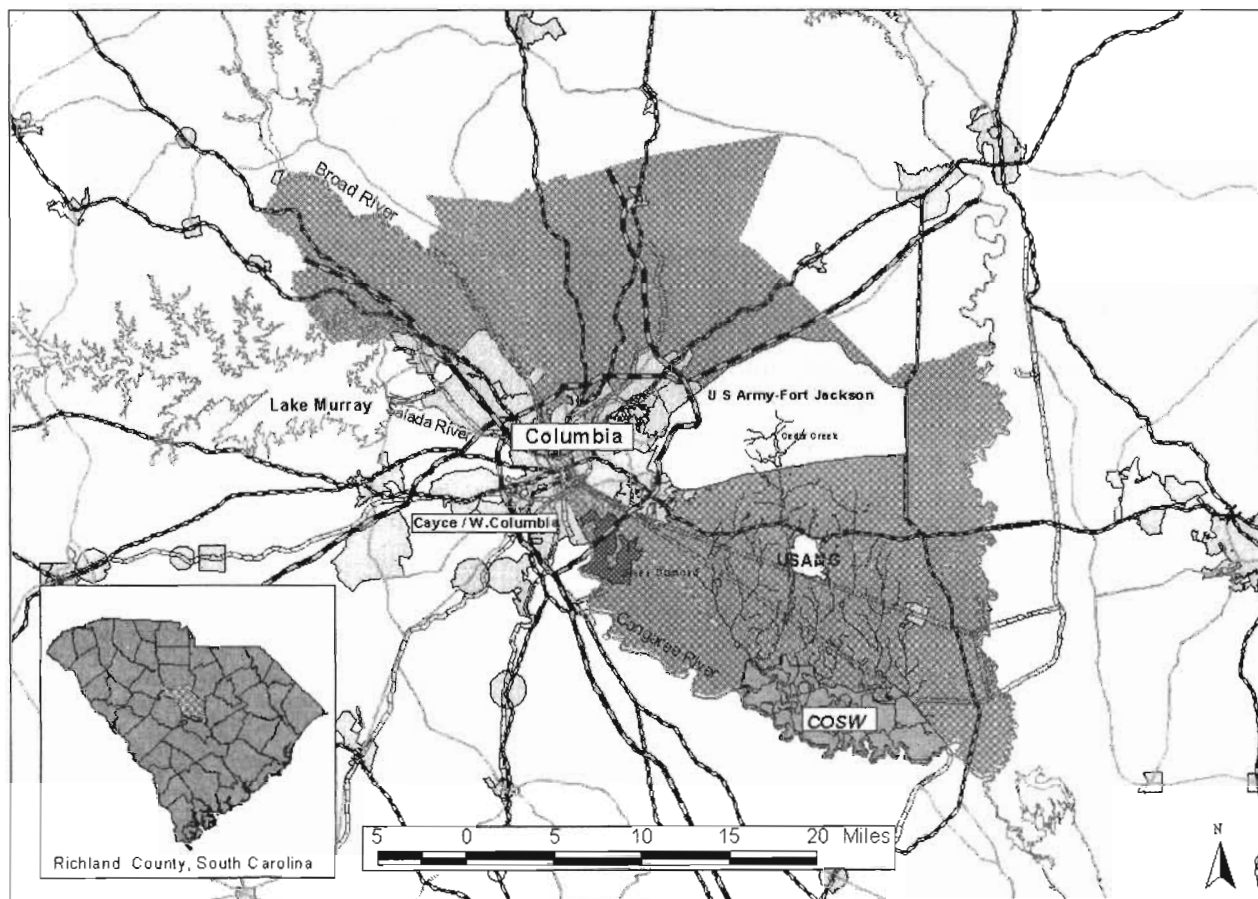


Figure 1. A regional perspective showing location of the Congaree Swamp Nat. Monument in the SC Midlands.

Within the COSW, the elevation of the Congaree floodplain ranges from 100 feet above sea level on the west side to 80 feet on the east. The Monument's eastern boundary is an elevated railroad line and the northern and western boundaries join private properties. The higher bluff regions of the COSW contain the Monument's infrastructure and support facilities; these include an education and visitor center, a learning center, maintenance and fire suppression facilities, picnic and camping areas, and an air quality monitoring station. Active forest management occurs in this upland area where prescribed fire is used to

reduce fuels and improve Red-cockaded woodpecker (RCW) habitat (see Web site <http://data2.itc.nps.gov/parks/cosw/ppdocuments/ACF1207.pdf>). The COSW has a history of selective and clear cut logging in and around the present boundaries of the Monument leaving the old-growth component bordered by these harvest treatments. A number of historical features existing in the COSW include historical access and logging roads, bridge abutments, cattle mounds, and anti-bellum era dikes. Cedar, Toms, and Myers are three named creeks that flow into and through the Monument. There are presently over 20 miles of marked hiking and 18 miles of marked canoe trails located in the Monument.

The COSW is ecologically significant in that it is the largest remaining, intact tract of old-growth bottomland hardwood forest in the United States. It is one of the tallest temperate deciduous forests in the world and boasts a number of national and state champion-sized trees. The COSW is recognized as a high biodiversity floodplain forest ecosystem that supports a variety of tree species and habitat conditions conducive for numerous future champion trees. The COSW also provides an ideal location for benchmark research on a virtually undisturbed floodplain forest ecosystem in the United States. This distinction makes this area attractive to researchers especially when a disturbance like Hurricane Hugo does occur, a recent natural event whose impacts continue to be studied. The Monument is also recognized as an International Biosphere Reserve, a National Natural Landmark, a Wilderness Area, and a Globally Important Bird Area. It is also home to a Society of American Forester's (SAF) Natural Area, one of 15 in South Carolina. Long-term vegetation monitoring plots, water quality monitoring stations, and flora and fauna survey points are some of the features located throughout the Monument.

External Influences and Regional Perspective

As previously mentioned, the COSW exists mostly in a floodplain environment subject to flooding and potential impacts from upstream contaminants. Maintaining water quality is of major concern to the COSW as these potential contaminants could affect the Monument's resources. Local and regional influences on the COSW include environmental pollutants that originate outside the property boundary and therefore beyond the control of the Monument. Certainly non-point sources of pollution associated with agriculture and municipal surface runoff are a concern given the vastness of the Congaree, Saluda, and Broad River watersheds.

Also, industries that discharge upstream and in proximity to the COSW are potential threats to surface and ground waters. These industries include: Westinghouse Nuclear Fuels Company, Carolina Eastman Company, Teepak Industries, and Columbia's Metro municipal wastewater treatment facility. In addition, Southland Fisheries, an aquaculture facility, directly borders the Monument's bluff boundary. Another potential concern is Cedar Creek, the COSW main recreational stream. Its headwaters originate and flow through two U.S. military installations (Fort Jackson and McEntire Air Base) prior to its entry into the COSW. Recently the growth potential for Columbia's south side has been tested with the proposed Green Diamond, a large-scale project to be located in the floodway of the Congaree River (Fig.1). While this project did not come to fruition, upstream developments such as this could have potentially negative effects on the COSW both in terms of altered water flows and urban runoff.

A more positive local influence associated with the Congaree River are the Congaree River Bluffs. These bluffs are directly across the river from the COSW and are now part of the SCDNR Heritage Trust Preserve Program (see Web site <http://www.dnr.state.sc.us/wild/heritage/hp/hpmap.html>). Noted by the scientific and conservation communities for their ecological significance, these steep, forested

bluffs are considered unique, existing perhaps nowhere else in comparable form in the coastal plain or piedmont of the State (NPS, 1988).

The Need for GIS Technology

Because of potential external influences and increased recreational and scientific demands on the Monument, many different types of information, especially geo-spatial information, must be integrated in order to effectively and efficiently monitor and manage the COSW resources. Acquiring and maintaining historical and up-to-date geo-spatial information on the COSW and its surrounding environs is a necessity. Accurate locations of property boundaries, facilities, trails, monitoring sites, and sensitive resources are essential, but can be problematic and inaccurate depending on the data. With the advent of computer-based desktop mapping and real time GPS technology, more efficient and accurate methods are being used to collect, process, analyze, and apply geo-spatial information. This information, whether in digital or hardcopy format, is best captured, processed, and utilized using a GIS. A GIS consists of people, computer hardware, software, and use of geo-referenced data with standards and procedures. Geo-referenced data is usually associated with a coordinate and projection system and gives locational information on the earth's surface. A GIS is capable of inputting, storing, manipulating, analyzing and outputting geo-referenced data. The power of a GIS is its ability to associate features with attributes and then generate maps that display multiple geo-referenced data layers.

A well managed GIS and its databases will provide the COSW with the tools for timely and comprehensive data analyses as well as for creating and displaying geo-referenced, multi-themed maps and images. Whether dealing with changing administrative boundary lines or multi-disciplined departments and staff, GIS facilitates the need and ability to provide accurate and current geographical data to COSW staff, researchers, and partnering public agencies. By using this data, these end users will be better able to detect changes, discover patterns, and predict trends associated with the COSW and its surrounding environments.

III. Creation of a GIS Program Plan for the COSW

Background

In FY 2000, the NPS I&M Natural Resource GIS Program urged NPS Units to initiate the development of their own GIS program. Since the COSW did not have the necessary expertise to do so, seasonal technical help was hired to begin creating a foundation of layers and infrastructure to support a GIS. At this time, the COSW GIS program consisted only of various datasets acquired either from the NPS I&M program or from contracted products (Colquhoun, 2001). The data consisted of a variety of GPS files, GPS derived shape files, Digital Ortho Quarter Quads (DOQQ's), two DRG's, and many other layers and coverages, most of which were produced by the SCDNR (Lacy et al., 1995; Colquhoun, 2001). The data had been collected and compiled by a variety of people over the years and thus many of the files had multiple projections and datums. Several versions of files, in various states of completeness, also existed. A database of GPS files was the only existing metadata.

By February 2001, the COSW had acquired enough GIS computer hardware and software to support the foundations for a functional GIS system. During this time, the COSW initiated a cooperative agreement

and contract with the University of Georgia Research Foundation, Inc., for SREL's GIS and Remote Sensing Lab to develop a comprehensive GIS Program Plan and database for the COSW. SREL's GIS Lab provides state of the art resources, support, and services in the application of GIS, GPS, and Remote Sensing technologies for ecological and environmental analyses and had been previously contracted by the COSW to conduct initial GIS database inventories (Wiggins-Brown et al., 2000), and to create surface contour maps of the COSW (Karapatakis, 2001). In addition, SREL has enjoyed good professional relations with the COSW through previous collaborative research efforts (Sharitz et al., 1992; Thompson, 1998; Allen and Sharitz, 1999).

The following plan details the specifications for all aspects of COSW current GIS program, including the theme layer development, scale and data model issues, and data gathering methodology. Common terms used throughout this document and synonymous with each other are dataset, data layer, and theme layer. The term "coverage" is sometimes used synonymously with these terms but coverages are generally referred to as Arc/Info datasets. Reference to a GIS library is synonymous with GIS database and COSW and Monument are the same.

Data Inventory and GIS Needs Assessment

To begin this contract, SREL initiated a user needs assessment and a data inventory for prioritizing base layer developments. COSW personnel were interviewed to determine GIS program requirements based on daily activities and analytical needs. SREL and COSW personnel then located, identified, inventoried and cataloged all available GIS data for the COSW. This included any imagery or data layer that was available from the USC, the SCDNR, or was provided by the NPS I&M Group. An exhaustive Internet search determined if any geo-spatially relevant databases or layers existed and were available for addition to the COSW GIS library.

NPS GIS web sites were visited for guidance and supportive information that would benefit this GIS program, and throughout this document an attempt was made to integrate GIS information obtained from these sites. In addition, the COSW 1988 General Management Plan (NPS, 1988) was reviewed for reference to any geo-spatial data that would suggest a historical or future value for use in this GIS database. Discovered or existing data layers were evaluated and verified for completeness, resolution, format, projection, and feature attributes. As a result, COSW was able to develop a Research Map that is described in Colquhoun, 2001.

Based on the assessment, all data layers were identified as either desired, incomplete, or would benefit from enhancement or modification. The result was a library list of desired potential layers prioritized for development based on time, cost, necessary resources, and needs of COSW personnel. SREL then defined information on data standards, metadata collection and documentation, appropriate resolution, attribute information, data model, and best method of capturing and creating data. Software tools necessary and useful to implementing a successful GIS program were evaluated and these included NOAA's automated metadata creation tool and the NPS's Theme Manager Software.

Data Standards and Management

The three data types that are necessary for working in a GIS environment are Geo-spatial, Tabular, and Metadata. When working in any of these data types, it must be stressed that a file naming convention be established early in project development. A clear and meaningful file name should convey the nature of the data, subject, and NPS Unit represented. All files associated with one another should share the naming convention; only the extensions should be different. Common ArcView standards that have evolved for most GIS applications suggest that all data and related file names should adhere to 8.3 naming standards and not contain spaces, special characters, capital letters, or dashes. Underscores are not widely used but are acceptable. Theme layer field names should be 10 characters or less to conform to dBase and Arc/Info field naming limitations. These guidelines are specified on the NPS GIS web site (see Web site http://www.nps.gov/gis/data_info/posting.html)

Geo-Spatial Data Types

Geo-spatial data collected for use in a GIS can be represented in several ways. **Vector data** are represented in the form of the ESRI-compliant geo-relational models (i.e., ArcInfo coverages, ArcInfo export files, ArcView shape files and Spatial Database Engine layers), as well as AutoCAD's DXF. ArcView shape file data are represented by points, arcs (lines), or polygons and usually have file extensions of .shp, .dbf, and .shx. ArcInfo coverages have .eoo file extensions and have to be imported into a project. Digital Line Graph (DLG) files are examples of vector data as well. Most SCDNR data is available in an ARC/INFO EXPORT format. The COSW can use these data with their GIS mapping packages that can import the EXPORT format such as ArcInfo and ArcView.

Another data type used in representing geo-spatial data is **Raster data**, which is "pixilated" imagery data such as scanned aerial photos, satellite imagery, or digital raster data called Digital Raster Graphics (DRGs). Raster data typically have the ERDAS format endings - .img and .lan, as well as .sid, .jpeg, .gif, .tiff, geotif, and .bil. For those ERDAS files ending in .img and .rdr, it is best to load these files using the ArcView Image Analysis extension.

Still another way of displaying data in a GIS is **Grid data**, and these are usually in formats called Digital Elevation Models (DEM; see Web site <http://www.dnr.state.sc.us/water/nrima/gisdata/demdesc.html>). Remember that imagery used in GIS for display and interpretive analyses needs rectifying before it will overlay properly. In addition, the Imagine Support and Spatial Analyst extension tools must be loaded in a project in order to view these data types.

Data Coordinate System

In order to determine precise locations where geographic features are in relation to each other, a common coordinate system must be used for all COSW geo-spatial data. These features can be located by some spatial coordinate and are necessary if one is going to work in a GIS environment. Furthermore, GIS data are available in multiple formats, which often aren't compatible with each other. Therefore, it is necessary for geographic information to have properties, such as projection and datum, so that it may be used in a GIS environment. Consequently, all geo-spatial data whether generated, displayed, or submitted for inclusion into the COSW GIS database program, should be geo-referenced and provided in the Park Unit Data Standard projection. The standard projection required from the NPS for COSW GIS layers is Universal Transverse Mercator (UTM) with the following parameters:

• Projection	UTM
• Datum	North American Datum 1983 (NAD83)
• Spheroid	GRS 1980
• False Easting	500,000
• False Northing	0
• Units	Meters

Note: This information is captured for all COSW theme layers in Appendix A.

According to NPS GIS standards, digital geo-spatial data should be referenced to two coordinate systems--the current standard system used by the individual Unit, generally UTM, NAD83, and a regional-scale system (generally Geographic, NAD83). The steps used to get the data into the proper projection should be documented in the metadata. In the numerous cases where theme layers were in a different projection than the COSW NAD83, SREL used the Projection Utility, an ArcView Extension tool to re-project these themes for proper base layer overlay.

NOTE: The SCDNR maintains and serves their data in the (UTM) projection, Zone 17 based on NAD27 (see Web site <http://www.dnr.state.sc.us/water/nrima/gisdata/gisdata.html>). Several S.C. State Agencies also maintain their data in UTM projections. While the NPS spatial standards dictate that COSW maintain their coordinate projection system in UTM NAD 83, the COSW is aware that a different projection/datum for local state and county agencies should not be a problem as long as the conversion method is standardized. Thus, it was agreed that all datum conversion would be done using NADCON. Spatial Data Standards for Richland County include: South Carolina State Plane, NAD83 Datum Conversion: NADCON Unit of Measure: International Foot. For accessing a NADCON conversion website see <http://www.ngs.noaa.gov/cgi-bin/nadcon.prl>.

Finally, when collecting **GPS data** on the COSW, obtaining base station information is necessary for the post processing (differential correction) of the data. The NOAA's National Geodetic Survey (NGS) office in Columbia (COLA) is a continuously operating reference station (CORS) and provides GPS carrier phase and code range measurements in support of 3-dimensional positioning activities for the COSW area. This information can be obtained at Web site http://www.ngs.noaa.gov/CORS/SCarolina/scarolina_cola.html.

Tabular Data

Tabular data is usually associated with spatial data where attributes are displayed in theme fields. Tabular form data are usually importable with Excel, INFO, Dbase, ASCII text delimited and ODBC compliant RDBMS tables.

Metadata

Metadata is the QA/QC documentation that accompanies digital geo-spatial data. More specifically, it is the Who, What, Where, When, and How data that describes a dataset's content, quality, and condition. It contains information about the methods and steps used to process the data as well as the coordinate systems used to display the data. Without this information, the accuracy and usefulness of a particular dataset is questionable. Metadata data has the advantage in that it helps to organize and maintain a Unit's investment in geo-spatial data development and aiding in facilitating data transfer and posting of data to the NPS GIS clearinghouse. Federal regulations require the NPS to develop metadata for all datasets that are produced, or edited by their Units. According to NPS GIS guidelines (see Web site http://www.nps.gov/gis/data_info/posting.html), all metadata must comply with the FGDC "Content Standards for Digital Geo-spatial Metadata." (see Web site <http://www.fgdc.gov/>). In addition, all metadata should be associated with .txt, html, or sgml formats.

Like all NPS units, COSW must generate metadata for each data layer or theme that is created, regardless of whether it was created by a COSW employee, a contractor, a cooperator, or a partner. However, the COSW is not responsible for creating metadata for data not developed by the Monument, contractor, cooperator or partner *unless* the data are modified. For example, the COSW is not responsible for creating metadata for United States Geological Survey (USGS) DLGs unless COSW adds or deletes feature attributes or modifies the spatial data, e.g. edge match one tile to another. During the course of this project, the COSW acquired datasets from various sources, including SCDHEC, SCDNR, USGS, USC, US Census Bureau. Many of these outside agencies did not provide metadata for their datasets. If a dataset was not modified or enhanced, then metadata was not generated for it. However, in all cases attempts were made to document what is known about datasets including their sources (Colquhoun, 2001).

The NOAA's Coastal Services Center's ArcView Metadata Collector tool was used for generating metadata for the Monument's datasets. This metadata collector is simple to use, provides a standardized format, and meets NPS and FDGC standards. SREL developed a user template for reference when loading and using the collector in an ArcView session (Appendix D). SREL also developed a training aid for filling out the FGDC Metadata Form (Appendix E). Additional information about metadata collecting can be found at the FGDC Web site <http://www.fgdc.gov/metadata/toollist/metatool.html>.

During all phases of the project, SREL played an important role in supporting the efforts of the COSW in developing its own metadata. SREL and the COSW generated or reviewed over 550 GIS layers and metadata files merging layers containing similar features and creating metadata files. For the regional Tiger Census data and the DEMS, DLGs, DRGs, and DOQQs data provided by the NPS I&M group, no metadata was produced if the file was not modified. For the imagery, metadata was produced for those images that SREL rectified.

COSW Training

SREL provided access to and training for Congaree personnel both at SREL and the COSW. COSW personnel attended certified training in ESRI's ArcView Spatial Analysis, FGDC Metadata creation, and GPS training. Training was also provided for general ArcView software use. SREL provided guidance and training in GPS data collection and assisted in developing standardized data dictionaries for collecting GPS data at the COSW. COSW employees were provided with a Trimble Pathfinder Office

data is illustrated in Figure 1. Following these efforts, SREL spent the majority of the contract time developing GIS layers identified by the COSW as desired or needed for developing.

NPS Theme Manager

The NPS's Theme Manager software was used to categorize and organize COSW GIS data layers. The TM is an ArcView extension tool that can be loaded into a project to assist in displaying and managing your GIS database. For creating theme lists and managing COSW theme layers, seven theme categories were developed. These categories included Base Layers and Imagery, Administrative, Maintenance, Natural Resources, Cultural Resources, and Archived Data layers. The categories were further defined into sub-categories that were tailored to fit the management needs of COSW personnel and their departments. Appendix A and the various color-coded (see below) tables throughout the document show an inventory of all digital data layers that had been provided by the NPS or were developed at the request of the COSW. Appendix E is information taken from the ArcView Extension tool - GIS Theme Manager help file that should aid in populating the Theme Manager database.

Reference Color-coding for identifying a layer's status of development or disposition:

Theme layer developed or modified by SREL

COSW Theme layer to be developed

* **Restricted Layer**

Duplicate theme layer developed or modified by SREL

indicates these layers not included in Lacy Report

Base Layer Category Development

Within the Base layer category, 245 themes and graphics are listed, of which 42 were developed or modified by SREL (Table 1; Appendix A.) These themes were grouped under six sub-categories which included General, Elevation, Utilities, Natural Resources, Recreation, and Regional data. Some of these layers are duplicates (see orange coding) , i e., Base layer\Recreation\ Developed Trails Recreation \ is the same layer as Maintenance\ Developed Trails, and are found in other categories so as to maximize use by the various departments at the COSW and help with TM search capabilities. The regional data includes DEMs, DRGs, DLGs, U.S.Census data (Tiger Files), some miscellaneous layers, and various USGS Small Scale databases. Table 1 lists the categorized themes, their originator(s), and the status of their completion for the Base Layer Categories. COSW Imagery was included under Base layers and an index of those images (raw images) that did not have metadata prepared for them are listed. There is one restricted layer in this category.

Table 1. NPS Theme Manager GIS Database for the Base Layers Category

THEME NAME	THEME ORIGINATOR(S)	STATUS
Sub-category - Base Layers\General		
Roads	SCDNR/NPS-COSW	Complete
Fish Ponds near the COSW	SREL	Complete
Handicap parking spaces	SREL	Complete

Helicopter Landing Zones	SREL	Complete
John Cely's Map of COSW * RESTRICTED	J. Cely/SREL	Complete
River Mile Markers for the Congaree River	SREL	Complete
DRG - Gadsden Quad (high resolution)	USGS/SCDNR/SREL	Complete
DRG - Gadsden Quad (low resolution)	USGS/SCDNR/SREL	Complete
DRG - Wateree Quad (high resolution)	USGS/SCDNR/SREL	Complete
DRG - Wateree Quad (low resolution)	USGS/SCDNR/SREL	Complete
JPEG Image of Regional Location of COSW	SREL	Complete

Sub-category - Base Layers\Elevation

FEMA data	FEMA/NPS-COSW/SREL	Complete
LIDAR Surface	Richland Co./SREL	Complete
LIDAR Canopy	Richland Co./SREL	Complete
Contours derived from LIDAR	Richland Co./SREL	Complete
DEM - Gadsden Quad	USGS/SCDNR/SREL	Complete
DEM - Wateree Quad	USGS/SCDNR/SREL	Complete

Sub-category - Base Layers\Utilities

Power and Meter Boxes/Poles	SREL	Complete
Power lines (underground and above)	SREL	Complete
Old Ranger Station Utilities Graphic	NPS-COSW/SREL	Complete
Septic tanks	SREL	Complete
Portable Rest Room Locations	SREL	Complete
Sewer lines	SREL	Complete
Phone lines (underground)	SREL	Complete
Phone posts	SREL	Complete
Water lines	SREL	Complete

Sub-category - Base Layers\Natural Resources

Soil Types within boundary	USGS/SCDNR/SREL	Complete
JPEG Image of Soils	SREL	Complete
Hydrology derived from LIDAR	Richland Co./SREL	Complete
Hydrologic Features	NPS-SERO/COSW	Complete
Wetlands	USGS/SCDNR/SREL	Complete
JPEG image of Wetlands	SREL	Complete
NWI Layer	USGS/SCDNR/SREL	Complete
Hydric Soils 500m Buffer	USGS/SCDNR/SREL	Complete
Soil Types 500m buffer	USGS/SCDNR/SREL	Complete
NWI Layer 500m Buffer	USGS/SCDNR/SREL	Complete
Gadsden/Wateree Hydrology	USGS/SCDNR/SREL	Complete
Isolated wetland depressions	SREL	Complete

Sub-category - Base Layers\Recreation

Bicycle Rack Location	SREL	Complete
Boardwalk Trails Recreation	NPS-COSW	Complete
Developed Trails Recreation	NPS-COSW/SREL	Complete
Canoe Access	NPS-COSW	Complete
Canoe Trail Public	NPS-COSW	Complete
Congaree River Recreation	NPS-COSW	Complete

Bluff Campsite	NPS-COSW	Complete
Backcountry Camping	SREL	Draft/Incomplete
After Hours Parking Area	SREL	Complete
Wayside Exhibits		To be developed
Camp Ground		To be developed

Sub-category - Base Layers\Regional Data
Digital Elevation Models

DEM - Barr Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Congaree Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Eastover Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Ellore Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Fort Jackson North Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Fort Jackson South Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Gadsden Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Gaston Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Lexington Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Lone Star Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Messers Pond Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Pelion East Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Pelion West Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Poinsett State Park Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Saint Matthews Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Saylor Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Southwest Columbia Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Staley Crossroads Quad	USGS/SCDNR/NPS-I&M	Complete
DEM - Wateree Quad	USGS/SCDNR/NPS-I&M	Complete

Digital Raster Graphics

DRG - Barr Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Congaree Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Eastover Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Ellore Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Fort Jackson North Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Fort Jackson South Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Gadsden Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Gaston Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Lexington Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Lone Star Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Messers Pond Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Pelion East Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Pelion West Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Poinsett State Park	USGS/SCDNR/NPS-I&M	Complete
DRG - Saint Matthews Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Saylor Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Southwest Columbia Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Staley Crossroads Quad	USGS/SCDNR/NPS-I&M	Complete
DRG - Wateree Quad	USGS/SCDNR/NPS-I&M	Complete

Digital Line Graphic-Hydrography

DLG - hyd - Barr Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Congaree Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Eastover Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Elloree Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Fort Jackson North Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Fort Jackson South Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Gadsden Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Gaston Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Lexington Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Lone Star Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Messers Pond Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Pelion East Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Pelion West Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Poinsett State Park	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Saint Matthews Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Saylor's Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Southwest Columbia Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Staley Crossroads Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyd - Wateree Quad	USGS/SCDNR/NPS-I&M	Complete

Digital Line Graphic -Transportation

DLG - tran - Barr Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Congaree Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Eastover Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Elloree Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Fort Jackson North Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Fort Jackson South Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Gadsden Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Gaston Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Lexington Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Lone Star Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Messers Pond Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Pelion East Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Pelion West Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Poinsett State Park	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Saint Matthews Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Saylor's Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Southwest Columbia Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Staley Crossroads Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - tran - Wateree Quad	USGS/SCDNR/NPS-I&M	Complete

Digital Line Graphic-Hypsography

DLG - hyp - Barr Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Congaree Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Eastover Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Elloree Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Fort Jackson North Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Fort Jackson South Quad	USGS/SCDNR/NPS-I&M	Complete

DLG - hyp - Gadsden Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Gaston Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Lexington Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Lone Star Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Messers Pond Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Pelion East Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Pelion West Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Poinsett State Park	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Saint Matthews Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Saylors Lake Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Southwest Columbia Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Staley Crossroads Quad	USGS/SCDNR/NPS-I&M	Complete
DLG - hyp - Wateree Quad	USGS/SCDNR/NPS-I&M	Complete

Miscellaneous

Hypsography data (SCDNR DLGs)	USGS/SCDNR	Complete
Parks data (SCDNR DLGs) original boundary	USGS/SCDNR	Complete
Pipes and Transmission Lines (SCDNR-DLGs)	USGS/SCDNR	Complete
Railroads (SCDNR-DLGs)	USGS/SCDNR	Complete
Soil Survey Geographic Data (SCDNR-DLGs)	NRCS/SCDNR	Complete
NRCS Watersheds	NRCS	Complete
SCDHEC Acid Rain Collector	SCDHEC	Complete
SCDHEC Water Monitoring Building	SCDHEC	Complete
SCDHEC Rain Gauge	SCDHEC	Complete
SCDHEC Water Monitoring (TSP)	SCDHEC	Complete
Green Diamond Property Boundary	SREL/USC	Complete

Small-Scale Base GIS Data

100K Quad Boundaries	NPS-WRD	Complete
24K Quad Boundaries	NPS-WRD	Complete
Major Airports	NPS-WRD	Complete
USGS Catalog Units	NPS-WRD	Complete
Cities Point Locations	NPS-WRD	Complete
County Boundaries	NPS-WRD	Complete
Highways	NPS-WRD	Complete
Main Hydrology/Shorelines	NPS-WRD	Complete
IDG Panels	NPS-WRD	Complete
IDG Stations	NPS-WRD	Complete
Interstates	NPS-WRD	Complete
Military Installations	NPS-WRD	Complete
Mines	NPS-WRD	Complete
National Forest Units	NPS-WRD	Complete
Other NPS Units near mapped unit	NPS-WRD	Complete
National Refuge Areas	NPS-WRD	Complete
NPS Unit being Mapped	NPS-WRD	Complete
Park Headquarters	NPS-WRD	Complete
Boundary areas 1:100,000 scale	NPS-WRD	Complete
Railroads	NPS-WRD	Complete
Road Symbols for Panel Maps	NPS-WRD	Complete
River Reach File Hydrography Version 3	NPS-WRD	Complete

Regional Roads	NPS-WRD	Complete
Used to create white background of road symbols in main maps	NPS-WRD	Complete
Used to create white background of road symbols in panel maps	NPS-WRD	Complete
Used to create road symbols in main maps	NPS-WRD	Complete
States used for regional map view	NPS-WRD	Complete
State Forests	NPS-WRD	Complete
State Parks	NPS-WRD	Complete
Retrieval Area for Water Quality Data	NPS-WRD	Complete
Superfund Sites	NPS-WRD	Complete
Water Quality Panels	NPS-WRD	Complete
Water Quality Stations	NPS-WRD	Complete

Sub-category - Base Layers\Regional Data\Tiger

Census Tiger data (Designated Places)	US Census\Tiger	Complete
Designated Places Current (Tiger)	US Census\Tiger	Complete
Key Geographic Locations (Tiger) 2000	US Census\Tiger	Complete
Landmark Polygons (Tiger)	US Census\Tiger	Complete
Line-Hydro (Tiger)	US Census\Tiger	Complete
Line-Non-visible (Tiger)	US Census\Tiger	Complete
Line-Roads (Tiger)	US Census\Tiger	Complete
Urban Areas (Tiger) 2000	US Census\Tiger	Complete
Water Polygons (Tiger)	US Census\Tiger	Complete
Block groups 90	US Census\Tiger	Complete
Blocks 1990	US Census\Tiger	Complete
Blocks Colblk 1990	US Census\Tiger	Complete
Blocks 2000	US Census\Tiger	Complete
Census 2000 collection blocks	US Census\Tiger	Complete
Census tracts 2000	US Census\Tiger	Complete
Census tracts 90	US Census\Tiger	Complete
Cmsa-msa-polygons 2000	US Census\Tiger	Complete
Congressional districts-106th	US Census\Tiger	Complete
Congressional districts-current	US Census\Tiger	Complete
County 2000	US Census\Tiger	Complete
County 90	US Census\Tiger	Complete
County census divisions 2000	US Census\Tiger	Complete
Landmark-points	US Census\Tiger	Complete
Line-landmarks	US Census\Tiger	Complete
Line-misc. transport	US Census\Tiger	Complete
Line-rail	US Census\Tiger	Complete
School districts-elm	US Census\Tiger	Complete
School districts-secondary	US Census\Tiger	Complete
School districts-united	US Census\Tiger	Complete
State legislative district-lower	US Census\Tiger	Complete
State legislative district-upper	US Census\Tiger	Complete
Traffic analysis zones	US Census\Tiger	Complete
Voting districts 2000	US Census\Tiger	Complete

Sub-category - Base Layers\Regional Data\Tiger-pre

Key Geographic Locations (Tiger) pre2000	US Census\Tiger	Complete
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Land and Water Outlines (Tiger) pre2000	US Census\Tiger	Complete
Landmark Areas (Tiger) pre2000	US Census\Tiger	Complete
Landmark Lines (Tiger) pre2000	US Census\Tiger	Complete
Places 90 (Tiger) pre2000	US Census\Tiger	Complete
Places 95 (Tiger) pre2000	US Census\Tiger	Complete
Points Landmark pre2000	US Census\Tiger	Complete
Railroads (Tiger) pre2000	US Census\Tiger	Complete
Streams Lines (Tiger) pre2000	US Census\Tiger	Complete
Streets (Tiger) pre2000	US Census\Tiger	Complete
Traffic Analysis Zones (Tiger) pre2000	US Census\Tiger	Complete
Urban Areas (Tiger) pre2000	US Census\Tiger	Complete
Urban Rural Outlines (Tiger) pre2000	US Census\Tiger	Complete
Utility Lines (Tiger) pre2000	US Census\Tiger	Complete
Water bodies (Tiger) pre2000	US Census\Tiger	Complete
Census block groups	US Census\Tiger	Complete
Census tracts	US Census\Tiger	Complete
Census transport planning packages	US Census\Tiger	Complete
Congressional districts	US Census\Tiger	Complete
County 90 boundaries	US Census\Tiger	Complete
County 95 boundaries	US Census\Tiger	Complete
Elementary school districts	US Census\Tiger	Complete
Lines unclassified	US Census\Tiger	Complete
Minor civil divisions 95	US Census\Tiger	Complete
Unified school districts	US Census\Tiger	Complete
Voting districts	US Census\Tiger	Complete

Special Layer Development

John Cely map - Through the COSW, SREL sought permission from John Cely to turn his hand drawn, hardcopy map into a geo-referenced digital product for use in developing and improving data layers. This map contains a wealth of historical features and attribute information and SREL used it extensively in conjunction with photography to identify and locate features.

LIDAR Products- SREL produced two special layers (floodplain canopy and surface elevation) using LIDAR data obtained from Richland County. A report was produced in addition to these layers (Karapatakis, 2003).

Utilities and Facilities- The COSW old ranger station (Learning Center), newer visitor center and maintenance facilities are located on the northern periphery of the Monument. These infrastructure support facilities and utilities in this area are shown in Figures 2a and 2b. SREL made an extended effort to capture this infrastructure into a GIS for maintenance and management support. This effort included GPSing all known power poles, transformer units, meters, aboveground and underground power and telecommunications service lines, telephone posts, sewer line and septic tank locations, towers, and wells and water lines.

Additional special layers in this Base Layer category are illustrated and discussed below under the Natural Resources category section.

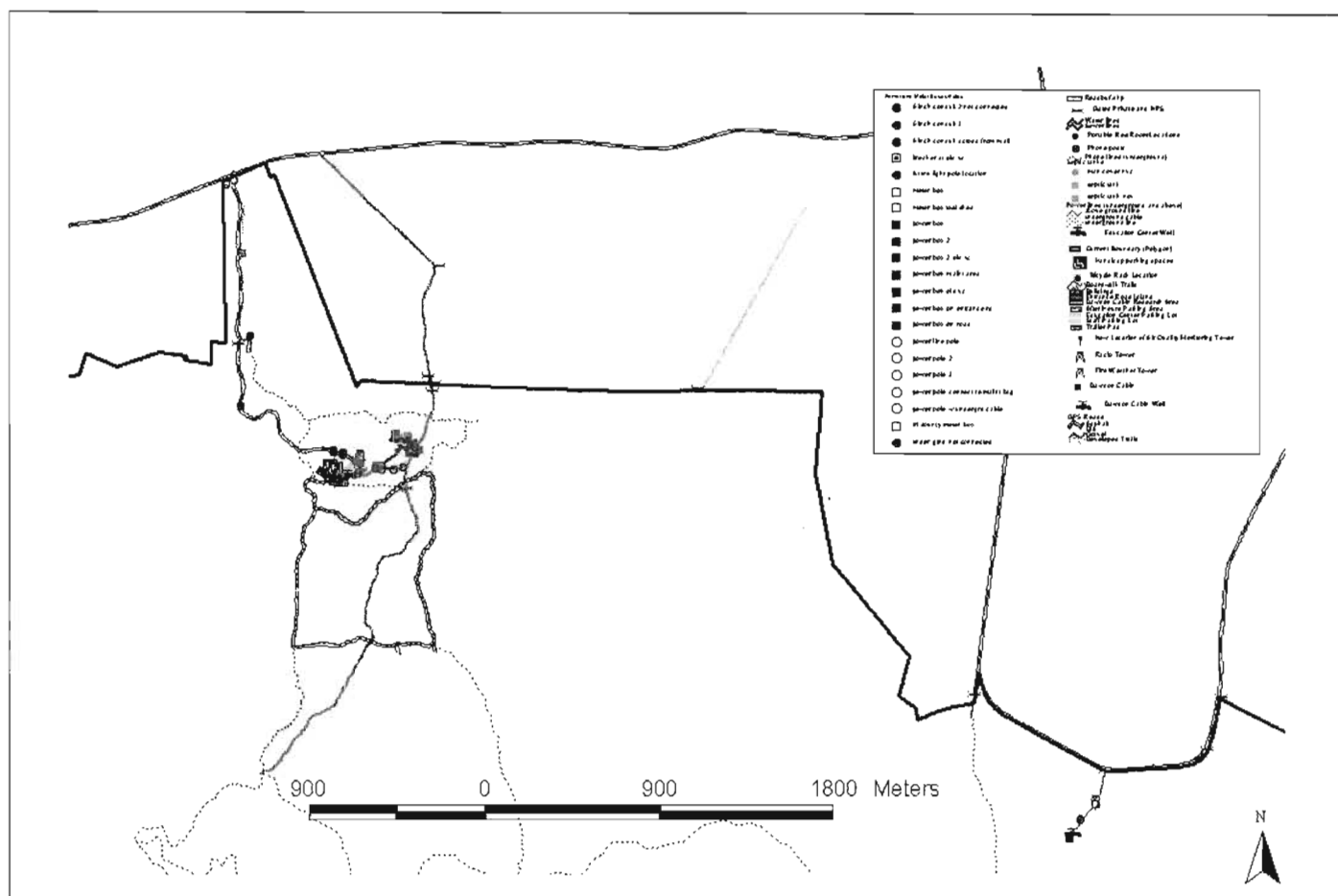


Figure 2a. Overview of COSW utility and facility locations.

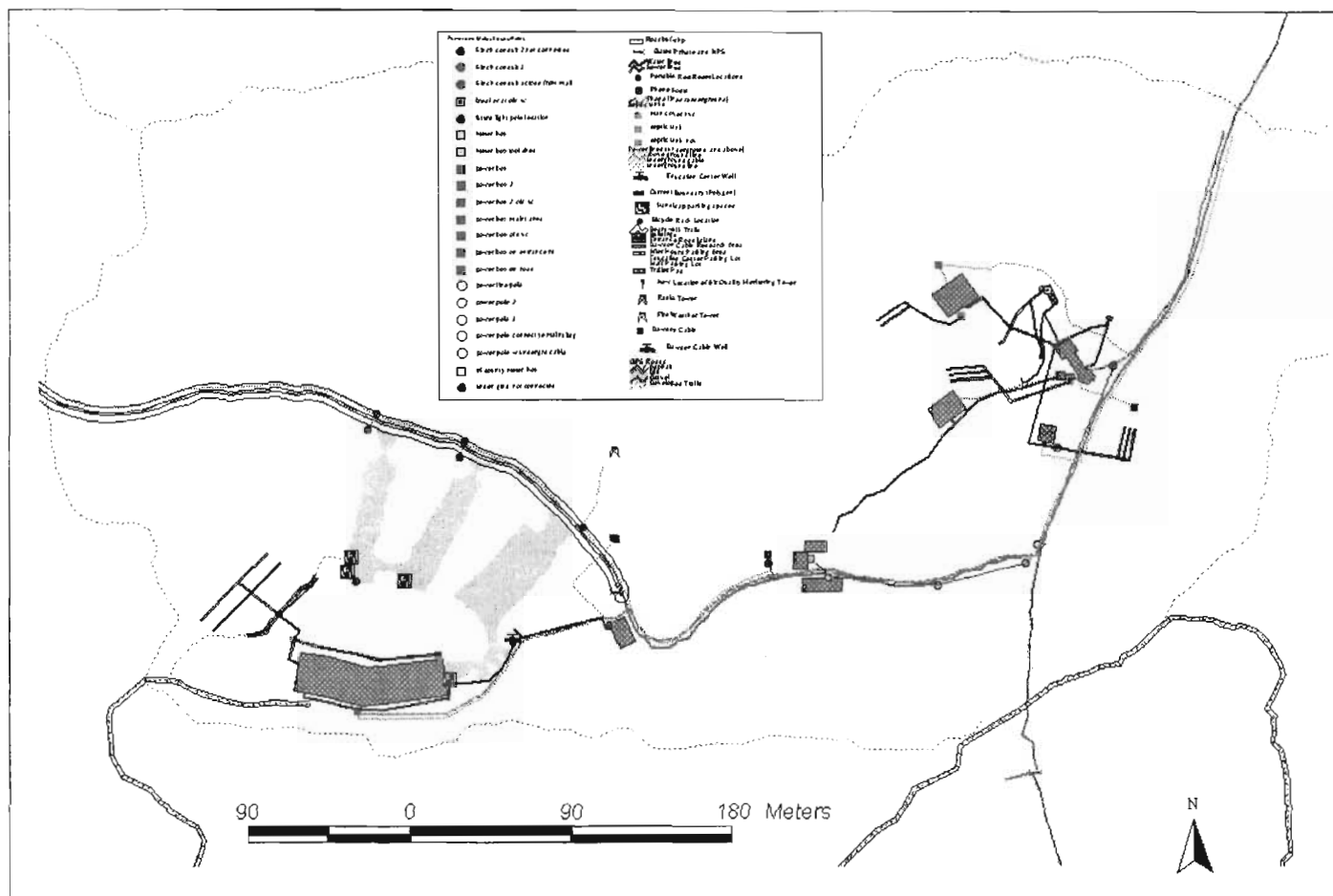


Figure 2b. COSW utilities and facilities in the vicinity of Visitor Center and Maintenance Area.

Base Layers\Imagery Category Development

To aid in theme layer development, SREL acquired imagery for the COSW from Dr. John Grego with the USC's Geography Department who generously volunteered to loan SREL historical imagery to scan for photo interpretation purposes. Images were acquired for the years 1938-39 1955-56, 1968, 1970, 1981, and 1999. COSW provided the 1989 pre-Hugo, 1991 post-Hugo, and 1994 DOQQs. Within the Base Layers\Imagery category, 129 images and graphics are listed, of which 45 were scanned, rectified or re-projected by SREL (Table 2; Appendix A). Table 2 is a listing of both raw (un-rectified) and rectified imagery. These photos are in digital format and can be printed out as hardcopies if needed. Three index maps were made for this imagery and more descriptive information is provided in the section following Table 2 since no metadata is available for this imagery other than this information. Other inventoried hardcopy photos are listed in Appendix B.

Table 2. NPS Theme Manager GIS Database for the Base Layers\Imagery Category

THEME NAME	THEME ORIGINATOR(S)	STATUS
Theme Category – Base Layer\Imagery		
Sub-category -Base Layers\Imagery\1938-39photos\Raw data		
1938 Image ATA 8-2	USC	
1938 Image ATA 8-3	USC	
1938 Image ATA 8-4	USC	
1938 Image ATA 8-6	USC	
1938 Image ATA 8-8	USC	
1938 Image ATA 8-75	USC	
1938 Image ATA 8-77	USC	
1938 Image ATA 14-39	USC	
1938 Image ATA 15-1	USC	
1938 Image ATA 15-3	USC	
1938 Image ATA 15-5	USC	
1939 Image ATA 14-41	USC	
1939 Image ATA 14-43	USC	
1939 Image ATA 27-25	USC	
1939 Image ATA 27-27	USC	
1939 Image ATA 27-29	USC	
1939 Image ATA 27-31	USC	
1939 Image ATA 29-3	USC	
1939 Image ATA 29-5	USC	
1939 Image ATA 29-7	USC	
1939 Image ATA 29-9	USC	
1939 Image ATA 29-11	USC	
1939 Image ATA 31-2	USC	
1939 Image ATA 31-4	USC	
1939 Image ATA 31-6	USC	
1939 Image ATA 31-8	USC	
1938-39 Index Map	SREL	Complete
Sub-category -Base Layers\Imagery\1938-39photos\Rectified		
R1938 Image ATA 14-39	USC/SREL	Complete
R1938 Image ATA 15-1	USC/SREL	Complete
R1938 Image ATA 15-3	USC/SREL	Complete
R1938 Image ATA 15-5	USC/SREL	Complete
R1938 Image ATA 8-3	USC/SREL	Complete
R1938 Image ATA 8-4	USC/SREL	Complete
R1938 Image ATA 8-6	USC/SREL	Complete
R1938 Image ATA 8-75	USC/SREL	Complete
R1938 Image ATA 8-77	USC/SREL	Complete
R1939 Image ATA 27-27	USC/SREL	Complete
R1939 Image ATA 27-29	USC/SREL	Complete
R1939 Image ATA 27-31	USC/SREL	Complete

R1939 Image ATA 29-3	USC/SREL	Complete
R1939 Image ATA 29-5	USC/SREL	Complete
R1939 Image ATA 29-7	USC/SREL	Complete
R1939 Image ATA 31-2	USC/SREL	Complete
R1939 Image ATA 31-4	USC/SREL	Complete
R1939 Image ATA 31-6	USC/SREL	Complete
R1938-39 Mosaic Image	USC/SREL	Complete

Sub-category -Base Layers\Imagery\1950sphotos\Raw data

1955 Image ATA 1P 137	USC	
1955 Image ATA 1P 139	USC	
1955 Image ATA 1P 141	USC	
1955 Image ATA 1P 146	USC	
1955 Image ATA 1P 148	USC	
1955 Image ATA 1P 150	USC	
1955 Image ATA 2P 19	USC	
1955 Image ATA 2P 20	USC	
1955 Image ATA 2P 22	USC	
1955 Image ATA 2P 27	USC	
1955 Image ATA 2P 29	USC	
1955 Image ATA 2P 31	USC	
1955 Image ATA 2P 96	USC	
1958 Image OV 1 OR 20	USC	
1958 Image OV 1 OR 22	USC	
1958 Image OV 1 OR 25	USC	
1958 Image OV 1 OR 27	USC	
1950s Index map	SREL	Complete

Sub-category -Base Layers\Imagery\1960\70s Photos\Raw data

1968 Image OV 2 JJ 9	USC	
1968 Image OV 4 JJ 255	USC	
1970 Image ATA 1MM 74	USC	
1970 Image ATA 1MM 118	USC	
1970 Image ATA 1MM 120	USC	
1970 Image ATA 1MM 179	USC	
1970 Image ATA 1MM 181	USC	
1973 Image 173-91	USC	
1973 Image 173-96	USC	
1973 Image 173-137	USC	
1960s\70s Index Map	SREL	Complete

Sub-category -Base Layers\Imagery\1981Photos\Raw data

1981 Image 278-24	USC	
1981 Image 278-24L	USC	
1981 Image 278-24R	USC	
1981 Image 278-56	USC	
1981 Image 278-56L	USC	

1981 Image 278-56R	USC	
1981 Image 278-61R	USC	
1981 Image 278-62	USC	
1981 Image 278-62R	USC	
1981 Image 278-62L	USC	
1981 Image USDA 24	USC/SREL	Complete
1981 Image USDA 56	USC/SREL	Complete
1981 Image USDA 62	USC/SREL	Complete

Sub-category -Base Layers\Imagery\1989 Pre-Hugo

1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete
1989 NAPP	SREL	Complete

Sub-category -Base Layers\Imagery\1991 Post-Hugo

1991 NAPP	SREL	Complete
1991 NAPP	SREL	Complete
1991 NAPP	SREL	Complete
1991 NAPP	SREL	Complete
1991 NAPP	SREL	Complete
1991 NAPP	SREL	Complete

Sub-category -Base Layers\Imagery\DOQQ 1994

DOQQ Elloree NE	SCDNR	Complete
DOQQ Elloree NW	SCDNR	Complete
DOQQ Gadsden NE	SCDNR	Complete
DOQQ Gadsden NW	SCDNR	Complete
DOQQ Gadsden SE	SCDNR	Complete
DOQQ Gadsden SW	SCDNR	Complete
DOQQ Lone Star NW	SCDNR	Complete
DOQQ Poinsett State Park NE	SCDNR	Complete
DOQQ Poinsett State Park NW	SCDNR	Complete
DOQQ Poinsett State Park SE	SCDNR	Complete
DOQQ Poinsett State Park SW	SCDNR	Complete
DOQQ Wateree NE	SCDNR	Complete
DOQQ Wateree NW	SCDNR	Complete
DOQQ Wateree SE	SCDNR	Complete
DOQQ Wateree SW	SCDNR	Complete
DOQQ 1994 Index Map	SCDNR	Complete

Sub-category -Base Layers\Imagery\DOQQ Year1994\Raw Data

DOQQ Gadsden NW	SCDNR	Complete
DOQQ Gadsden SE	SCDNR	Complete
DOQQ Gadsden SW (not included)	SCDNR	
DOQQ Wateree SW	SCDNR	Complete
DOQQ Wateree SE (Unavailable from SCDNR)	SCDNR	

Sub-category Base Layers\Imagery\DOQQ\Year1994

DOQQ Gadsden SE (SID format)	SCDNR	Complete
DOQQ Gadsden SW (SID format)	SCDNR	Complete
DOQQ Wateree NE (SID format)	SCDNR	Complete
DOQQ Wateree NW (SID format)	SCDNR	Complete
DOQQ Wateree SE (SID format)	SCDNR	Complete
DOQQ Wateree SW (SID format)	SCDNR	Complete

Photo Index Summary**YEAR****STATUS**

1938, 1939	rectified composite (complete coverage with varying dates)
1943	available from USC but not acquired for COSW
1951, 1955, 1966, 1970	partial coverage un-rectified but acquired
1981	rectified (incomplete coverage, one date)
1989 pre Hugo	un-rectified (complete coverage, one date)
1991 post Hugo	un-rectified (complete coverage, one date)
1994 DOQQ	rectified (complete coverage, one date)
1999 DOQQ	un-rectified (incomplete coverage, one date)

1938 and 1939 Imagery

On 24 April 2002, SREL borrowed nineteen 1938 and 1939 black and white (B&W) aerial photographs from USC and scanned at .6 pixel size, or 600 dpi, 14-bit grayscale using an Epson Expression 1640XL. The image size was set to W5347 x H6537 pixels for all photographs. The Auto adjust and focus functions were used for each photo. The raw tifs were saved as 14- bit grayscale as opposed to the traditional 8-bit grayscale. A geo-referenced index maps were then created for locating and viewing individual photographs.

The following aerial photographs were scanned using the above specifications:

Frame	Date	Scale	Source
ATA 14-39	5/1938	1:20000	Unknown
ATA 15-1	5/1938	1:20000	Unknown
ATA 15-3	5/1938	1:20000	Unknown

ATA 15-5	5/1938	1:20000	unknown
ATA 27-25	3/1939	1:20000	unknown
ATA 27-27	3/1939	1:20000	unknown
ATA 27-29	3/1939	1:20000	unknown
ATA 27-31	3/1939	1:20000	unknown
ATA 29-3	3/1939	1:20000	unknown
ATA 29-5	3/1939	1:20000	unknown
ATA 29-7	3/1939	1:20000	unknown
ATA 31-2	3/1939	1:20000	unknown
ATA 31-4	3/1939	1:20000	unknown
ATA 31-6	3/1939	1:20000	unknown
ATA 8-3	5/1938	1:20000	unknown
ATA 8-4	5/1938	1:20000	unknown
ATA 8-6	5/1938	1:20000	unknown
ATA 8-77	5/1938	1:20000	unknown
ATA 8-75	5/1938	1:20000	unknown

The image ATA-27-27.tif was scanned in at 600 dpi using the same scanning equipment. This image was positive film instead of hardcopy photo. The image size was set to W6525 x H5348. These images were then rectified using the Geo-reference tool in ERDAS Imagine 8.5.

1943 Imagery

The USC's Geography Department has archived 1943 aerial photography for the COSW, however these were not borrowed by SREL for scanning or rectification due to time constraints.

1955/1958 Imagery

Seventeen 1955 and 1958 B&W air photo images were acquired from USC on 2 October 2002. These images were scanned at a resolution of .6 pixel size, or 600 dpi on an Epson Expression 1640XL. These photos were **not** rectified. See following index of individual frames scanned.

Frame	Date	Scale	Source
ATA-2P-96	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-2P-31	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-2P-29	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-2P-27	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-2P-19	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-2P-20	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-2P-22	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-1P-150	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-1P-148	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-1P-146	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service

ATA-1P-137	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-1P-139	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
ATA-1P-141	3/29/55	1"-1'-1320'	USDA, Soil Conservation Service
OV-1-OR-27	2/19/58	unknown	Unknown
OV-1-OR-25	2/19/58	unknown	Unknown
OV-1-OR-22	2/19/58	unknown	Unknown
OV-1-OR-20	2/19/58	unknown	Unknown

1968, 1970, and 1973 Imagery

Ten images for the years 1968, 1970, and 1973 were borrowed from USC on 2 October 2002 and scanned at 600dpi on an EPSON Expression 1640XL scanner. None of these images were rectified. See following index for list of individual frames.)

FRAME	TIME	DATE	SCALE	SOURCE	TYPE
OV-4JJ-255	n/a	3/4/68	unknown	Unknown	B&W
OV-2-JJ-9	n/a	3/4/68	unknown	Unknown	B&W
ATA-1MM-74	10:59	11/21/70	1:20,000	unknown	B&W
ATA-1MM-118	11:12	11/27/70	1:20,000	unknown	B&W
ATA-1MM-179	11:34	11/27/70	1:20,000	unknown	B&W
ATA-1MM-120	11:14	11/27/70	1:20,000	unknown	B&W
ATA-1MM-181	11:36	11/27/70	1:20,000	unknown	B&W
A40-45017-173-137	n/a	2/24/73	unknown	unknown	B&W
A40-45017-173-91	n/a	2/24/73	unknown	unknown	B&W
A40-45017-173-96	n/a	2/24/73	unknown	unknown	B&W

1981 Imagery

Three 1981 B&W images were acquired from USC on 25 September 2002 and scanned and rectified. SREL prepared an index map for these images for locating individual frames for easier retrieval and loading. The 1994 DOQQs were used as a source for ground control points.

1994 Imagery

The 1994 false color infrared DOQQs provided by the COSW were used extensively for photo interpretation in developing data layers. SREL prepared an index map for these images for location and easier retrieval and loading.

Figures 3a and 3b below illustrate examples of historical and more recent images that the COSW has in their digital inventory. SREL made a mosaic of the 1981 photography for display and photo interpretative purposes (Fig. 3a).

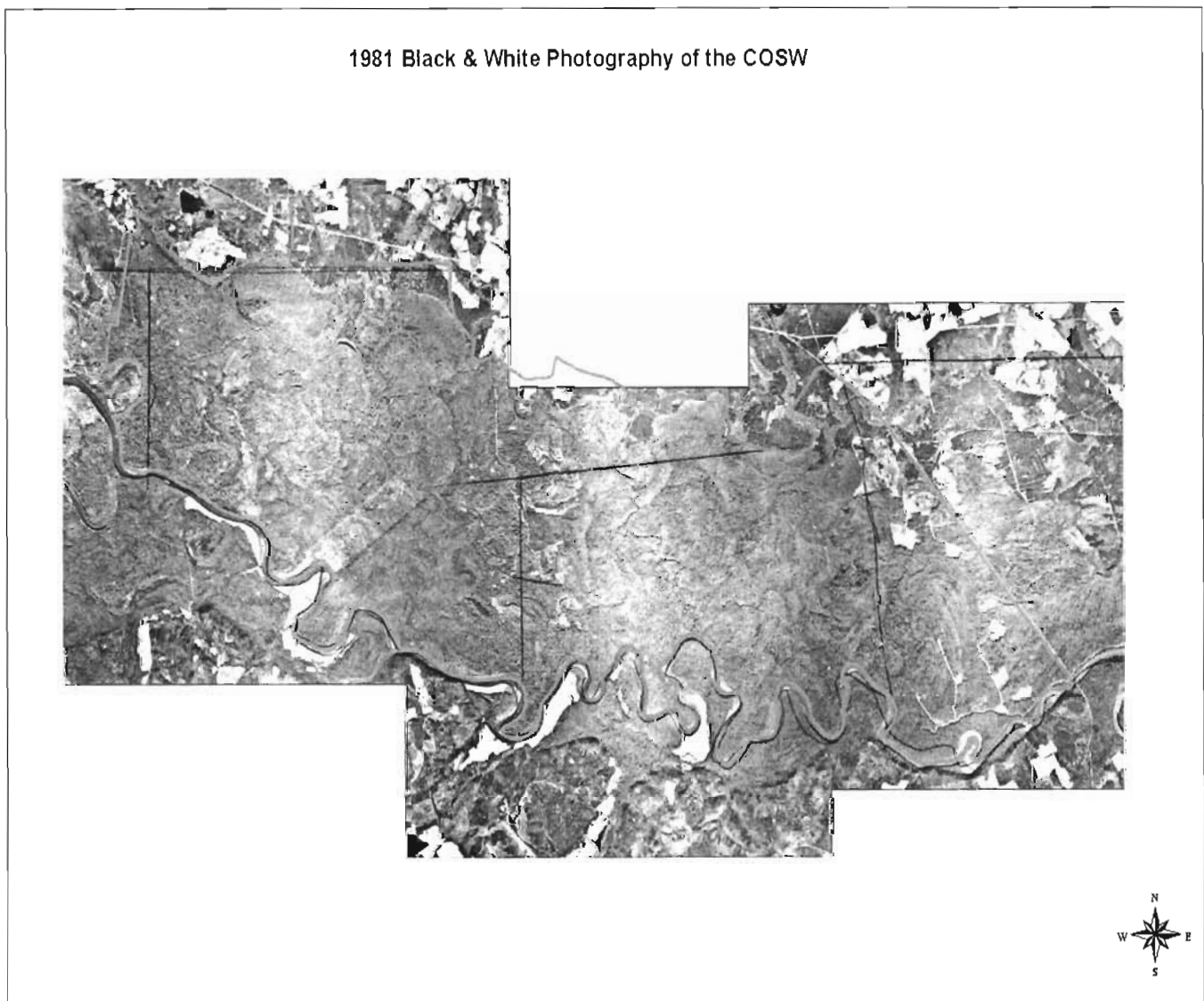


Figure 3a. Rectified 1981 B&W photos of the COSW.

The 1994 color infrared DOQQs were also combined for display and photo interpretive purposes (Fig. 3b).

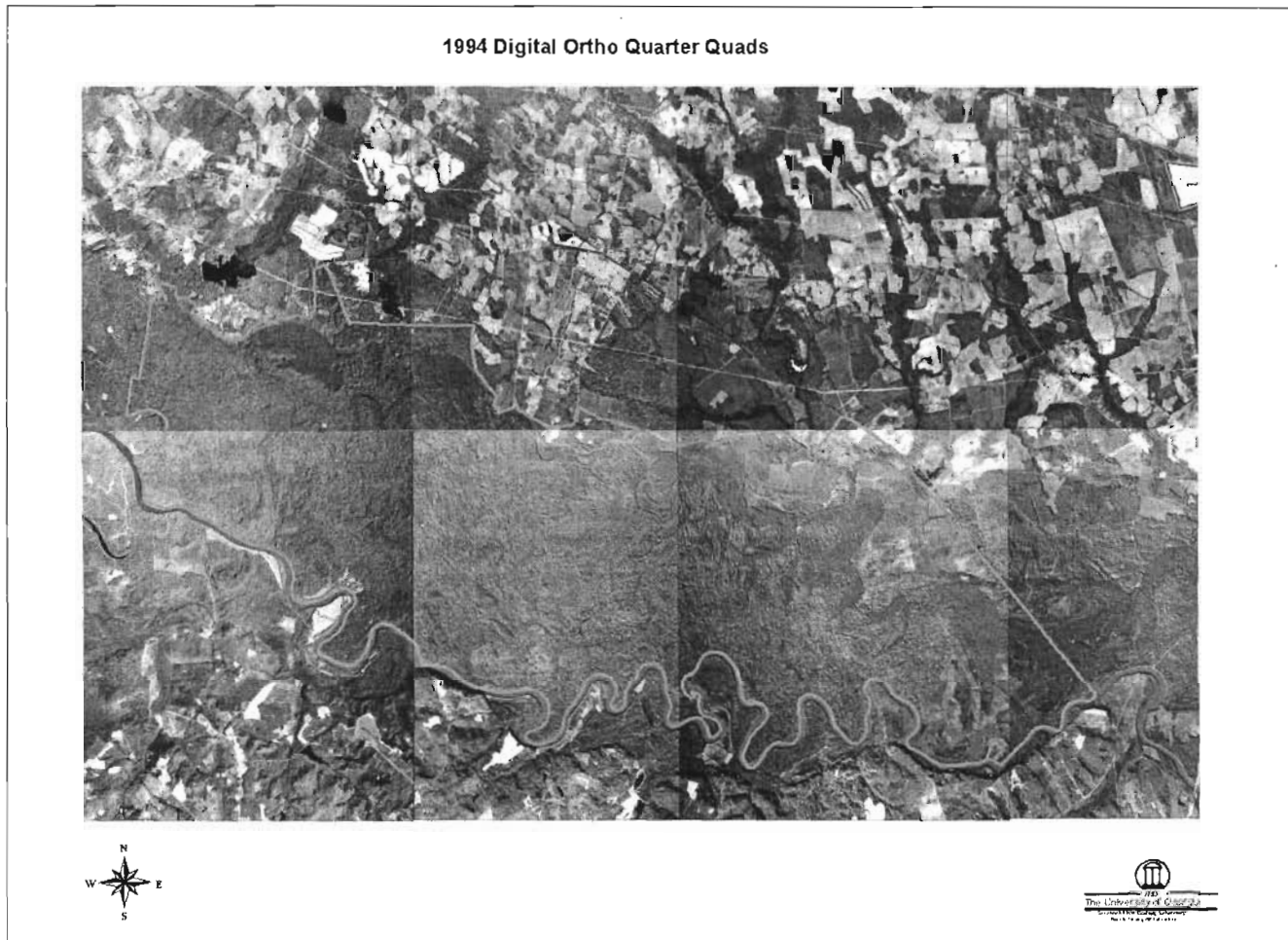


Figure 3b. 1994 color infrared DOQQs of the COSW.

1999 Imagery

The compressed (Mr.SID) 1999 false color infrared DOQQ files were downloaded from the SCDNR GIS web page. According to the SCDNR Land Resources office in Columbia, no metadata are available for these images. These file were in NAD27 and SREL re-projected them into NAD83 for the COSW. The original photos (contact prints), with the exception of the Gadsden NE quad, were checked out from the SCDNR and scanned using an Epson Expression 1640XL scanner. These three 9.01 x 9.01 photos were scanned at 2032 dpi to give a .5 pixel size. The 1999 DOQQs photos are 1:40000 scale, flown at 20,000 ft. Note: The Mr.Sid extension tool should be loaded to view these file types. The Gadsden NE quad was missing from the SCDNR inventory and was unaccountable. If this frame is needed by the

COSW in the future, then SREL recommends the COSW make a formal written request for the SCDNR to initiate a search to recover this print.

Satellite Imagery

For locating available satellite imagery for the COSW area, the NPS has a website that provides a database that provides a description of imagery types as well as links for user location of imagery. The metadata for each image located is recorded and saved in this database, including the imagery entity number, the coordinates of the area covered by the image, the date the image was acquired, and the cost. See Web site http://www.nps.gov/gis/nps_imagery_data_base.htm.

Administrative Category Development

Within the Administrative category, eight themes are listed, four of which were developed or modified by SREL (Table 3; Appendix A).

Table 3. NPS Theme Manager GIS Database for the Administrative Category

THEME NAME	THEME ORIGINATOR(S)	STATUS
NPS Boundary Line (line)	NPS-SERO	Complete
NPS Boundary Line (Polygon)	NPS-SERO	Complete
Parcel Tract Map	NPS-SERO	Complete
Authorized Wilderness Boundary	NPS-SERO	Complete
GPS Boundary Locations	SREL/NPS-COSW	Working
Land Holdings 2002	SREL	Complete
Current Boundary (Polyline)	SREL	Working
Current Boundary (Polygon)	SREL	Working

Special Layer Development

Boundary layer -The NPS's Authorized boundary layer that was developed by the NPS-SERO totals 21697.47 acres (8,881 ha) and includes all the parcels (including the three or four parcels still not acquired) that have been incorporated into the COSW authorized boundary. SREL reviewed this layer for accuracy when overlaying with photography and determined that not all of certain features (historic dikes) were within the authorized layer. SREL attempted to clarify this discrepancy between boundary shape files by producing a large color poster of the COSW with the two boundary layers overlain with the 1994 DOQQ photos in order to show where the boundary differences were. The Congaree River boundary is the most difficult to establish and maintain since it changes over time and SREL digitized the river boundary off the 1994 DOQQs since it is some of the better rectified imagery. SREL also digitized the COSW eastern boundary based on a 50 foot right of way (Lewis Prettyman, personal communication) from the railroad track centerline. With the help of COSW personnel, SREL GPSd located boundary monuments to verify and improve this layer. The area for the resulting layer that

SREL developed totals 21,665 acres (8,767.8 ha). The difference between this and NPS-SERO layer is 32.39 acres (13.11ha). There are additional GPSd points needed to further improve this layer but time did not permit and because these points would have to be located by COSW personnel in order for SREL to GPS these corners. If you subtract the NPS-SERO layer from Regions latest acreage (21,773.34 acres; 8,811.67ha), there is a 76 acre (30.75 ha) difference or approximately the same acres as parcels 101-13, 101-15, and 101-16 (78.59 acres) which is part of the recently acquired and GPSd Burnside tract. SREL's contract time did not permit a resolution of this boundary area so Figures 4a-4d are illustrations of where COSW boundary adjustments were made by SREL and where GPS locations are needed to improve and finalize this boundary layer.

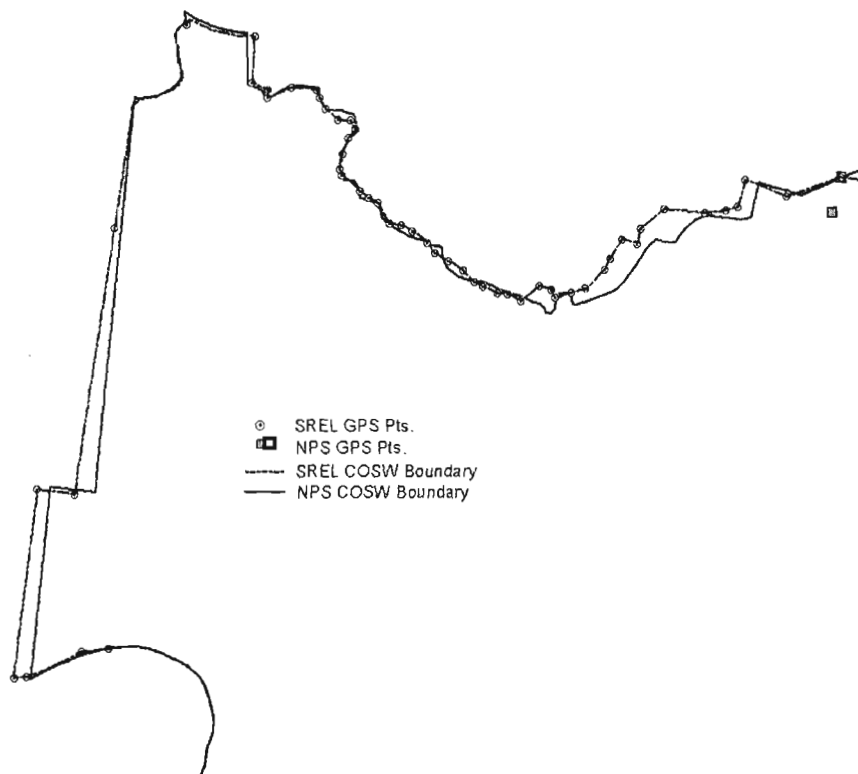


Fig. 4a. GPS points along the northwestern boundary section of COSW.

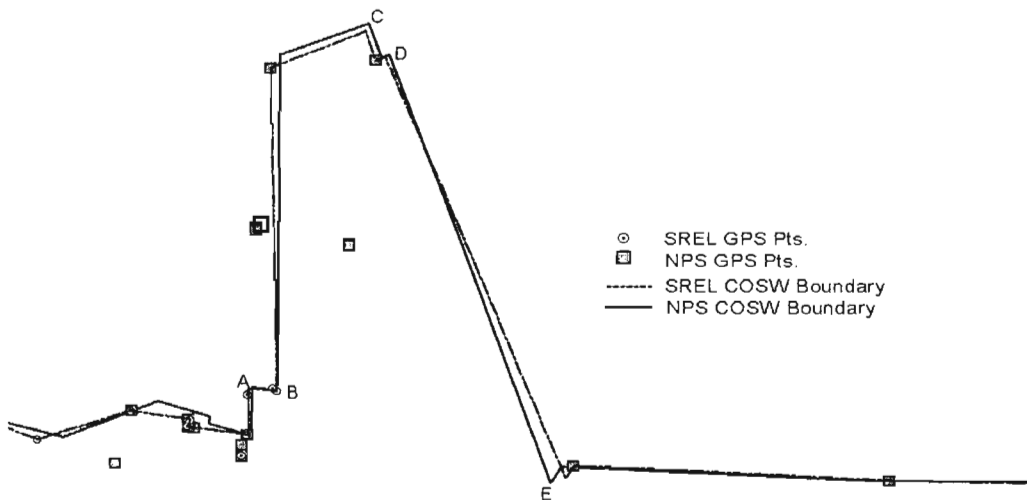


Fig. 4b. GPS points along the Administrative/entrance road boundary section of the COSW.

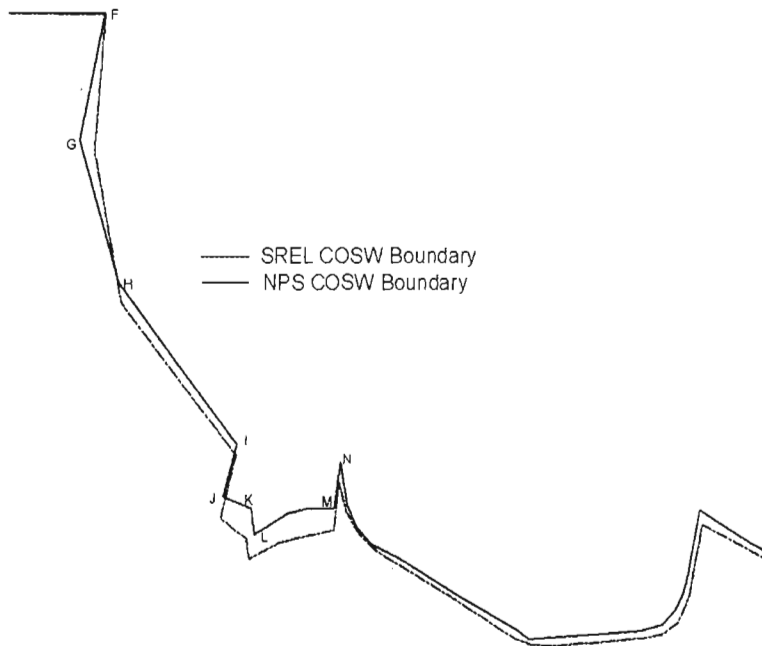


Fig. 4c. Recommended GPS points along the north-central boundary section of the COSW.

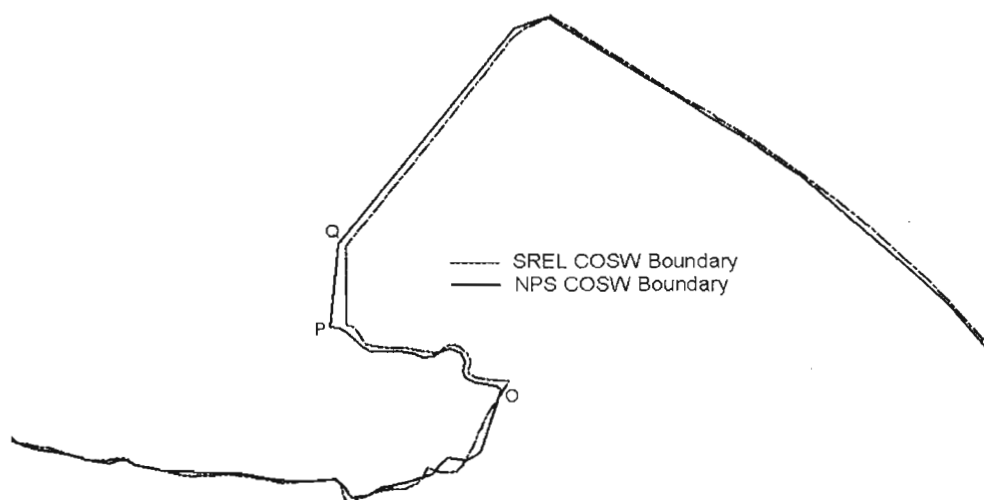


Fig. 4d. Recommended GPS points along the northeastern Railroad boundary section of the COSW.

Maintenance Category Development

Within the Maintenance category, 61 themes and graphics are listed, of which 13 were developed or modified by SREL (Table 4; Appendix A.) These themes were grouped under eight sub-categories which included Access Points, Building locations, General Areas Roads, Signs, Structures\Misc, Trails, and Well Locations.

Table 4. NPS Theme Manager GIS Database for the Maintenance Category

THEME NAME	THEME ORIGINATOR(S)	STATUS
Sub-category – Maintenance \Access Points		
Boat Landing at Hwy 601 Bridge	NPS-COSW	Complete
Boat Launch Site	NPS-COSW	Complete
Private and NPS Gates	NPS-COSW	Complete
Public Canoe Access	NPS-COSW	Complete
Stump Gut Access	NPS-COSW	Complete

Sub-category – Maintenance\Building locations

All Buildings on the COSW	SREL	Complete
Dawson Cabin	NPS-COSW	
Fire Building	NPS-COSW	
Fire Suppression Building	SREL	Complete
Maintenance Materials Building	SREL	Complete
Maintenance Office Building	SREL	Complete
Maintenance Shed Building	SREL	Complete
New Harry Hampton Visitor Center	NPS-COSW	Complete
New Visitor Center Pump House	SREL	Complete
Old Bathroom Locations	NPS-COSW	Complete
Old Ranger Station Pump House	NPS-COSW	Complete
Picnic Shelter Building	NPS-COSW	Complete
Ranger Station (Learning Center)	NPS-COSW	Complete
Wheelchair Accessible Restrooms	NPS-COSW	Complete
JPEG image of Utilities and Facilities	SREL/NPS-COSW	Complete

Sub-category - Maintenance\General Areas

After Hours Parking Area	SREL	Complete
Barrow Pit Perimeter	NPS-COSW	Complete
Dawson Cabin Field	NPS-COSW	Complete
Dawson Cabin Research Area	SREL	Complete
Education Center Parking Lot	NPS-COSW	Complete
Entrance Road Island	SREL	Complete
Fields of the Goff-Sox Tract	NPS-COSW	Complete
Hunt Club Field	NPS-COSW	Complete
Paved Pathways	NPS-COSW	Complete
Native Butterfly Garden	NPS-COSW	Complete
Old Boardwalk Parking Area	NPS-COSW	Complete
Old Shooting Range	NPS-COSW	Complete
Staff Parking Lot	NPS-COSW	Complete
Trailer Pad	NPS-COSW	Complete
Water Sites for Pumping		To be developed
Dumping Sites		To be developed
Wayside Exhibits		To be developed

Sub-category - Maintenance\Roads

GPS Roads	NPS-COSW	Complete ✓
National Park Road and Bluff Trail Extension Intersection	NPS-COSW	Complete
Old Bluff Road and Caroline Sims Road Intersection	NPS-COSW	Complete
Old Bluff Road Intersections	NPS-COSW	Complete
South Cedar Creek and Dawson Cabin Road Intersection	NPS-COSW	Complete
South Cedar Creek and Gay Road Intersection	NPS-COSW	Complete

Sub-category - Maintenance\Signs

Main Entrance Signs	SREL	Complete
Park Maintained Road Signs	NPS-COSW	Complete
Park Maintained Trail Signs	NPS-COSW	Complete
Research Markers for Crest Gages	NPS-COSW	Complete

Sub-category - Maintenance\Structures\Misc.

Abandoned Car	NPS-COSW	Complete
Fire Weather Tower	NPS-COSW	Complete
Maintenance Area Fence	NPS-COSW	Complete
New Location of Air Quality Monitoring Tower	NPS-COSW	Complete
Old Location of Air Quality Monitoring Tower	NPS-COSW	Complete
Old Shooting Range Features	NPS-COSW	Complete
Points of Interest	NPS-COSW	Complete
Radio Tower	NPS-COSW/SREL	Complete
Remains of Old Truck	NPS-COSW	Complete
Winch Mechanism	NPS-COSW	Complete

Sub-category - Maintenance\Trails

Developed Trails	NPS-COSW/SREL	Complete
Maintenance Foot Trails	SREL	Complete
Trail Bridges	NPS-COSW	Complete

Sub-category - Maintenance\Well Locations

Dawson Cabin Well	NPS-COSW	Complete
Education Center Well	NPS-COSW	Complete
Old Hunt Club Well	NPS-COSW	Complete
USGS Wells	USGS/SREL	Complete

Natural Resource Category Development

Within the Natural Resources category, 58 themes and graphics populate the TM, of which 34 were developed or modified by SREL (Table 5; Appendix A.) These themes were grouped under 11 sub-categories. These sub-categories are Biophysical Air Monitoring Flora, Hydrology, Monitoring Pest, Soil Monitoring, Water Monitoring, Fire Management Units, Research Flora and Fauna, Sensitive Flora and Fauna, and Special Ecology Areas. There are five restricted layers in this category.

Table 5. NPS Theme Manager GIS Database for the Natural Resources Category.

THEME NAME	THEME ORIGINATOR(S)	STATUS
Theme Category-Natural Resources/Biophysical Air Monitoring		
New Location of Air Quality Monitor	NPS-COSW	Complete
Old Location of Air Quality Monitoring	NPS-COSW	Complete
Sub-category -Natural Resources/Biophysical Flora		
Pine Plantations on the COSW	SREL/TNC	Complete
Vegetation Map (TNC)	USGS/NPS/TNC	Complete
JPEG Image of TNC Vegetation	SREL/TNC	Complete
Index of Air Photos for USGS/TNC Vegetation Map	USGS/NPS/TNC	Complete
Graphic of Vegetation Mapping	USGS/NPS/TNC	Complete

COSW Vegetation Photographs	USGS/NPS/TNC	Complete
Pre-settlement Vegetation	UNC/Frost	Complete
JPEG Image of Pre-settlement Vegetation	UNC/Frost	Complete
Fire Frequency	UNC/Frost	Complete
JPEG image of Fire Frequency Vegetation	UNC/Frost	Complete

Sub-category –Natural Resources/Biophysical Hydrology

Cedar Creek	NPS-COSW	Complete
Congaree River	NPS-COSW	Complete
Lakes Located on the COSW	SREL	Complete
Sam's Pond	NPS-COSW	Complete
Water Bodies	NPS-COSW	Complete
Hydrology derived from LIDAR	SREL	Complete

Sub-category –Natural Resources/Biophysical Monitoring Pests

1991 Southern Pine Beetle Infestation	NPS-COSW	Complete
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Sub-category –Natural Resources/Biophysical Soil Monitoring

Soil Contaminant Testing Sites	NPS-COSW	Complete
Soil Testing Sites	NPS-COSW	Complete

Sub-category –Natural Resources/Biophysical Water Monitoring

14 Water Sampling Sites	USGS/NPS-COSW/SREL	Complete
Crest Gauges	NPS-COSW/SREL	Complete
Water Sampling Site for the USGS	USGS/NPS-COSW/SREL	Complete
River Transect Sampling Sites	USGS/NPS-COSW/SREL	Complete
Real Time Gauging Station 1	USGS/NPS-COSW/SREL	Complete
Real Time Gauging Station 2	USGS/NPS-COSW/SREL	Complete
Sediment Traps	USGS/NPS-COSW/SREL	Complete
USGS Water Gauging Stations	USGS/NPS-COSW/SREL	Complete
Biological Monitoring Stations (SCDHEC)	SCDHEC/NPS-COSW/SREL	Complete
Potential Ground Contamination Sites (SCDHEC)	SCDHEC/NPS-COSW/SREL	Complete
National Pollutant Discharge Elimination System Permits (SCDHEC)	SCDHEC/NPS-COSW/SREL	Complete
Surface Water Intakes (SCDHEC)	SCDHEC/NPS-COSW/SREL	Complete
Water Quality Monitoring Stations (SCDHEC)	SCDHEC/NPS-COSW/SREL	Complete
USGS Wells	USGS/NPS-COSW/SREL	Complete

Sub-category –Natural Resources/Fire Management Units

Prescribed Burn Area (RCW)	NPS-COSW	Complete
Prescribed Burn Areas for 2002	SREL/NPS-COSW	Complete

Sub-category –Natural Resources/Research Fauna

Feral Hog Disturbance Monitoring Plots	Clemson/RPI	Complete
Active Feral Hog Disturbance Monitoring Plots	Clemson/RPI	Complete
Trap Sites for Hawkmoth Study	SCDNR	Complete
Herp Cover Boards	SREL/NPS-COSW	Complete
Drift Fences for Herp Study	NPS-COSW	Complete
Center of the DNR MAPS Study	SCDNR	Complete
Study Area for the DNR MAPS Project	SCDNR	Complete
DNR Fish Study 2000	SCDNR	Complete

DNR Fish Study 2001	SCDNR	Complete
DNR Fish Study Footbridge	SCDNR	Complete
RCW Cavity locations *RESTRICTED		Incomplete

Sub-category -Natural Resources/Research Flora

Vegetation Plots (Thompson)	SREL	Complete
Vegetation Plot Research Markers (Thompson)	SREL	Complete
Forest Dynamics Plots (Sharitz)	SREL	Complete

Sub-category -Natural Resources/Sensitive Flora and Fauna

Carolina Bogmint Locations *RESTRICTED	NPS-COSW/NC NHP	Complete
Bachman's Warblers Locations *RESTRICTED	NPS-COSW	Complete
Threatened and Endangered Plants *RESTRICTED	NPS-COSW/Terra Incognita	Complete
Populations of Milkweed *RESTRICTED	SREL/NPS-COSW	Complete

Sub-category -Natural Resources/Special Ecological Areas

Big Cypress Stand	SCDNR/NPS-COSW	Complete
Big Tree Locations	RPI/ B. Jones	Complete
SAF Natural Area	SREL/SAF	Complete
Layout of SAF Natural Area	SREL/SAF	Complete

The following figures are sample illustrations of some of the natural resources and special areas of the COSW. Figure 5 shows the soil types for the COSW and illustrates with an extended 500 meter area to show continuity of soils with bordering properties.

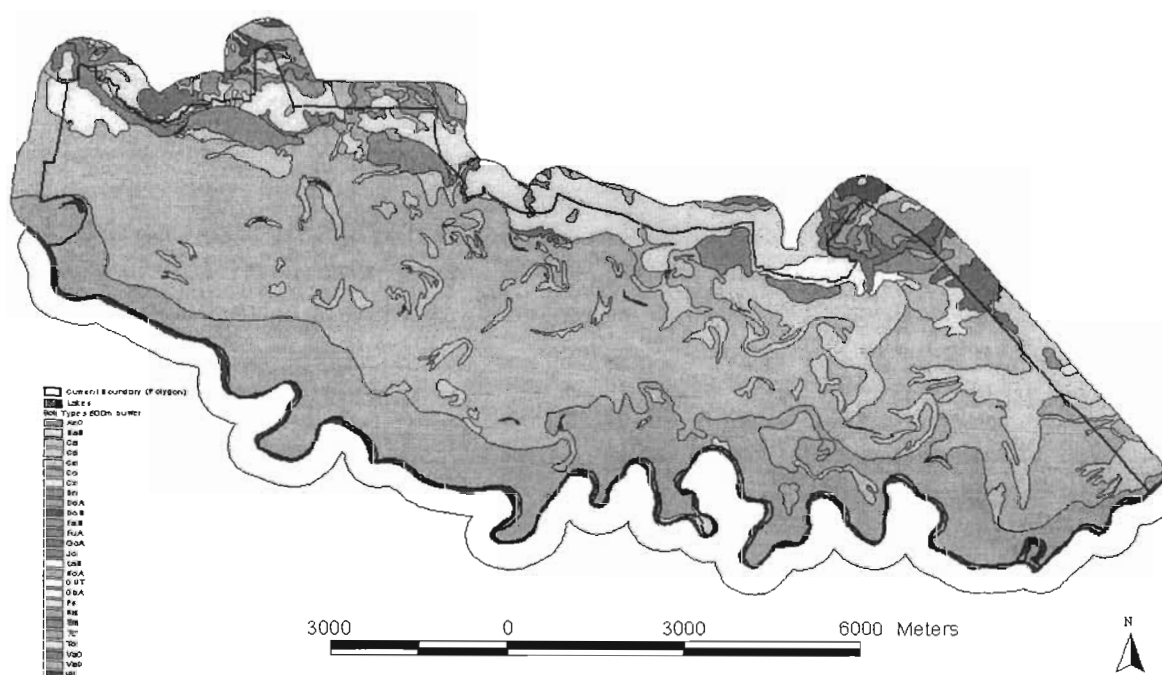


Figure 5. Soils of the COSW.

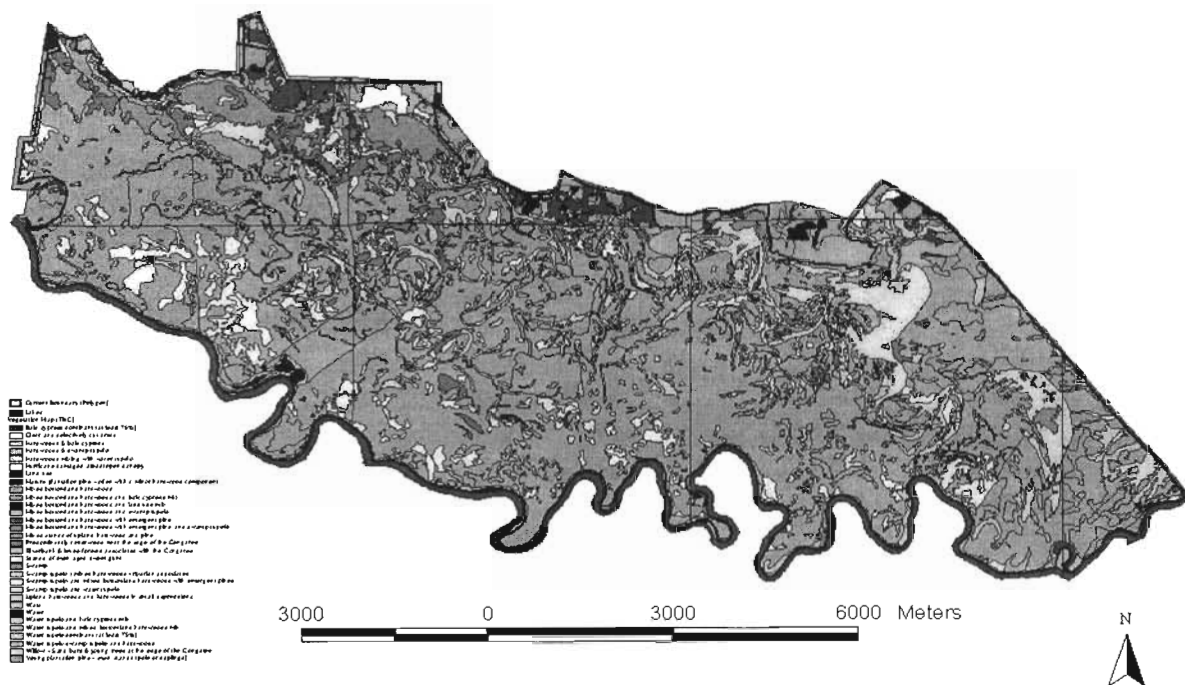


Figure 6. TNC and USGS-BRD Vegetation communities of the COSW.

Figure 6 illustrates the various vegetation communities that were delineated and classified by the Nature Conservancy.

Special Layer Development

SAF Natural Area -For developing the GIS layer for the SAF Natural Area on the COSW, SREL and MeadWestvaco staff determined the boundaries of the SAF Natural Area by GPSing the only two known corners of the Area and then defined the remaining boundaries by named trails and hydrologic features (Fig. 7).

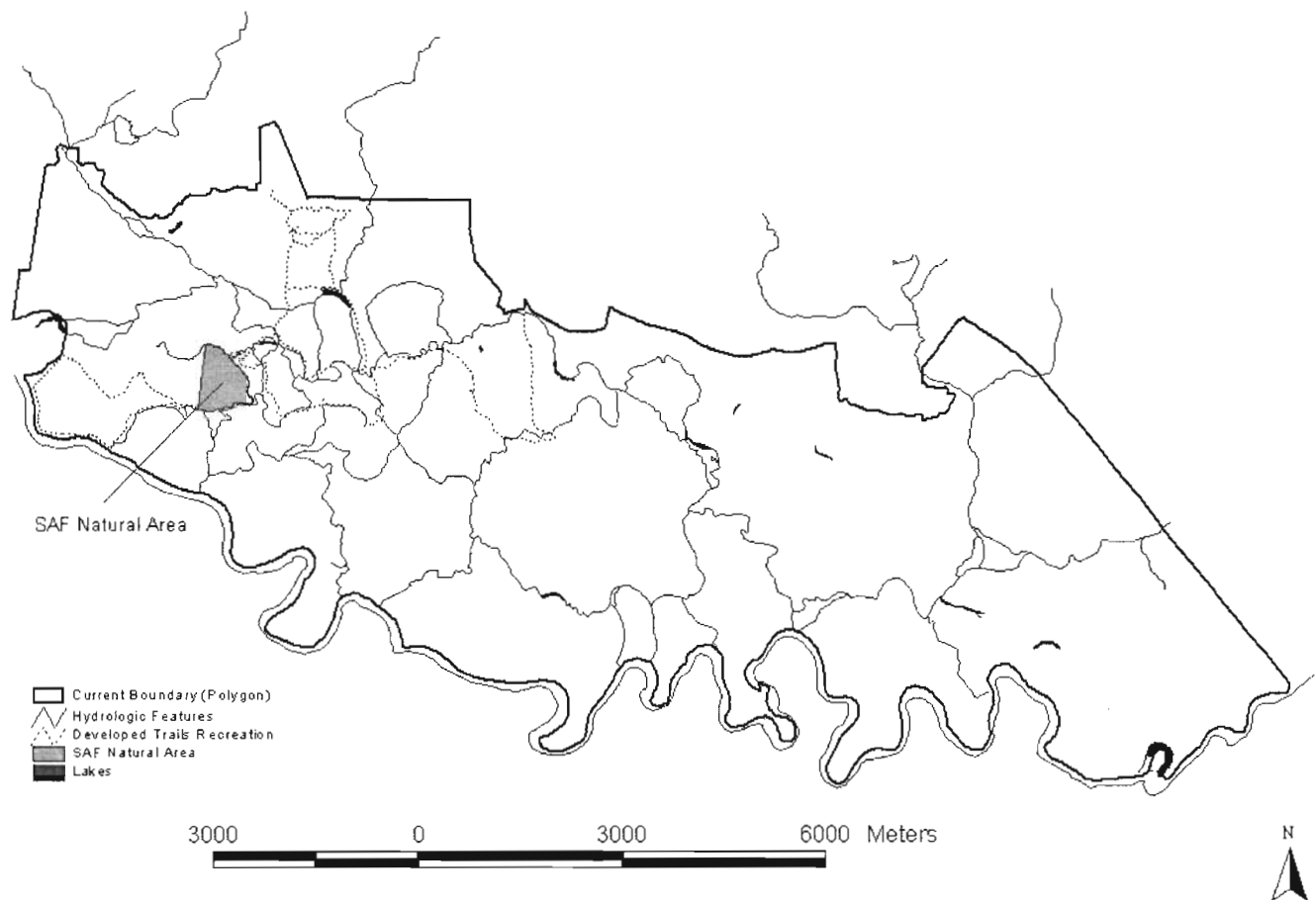


Figure 7. Location of the SAF Natural Area on the COSW.

As shown in Figure 8, SREL developed a Wetland layer for the COSW by merging hydric soils from the Soils layer with the NWI wetland vegetation and then merging this layer with a wetland depression layer that SREL created.

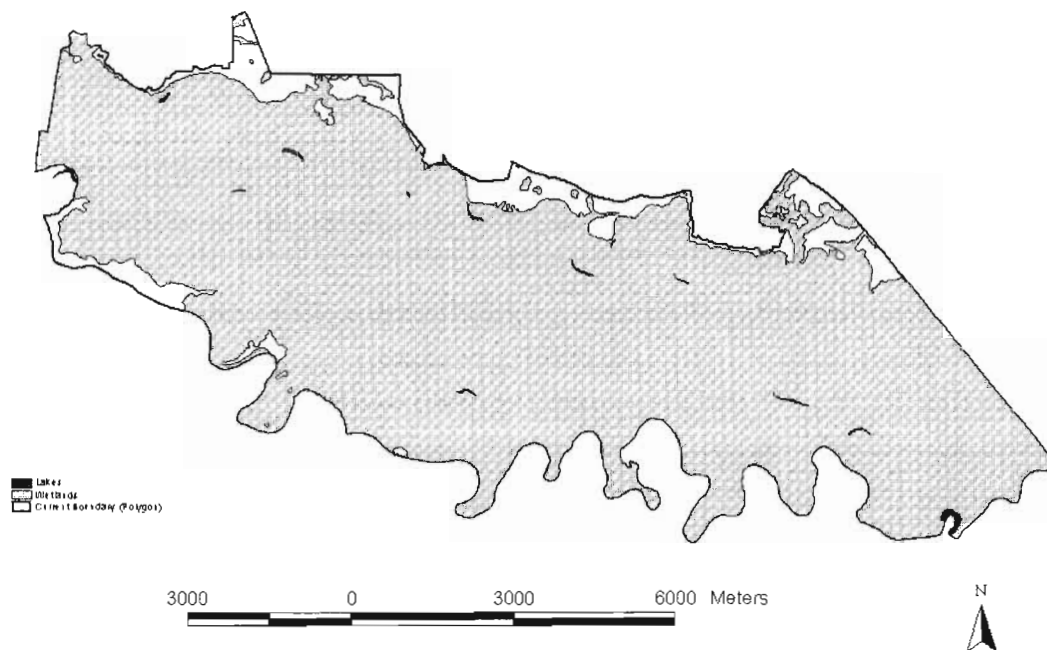


Figure 8. Wetlands of the COSW.

Cultural Resources Category Development

Within the Cultural Resources category, 9 themes populate the TM, of which 6 were developed or modified by SREL (Table 6; Appendix A.). The Historic Logging layer is still a work in progress and is being completed on a volunteer basis. There are six restricted layers in this category.

Table 6. NPS Theme Manager GIS Database for the Cultural Resources Category.

THEME NAME	THEME ORIGINATOR(S)	STATUS
Cultural Res. Inventory and Assessment *RESTRICTED	USC/NPS-COSW	Complete
Old Road Beds * RESTRICTED	SREL	Working
Cattle Mounds *RESTRICTED	SREL	Working
Historic Dikes *RESTRICTED	SREL	Working
Historic Ditches *RESTRICTED	SREL	Working
Historic Structures *RESTRICTED	SREL	Working
Historic Logging	SREL	Work in progress
Historic Landmarks (including trails)		
Archaeological Investigations		

Special Layer Development

Archeological Investigations - SREL prepared a letter for the COSW to send to John Leader of the USC Institute of Archaeology requesting known locational information of archaeological sites within the Monument. The purpose of securing this digital information was to compare and update COSW's Cultural Resources and Inventory theme layer to that provided by the NPS. A new layer would then be developed for documenting the location of these cultural resources to aid in their management and protection. The layer was to have restricted access; to date, no response has been received from the USC Institute (personal communication, Martha Bogle, COSW park superintendent).

Cattle Mounds - The following cattle mounds were identified by name: Big Lake Cattle Mound, Brady's Cattle Mound, Cattle Mound #6, Cook's Lake Cattle Mound, Cooner's Cattle Mound and Dead River Cattle Mound. These historical structures found within the boundary of the COSW were entered the National Register of Historic Places on 25 January 1996. SREL identified the majority of these mounds on the Cely (2001) map, then verified them with the LIDAR contours layer and digitized them in for location purposes. The only mound not detected with the LIDAR was the Cook's Lake Cattle Mound, and it is questionable if this mound is actually on the COSW. Photo interpretation from the 1996 DOQQ's showed a ditched, perhaps raised area, east of Cook's Lake and in the vicinity of where John Cely drew a cattle mound. The LIDAR did show a pronounced elevated area on the edge of Cook's lake but this location is outside the COSW boundary. The layer should be recommended for restricted access due to the recognized historical significance of the mounds.

Archived Data

Within the Archived Data category, 39 themes populate the TM, of which 4 were developed or modified by SREL (Table 7; Appendix A.) The themes were grouped under 3 sub-categories that which include Archived, CAD, and Lacy Report.

Lacy Report

The 1995 Lacy Report (Lacy et al., 1995) generated a number of GIS datasets that were to serve as management tools for the COSW and ultimately as the foundation layers for the COSW GIS program. SREL was tasked to assess the digital data and imagery associated with the Lacy Report for accuracy and geo-reference overlay purposes. In addition, SREL developed the metadata for all these datasets associated this report. The digital data and metadata was provided to the COSW on CD with the recommendation that these data be archived after it was determined that neither the layers or imagery were usable for GIS purposes.

Table 7. NPS Theme Manager GIS Database for the Archived Category.

THEME NAME	THEME ORIGINATOR(S)	STATUS
Archived Data		
Historic USGS 1 Foot Contours	SREL	Complete
Congaree Elevation Points	SREL	Complete
Historic USGS DEM	SREL/USGS	Complete
Park Structures and Areas	NPS-COSW	Complete
GPS Control Points	SREL	Complete
Sub-category -Archived Data\Cad Layers		
NPS Boundary (CAD)	NPS-SERO	Complete
Adjusted Park Boundary (CAD)	NPS-SERO	Complete
Bluff Line (CAD)	NPS-SERO	Complete
Building Locations (CAD)	NPS-SERO	Complete
Development Zone (CAD)	NPS-SERO	Complete
Tract Map (polyline) (CAD)	NPS-SERO	Complete
COSW miscellaneous (CAD)	NPS-SERO	Complete
Old Boundary (CAD)	NPS-SERO	Complete
Railroads (CAD)	NPS-SERO	Complete
RCW area (CAD)	NPS-SERO	Complete
Roads (CAD)	NPS-SERO	Complete
Old Wilderness Boundary (CAD)	NPS-SERO	Complete
Wilderness Boundary (CAD)	NPS-SERO	Complete
Wilderness Spot (CAD)	NPS-SERO	Complete
Parcels (CAD)	NPS-SERO	Complete
Sub-category -Archived Data\Lacy Report		
Lacy Legal Monument Boundary	NPS-SERO (1994)	Complete
Elevation (Contours)	USGS/WRD -1985	Complete
Surface Hydrology	USGS/WRD -1985	Complete
Soil Types	USDA/NRCS (1978)	Complete
NWI Wetland Types	USFWS/NWI (1983)	Complete
Trails and Boardwalks	SCDNR	Complete
Vegetation Types	Smathers/Gaddy (1976)	Complete
Geo-rectification of SPOT Satellite Imagery	SCDNR/SPOT (1988-90)	Complete
Satellite Imagery-Land Cover/Land Use (Unsup.class.)	SCDNR/SPOT (1988-90)	Complete
Satellite Imagery-Land Cover/Land Use (Supervised class.)	SCDNR/SPOT (1988-90)	Complete
Ground Control Points	SCDNR (1992-1994)	#
Survey Monuments	USGS/SCDOT (1976-88)	#
Pre-Hugo NAPP Photo (1)	SCDNR/SREL/USGS (1989)	#
Post-Hugo NAPP Photo (1)	SCDNR/SREL/USGS (1991)	#
Pre-Hugo NAPP Photo (2)	SCDNR/HAS/USGS (1989)	#
Post-Hugo NAPP Photo (2)	SCDNR/HAS/USGS (1991)	#
Land Cover/Land Use	SCDNR/EOSAT (1990-92)	#
Digital Line Graph	USGS/SCDNR (1983)	#
Points of Interest	SCDNR (1992-1994)	#

Hardcopy Notebooks

During the course of this project, SREL made a significant effort to compile notebooks that would accompany this report and serve as a user reference tool. The five notebooks contain hardcopies of all the GIS layers that have been acquired or recently developed for the COSW. Compiled under each TM category, theme layers were printed as a layout with the COSW boundary base layer as a backdrop. The print outs were followed by the layer's metadata. Examples of geo-referenced imagery were also produced.

IV. GIS Plan Implementation

The implementation of GIS requires the acquisition of data, computer hardware, software, and staff. Presently the COSW GIS program consists of 1 individual with collateral duties. This individual is responsible for the coordination and management of COSW hardcopy maps, imagery and digital geo-spatial databases. The current hardware and software employed by the COSW to support this GIS program is a DELL Precision computer (hard drive size 120 GB) with Windows XP Pro operating system. This system includes both a CD and DVD with read/write capabilities, a 3 1/2" floppy and Iomega Zip 250 drive. Supportive peripherals include a HP 1050C Designjet plotter, HP Laserjet 4100dtn and HP Colorjet 5M. GPS units include 1 Trimble Pro XR, 1 Geo Explorer III, and 3 Garmin E-Trex Summits. Software that is devoted to the GIS includes ArcView 3.2a, Microsoft Office XP (Microsoft Word, Excel, Access, and Powerpoint), Trimble Office Software (Pathfinder Office 2.51) and Adobe Reader 6.0.

Extension tools required to be loaded into an ArcView session for viewing theme layers, loading imagery, and creating metadata respectively include: NPS Theme Manager, ERDAS Imagine Image Support, ESRI Spatial Analysis, and NOAA Metadata Collection Tool. It is anticipated that NPS software upgrades in the near future will include Arc GIS and Image Analysis Extension tool. In the event the NPS requires the COSW to replace ArcView with ArcGIS, and it is determined that the NPS Theme Manager interface software is incompatible with ArcGIS, then themelists may be created using MicroSoft Access software using old ArcView themelists and importing those .dbf files into Access. A good contact for clarification on using .dbf files and MS Access is Danelle Malget, GIS Specialist with the NRID Inventory and Monitoring Program.

Posting of Themes and Metadata

There are specific issues that the COSW will need to address in terms of data management and posting of data to the NPS GIS clearinghouse. These issues are addressed at http://www.nps.gov/gis/data_info/posting.html. In deciding which layers to post, Sensitive, Classified, or Restricted data should not be sent to the Clearinghouse servers for distribution. For posting digital geo-spatial data, themes and metadata to the NPS GIS Data Clearinghouse, the COSW will need to contact Bill Slocumb, at North Carolina State University's GIS Research and Teaching Program. Upon approval of this report and program plan, COSW will provide SREL with a list of identified, completed GIS layers with metadata they have determined to be posted at the NPS Clearinghouse. Table 8 is a list of possible layers that has been considered for posting.

Table 8. Listing of COSW GIS Layers, Imagery, and Metadata that are being considered for posting to the NPS Clearinghouse.

Administrative

NPS Boundary Line (Polygon)
Authorized Wilderness Boundary

Base Layers

Roads
River Mile Markers for the Congaree River
DRG - Gadsden Quad
DRG - Wateree Quad
Contours derived from LIDAR
DEM - Gadsden Quad
DEM - Wateree Quad
Hydrologic Features
Wetlands
NWI Layer 500m Buffer
Hydric Soils 500m Buffer
Soil Types 500m buffer
Developed Trails
Canoe Access
Canoe Trail Public
Congaree River

Imagery

R1938-39 Mosaic Image
1981 Image USDA 24
1981 Image USDA 56
1981 Image USDA 62
1994 DOQQ Gadsden NE
1994 DOQQ Gadsden NW
1994 DOQQ Gadsden SE
1994 DOQQ Gadsden SW
1994 DOQQ Wateree NE
1994 DOQQ Wateree NW
1994 DOQQ Wateree SE
1994 DOQQ Wateree SW

Maintenance

Private and NPS Gates
New Harry Hampton Visitor Center
Picnic Shelter Building (Learning Center)
Ranger Station (Learning Center)
GPS Roads
Trail Bridges
USGS Wells

Natural Resources

Vegetation Map (TNC)

Pre-settlement Vegetation

Lakes Located on the COSW

Water Bodies

Water Quality Monitoring Stations (SCDHEC)

SAF Natural Area

V. Recommendations

A GIS program without organization and standards quickly becomes too cumbersome to manage and then useless to serve out data. Metadata prevents this from happening and should be a standard not overlooked. Since a considerable amount of time was invested in creating metadata for this plan, COSW should continue this standard and ensure metadata is created for each GIS data layer that is developed by the unit's employees or by its contractor, a cooperator or partner. It is recommended that the best time to create metadata is during spatial data creation, when those individuals generating the layer have the most information about the data. When dealing with multiple data layers of the same data, e.g. current park boundary, metadata should be created for the "best" layer while purging or archiving the others. When creating metadata, the data originator or producer should be contacted to assist with metadata creation. In the event the originator of the data cannot be contacted it should be assumed that that particular data layer is not the best representation of the data and should probably be purged. However, the data may need to be retained if it is determined to be the sole data layer available. Concerning the volume of data to be documented in the development of future theme layers, it is recommended that COSW begin creating metadata for the data that will benefit the most users. This would include updates to layers such as Monument boundaries, trails, roads, vegetation, streams and water bodies etc.

For those themes considered Sensitive or Restricted, SREL recommends restricted access be applied to these layers. A recommendation for these restricted themes in the TM database would be to at least have the files listed for researchers to view so they are aware the data layer exists. A search of the GIS TM help file did not provide a method by which the TM only lists the layer but then restricts access of the layer to the user. As one possible remedy to this, SREL recommends generating a dummy file, perhaps a graphic that would load instead of the restricted data layer shape file. This graphic would then alert the user that the layer is restricted or sensitive and advise the user to seek Park Superintendent permissions about accessing the data layer.

Because of COSW staff limitations and the potential for many data custodians and end users, SREL's recommendation would be that COSW designate or hire the personnel to act as central GIS data custodian, archivist, and repository source. This individual would be responsible for maintaining the data layers and backups, securing access to them, ensuring standards, archiving, and upgrading GIS computer system and software components when necessary. In addition, this person would facilitate GIS coordination with the NPS SERO and be responsible for disseminating data layers to users and NPS GIS

clearinghouse postings. Regular contact with Richland County, USC, and SCDNR GIS departments should be maintained for obtaining the most current local and regional geo-spatial data.

By the conclusion of this project, it was determined that there are nine additional layers recommended for continued or future development; these are noted in the blue highlights in each of the tabled categories. One of these layers was the historical logging layer and SREL will continue to develop this as time permits. One noticeable omission that was determined late in project development was the lack of a comprehensive survey of historical COSW research reports. These reports may contain additional or missing geo-spatial data, therefore SREL recommends these documents be inventoried for any historically significant geographic information such as coordinate values or hardcopy maps.

Finally, if future funding is available for GIS training, the COSW may want to consider making discipline-specific department users become custodians of their departments data layer and therefore responsible for maintaining the geographic and database elements of those layers. However, as changes in a layer occur in departmental databases, custodians would still need to update layers in a central repository. As GIS layers are developed and established by multi-disciplined individuals, it is recommended that the COSW maintenance procedures and applications are also developed for those individuals or disciplines that are tasked with maintaining thematic layers.

VI. Summary and Conclusion

This final report summarizes the efforts SREL and NPS personnel made in creating a comprehensive GIS database and program plan for the COSW. It is also a compilation of the digital and hardcopy geographical databases that exist for implementing this plan. Much effort was put into creating desired data layers, generating metadata, categorizing the layers, and then populating the Theme Manager tool for implementation. SREL modified this tool to be more menu driven and user friendly. Theme layers were populated into the seven categories then delivered and loaded into the COSW Theme Manager for testing and verification.

SREL reviewed the SCDNR Lacy report for GIS base layer usage and generated metadata for these layers and these data were provided to the COSW on CD. SREL also inventoried all hardcopy maps and imagery located for the COSW. In addition, hardcopy imagery was obtained for the COSW and SREL scanned, rectified, and created mosaics for many of these historical images for the COSW GIS library. Minimal effort was made to provide descriptive summaries for all the data layers because this information can be obtained from either the Appendices or the layer's metadata.

In addition to this report, SREL has provided on CD and DVD formats, digital and hardcopies of all data layers to include ArcView shape files, imagery and any accompanying FGDC compliant metadata which meets and NPS standards. In addition, Excel spreadsheets of the Appendix A are provided.

This GIS program was designed for the staff of the COSW to easily implement a multi-thematic approach in managing and displaying the Monument's imagery and geographical data. By working in an ArcView desk-top mapping environment and loading the NPS Theme Manager extension tool to display and manage theme layers and imagery, the COSW can now manage, retrieve, serve, analyze, and display

their GIS data without difficulty. While the COSW is presently limited in staff with GIS expertise and training, it is thought that this theme management approach to handling digital data while utilizing the notebook's hardcopy maps and metadata will lead to successful application of these GIS products. These products should aid in managing the COSW resources, planning for the recreational demands of the public, and assist the scientific community in gaining access to the monument's geographical information.

Finally, the COSW GIS Program should now be in a better position for functioning within the NPS's Natural Resource GIS Program as well as meeting NPS GIS standards and goals. As the COSW GIS program becomes integrated into this Program, information management issues associated with the NPS's Natural Resource and I & M GIS can more easily be addressed and spatial data management training programs and database development should be more supported. Securing funding for GIS data acquisition and for tapping support for operations and Monument related GIS projects from the NPS's Regional Technical Support Centers should hopefully be easier. Partnerships with other agencies and organizations should increase now that the COSW has a foundation for building on and expanding a comprehensive GIS program. With the possibility of a National Park designation and expansion of the Monument's boundaries, the future looks bright for the COSW GIS Program now that it is in position to address future geographical information needs.

VII. Acknowledgments

The authors would like to expressly thank the following individuals that contributed to the enhancement of the GIS layers that were developed to support this project: to Richard Lacy with the SCDNR for his historical layer assistance; to John Grego with USC's Geography Department for volunteering to make historical imagery available to SREL; to Dan Tufford for volunteering to provide the footprint for the Green Diamond project; to John Cely for granting permission to reproduce his map of the COSW; to Mark Kinzer and Gil Noice of the NPS-SERO for providing historical maps and boundary information; and to MeadWestvaco employees John Martin, David Bourgeois, and Fred Kinard for their knowledge and field assistance in locating the SAF Natural Area. We also would like to thank Martha Bogle, COSW Park Superintendent for allowing project overrun for SREL to develop a utilities and an improved boundary layer. In addition we wish to thank Theresa Yednock, Justin Colquhoun, Patrick Dege, and Lewis Prettyman of the COSW staff for their support and assistance in layer development. We would especially like to acknowledge Bobbi Simpson, formerly with the COSW and Helen Wiggins-Brown, formerly with SREL for their efforts and support in developing and maintaining a GIS relationship with the SREL's Remote Sensing and GIS lab. Dr. Rebecca Sharitz of SREL is thanked for her encouragement and in-kind contribution of staff resources.

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VIV. APPENDICES

- Appendix A NPS Theme Manager GIS Database and Inventory for the COSW
- Appendix B Hardcopy Map and Photo Inventory for the COSW
- Appendix C Metadata Extension Tool
- Appendix D Training Aid for filling Out FGDC Metadata Form
- Appendix E NPS Theme Manager Tool help information

APPENDIX B. Hardcopy map and imagery for the COSW (current 6/03)

Map ID	Land Survey Maps	Description	Date	Scale	Author	Material	No. of Maps
LU 1	949	Property Maps, Old Bluff	N/A	1" = 400'	Richland County	Paper	1
LU 2	951	Duffies Pond	N/A	1" = 400'	Richland County	Paper	1
LU 3	963	Mt. Moriah Church	N/A	1" = 400'	Richland County	Paper	1
LU 4	964	West Boundary Road	N/A	1" = 1000'	Richland County	Paper	1
LU 5	985	South Cedar Creek Road	N/A	1" = 1000'	Richland County	Paper	1
LU 6	1011	Sox/Goff Property	N/A	1" = 1000'	Richland County	Paper	1
LU 7	1054	Devil's Elbow	N/A	1" = 1000'	Richland County	Paper	1
LU 8	1080	Georgia Pacific	N/A	1" = 1000'	Richland County	Paper	1
LU 9	Beidler/Congaree Tract	Logging Survey	1977	1" = 2000'	Knott & Co.	Paper	8
LU 10	Devil's Elbow	Map of Devil's Elbow COSW	1996	N/A	Hudson	Paper	2
LU 11	Historic Survey	Clerk of Court Map, Cedar Creek Road	N/A	N/A	Richland County	Paper	1
LU 12	Iron Bridge Blueprint	Kingsnake Trailhead	1984	3" = 1'	Continental Custom Bridge Co.	Paper	1
LU 13	Santee River Cypress Lumber Co.	Timberland Plat	1971	1" = 1000'	Beidler Owners	Paper	1
LU 14	TM5963, Block 1	Tract	N/A	N/A	N/A	Paper	1
LU 15	TM5963, Block 1	Tract	N/A	N/A	N/A	Paper	1
LU 16	Tract 64A	Northeastern COSW	1990	1" = 400'	Trust for Public Land	Paper	1
LU 17	Wise Tract	Wise Tract 101-04 & 101-05, Buyck Tract	N/A	N/A	N/A	Paper	2
	Boundary Adjustment, Wilderness, and Manag. Zoning	Boundary Adjustment, Wilderness, and Manag. Zoning	1999	1" = 2000'	USDOI-NPS	Paper	
	Existing Conditions -COSW	Existing Conditions	1978	2000' = 609.6 m.	USDOI-NPS	Paper	1
	Vegetaion - COSW	Vegetaion - COSW	1978	2000' = 609.6 m.	USDOI-NPS	Paper	1
	Mills' Atlas of South Carolina	Large format reproduction of Mills' Atlas	1825	N/A	Robert Mills	Paper	1
	Map of Holdings, Santee River Cypress Lumber Co.	Map of parcels included within Beidler Tract	1927	N/A	L.A. Emerson	Paper	1
	Timber Map of Compartments 62b 64a, 66a, 69a, 70a	Timber Maps of Georgia-Pacific Lands	1988	1" = 20 chains	Dwight L. Stewart and Assoc.	Paper	4
	Georgia-Pacific Co. Kingsville Tract Comp. 71-63A	Timber Maps of Georgia-Pacific Lands	1990	1" = 10 chains	Dwight L. Stewart and Assoc.	Paper	
	Georgia-Pacific Co. Kingsville Tract Comp. 71-64A	Timber Maps of Georgia-Pacific Lands	1990	1" = 10 chains	Dwight L. Stewart and Assoc.	Paper	
	Georgia-Pacific Co. Kingsville Tract Comp. 71-66A	Timber Maps of Georgia-Pacific Lands	1990	1" = 10 chains	Dwight L. Stewart and Assoc.	Paper	
	Timber Type Map- Beidler Tract Dean-Dempsey Sale	Timber Type Map- Beidler Tract	1977	1" = 10 chains	Don M. Handley	Paper	
	Timber Type Map- Beidler Tract- Council Sale	Timber Type Map- Beidler Tract	1977	1" = 10 chains	Don M. Handley	Paper	
	Timber Sales Map of Buyck Tract	Timber Map of Santee River Cypress Lumber Co.	1976	1" = 10 chains	Robert F. Knott & Co.	Paper	1
	(4) Timber Sales Map of Agnew Tract	Original and Revised timber sale maps of Agnew Tract	1974-76	1" = 10 and 15 chains	Robert F. Knott & Co.	Paper	4
	Timber marking for Weston, Hildebrand-Wise Tract	Area of marking for Weston units 1B and II A	1973	1" = 10 chains	Robert F. Knott & Co.	Paper	2
	Timber Sales Map - Council Sale (Lower Hildebrand)	Timber Map of Santee River Cypress Lumber Co.	1976	1" = 10 chains	Robert F. Knott & Co. (?)	Paper	1
	Original Land Grants -COSW	Historical tract map drawn by John Cely	2001	unknown	John E. Cely	Paper	
	Colonial and Later Land Plats -COSW	Map of historic plats, sketched by hand on topo maps	N/A	1:24000	Jim Watkins (?) - COSW	Paper	2
	(25) Sheets: Sketches of 18th & 19th Cent. Land Plats	Sketches of historic land plats drawn by [John Cely (?)]	N/A	unknown	John Cely (?)	Paper	25
	Plat of James Adams Sr. et al. Tract	Plat of Adams tract dated April 22, 1839	1839	1" = 20 (?) chains	John N. Barrilow	Paper	1
	Plat of James Adams Sr. et al. Tract	Based on 1839 plat, but showing original land grants	1936 (?)	1" = 15 chains	Tomlinson Engineering Co.	Paper	1
	Plat of I.T. Weston Tract	Plat of I.T. Weston Tract, including homestead	1873	1" = 20 chains	Samuel G. Henry	Paper	1
	Plat of Pea Ridge Planatation (Mrs. Sallie H. Adams)	Plat of Pea Ridge Planatation	1886	1" = 20 chains	Samuel G. Henry	Paper	1
	Plat of W.L. Buyck Tract	Plat of W.L. Buyck Tract	1903	unknown	Samuel Dibble, Jr.	Paper	1
	Plat of W.W. Weston #1 Tract (and adjacent lands)	Plat of W.W. Weston #1 Tract, including adjacent tracts	1904	unknown	unknown	Paper	1
	Plat of (former) Daniel Zeigler Tract	Plat of former Zeigler Tract, showing original land grants	1883	1" = 10 chains	D.B. Miller, Jr.	Paper	1
	Plat of Ernest H. Kaminer Tract	Plat of Ernest H. Kaminer Tract	1914	1" = 500'	James C. Covington	Paper	1
	Plat of A.M. Hunt Tract	Plat of A.M. Hunt Tract	1861	1" = 20 chains	Samuel G. Henry	Paper	1
	Plat of D.D. Buyck Tract (200 acre portion of 774 acre)	Plat of D.D. Buyck Tract (200 acre portion of 774 acres)	1918	1" = 500'	unknown	Paper	1
	Plat of D.D. Buyck Tract (168 acre portion of 774 acre)	Plat of D.D. Buyck Tract (168 acre portion of 774 acres)	1901	1" = 10 chains	Samuel Dibble, Jr.	Paper	1
	Plat of Gray Lands	Plat of Gray Lands	1873	1" = 20 chains	Samuel G. Henry	Paper	1
	Plat of Paul Spigner Tract	Plat of Paul Spigner Tract	1839	1" = 20 chains	N. Whitmire (?)	Paper	1
	Plat of Elias Jaudon Tract (and adjacent lands)	Late 18th century (?) plat; shows road to Huger's Ferry	N/A	unknown	unknown	Paper	1
	Plat of Dr. William Weston Tract	Plat of Dr. William Weston Tract	1890	1" = 20 chains	C.A. Stiles & S.G. Henry	Paper	1
	Plat of S.W. McKenzie Tract	Plat of S.W. McKenzie Tract	1895	unknown	Stiles and Henry	Paper	1
	Plat of John Bostick Tract	Plat of John Bostick Tract; shows road to Huger's Ferry	1802	unknown	unknown	Paper	1
	Plat of 590 Acres near Kingville	Plat of 590 Acres near Kingville	1896 (?)	unknown	C.A. Stiles	Paper	1

Map of Landings, Lower Congaree River	Map of Huger's Landing et al.; shows road to Huger's Feca. 1785	unknown	unknown	Paper	1	
Map of Congaree River, S.C.	Map showing cultural features on riverbank	1884	1:90000	S. McBee & D.B. Miller, Jr.	Paper	1
Plat of Devils Elbow	Prop. of Robert Hall/P Devil's Elbow at Congaree R.	1988	unknown	Wilson Smith Assoc.	Paper	1
Plat of Lorick and Lowrance (formerly L. Thompson) Tract	Plat of Lorick and Lowrance (formerly L. Thompson) Tract	1956	1" = 800'	James C. Covington	Paper	1
Plat of L.M. Braddy Tract	Plat of L.M. Braddy Tract	1966	1" = 1000'	Robert F. Knoth & Co.	Paper	1
Plat of Julian Sox/Haynes Goff Tract	Plat of Julian Sox/Haynes Goff Tract	1998	1" = 400'	Cannon Surveying, Inc.	Paper	1
Haynes Goff Plat Map	Haynes Goff Plat Map	1998	1" = 300'	Rawls Land Survey Co.	Paper	1
Plat of Julian Sox Tract	Plat of Julian Sox Tract	1998	1" = 400'	Rawls Land Survey Co.	Paper	1
Plat of Mrs. J.E. Elliott Tract	Plat of Mrs. J.E. Elliott Tract	1957	1" = 500'	Joseph Keels	Paper	1
Plat of Lorick and Lowrance (formerly Rawls) Tract	Plat of Lorick and Lowrance (formerly Rawls) Tract	1956	1" = 500'	James C. Covington	Paper	1

Map ID	Educational Maps	Description	Date	Scale	Author	Material	No. of Maps
E 1	Civil War, 1860 - 1865	South Carolina	1991	N/A	Sandlapper	Laminated Paper	1
E 2	Colonial Period, 1670 1775	South Carolina	1991	N/A	Sandlapper	Laminated Paper	1
E 3	Educational Cross-Section of SC	Fluvial Geomorphology	N/A	N/A	N/A	Laminated Paper	3
E 4	Exploring and Settling 1520 - 1670	Exploring and Settling 1520 - 1670	1991	N/A	Sandlapper	Laminated Paper	1
E 5	Native Americans, Colonial Period	1713 - 1725, Native American Cultural Locations within SC	1991	N/A	Sandlapper	Laminated Paper	1
E 6	Plantation Era, 1785 - 1860	Demographics	1991	N/A	Sandlapper	Laminated Paper	1
E 7	Revolution, 1781 - 1783	Sumter and Marion	1991	N/A	Sandlapper	Laminated Paper	1
E 8	Relief Map of South Carolina	Natural Regions of South Carolina	1981	N/A	Sandlapper	Laminated Paper	1
	COSW, Richland County Version 1.1	Historical and General Features map drawn by John Cely	2001	1" = 1500'	John E. Cely	Paper	

Map ID	Richland Co. Property Tax Maps	Description	Date	Scale	Author	Material	No. of Maps
PT 1	211	Dead River	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 2	212	Goose Pond	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 3	238	Mullers Big Lake	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 4	239	West Boundary Road	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 5	240	NW Cedar Creek	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 6	241	Duffies Pond	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 7	268	Sox/Goff Property	1978	1" = 400'	Kucera and Associates	Aerial Photo	2
PT 8	269	Sox/Goff Property	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 9	270	Hunt Club	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 10	272	Mt. Zion Church	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 11	295	Buyck Property	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 12	296	Old Dead River	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 13	297	Parcel 10	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 14	298	Dawson's Cabin	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 15	299	South Cedar	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 16	319	Calhoun County	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 17	320	Cedar Creel Terminus	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 18	321	South Cedar Creek	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 19	322	Red Bluff Road	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 20	323	Center North Boundary	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 21	341	Cedar Creel Terminus	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 22	342	Tom's Creek	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 23	343	Running Lake	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 24	344	Kingville	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 25	361	Devil's Elbow	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 26	362	Running Lake	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 27	363	Georgia Pacific	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 28	364	Kingville	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 29	368	601	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 30	382	Fort Motte	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 31	383	601 Bridge	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 32	384	Bates Old River	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 33	385	Running Creek	1978	1" = 400'	Kucera and Associates	Aerial Photo	1
PT 34	Sheet Number 21100	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	1
P1 35	Sheet Number 23900	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	1

PT 36	Sheet Number 24000	Block #50, Lot #50, Property Tax	1985	1" = 400'	Kucera and Associates	Paper	2
PT 37	Sheet Number 24100	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	2
PT 38	Sheet Number 26800	Block #50, Lot #50, Prop Tax, Sox Prop	1997	1" = 400'	Kucera and Associates	Paper	2
PT 39	Sheet Number 26900	Block #50, Lot #50, Prop Tax, Sox/Goff Prop	1997	1" = 400'	Kucera and Associates	Paper	2
PT 40	Sheet Number 27100	Block #50, Lot #50, Property Tax	1995	1" = 400'	Kucera and Associates	Paper	1
PT 41	Sheet Number 27200	Block #50, Lot #50, Property Tax	1993	1" = 400'	Kucera and Associates	Paper	2
PT 42	Sheet Number 29800	Block #50, Lot #50, Property Tax	1985	1" = 400'	Kucera and Associates	Paper	1
PT 43	Sheet Number 32100	Block #50, Lot #50, Property Tax	1985	1" = 400'	Kucera and Associates	Paper	1
PT 44	Sheet Number 32200	Block #50, Lot #50, Property Tax	1985	1" = 400'	Kucera and Associates	Paper	2
PT 45	Sheet Number 34400	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	1
PT 46	Sheet Number 36200	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	1
PT 47	Sheet Number 36300	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	1
PT 48	Sheet Number 36400	Block #50, Lot #50, Property Tax	1994	1" = 400'	Kucera and Associates	Paper	1

Map ID	Richland Co. Floodplain Maps	Description	Date	Scale	Author	Material	No. of Maps
F1	Hydrologic Unit Map of S.C.	South Carolina	1999 ?	1"=8 miles	USGS	Paper	1
F2	COSW	Gadsden Quadrangle	1992	1:24000	SC Maps	Paper	1
T 3	COSW	COSW	N/A	1:24000	NPS	Paper	10
T 4	COSW	COSW	N/A	1:24000	NPS	Mylar	1
T 5	COSW	COSW, Elevation Topo				Mylar	1
T 6	Eastover	Eastover, SC	1982	1:24000	USGS/Army	Paper	3
T 7	Elloree	Elloree, SC	1946	1:62500	USGS/Army	Paper	2
T 8	Fort Jackson South Quad	Fort Jackson, Sc	1982	1:24000	Army/USGS	Paper	2
T 9	Fort Motte Quad	Fort Motte Quad	1987	1:24000	USGS	Paper	1
T 10	Francis Marion National Forest	Francis Marion NF	1979	1" = 2 miles	USDA/Forest Service	Paper	1
T 11	Gadsden Quad	COSW	1982	1:24000	USGS/Army	Paper	1
T 12	Lexington Quad	Lexington, SC	1982	1:24000	USGS	Paper	1
T 13	Lonestar Quad	Lonestar Quad	1988	1:24000	USGS	Paper	1
T 14	Poinsett State Park	Poinsett State Park	1953	1:24000	USGS/Army	Paper	4
T 15	Saylors Lake	Saylors Lake	1982	1:24000	USGS/Army	Paper	4
T 16	Southwest Columbia Quad	Columbia, SC	1982	1:24000	USGS	Paper	1
T 17	St. Matthews	St. Matthews, SC	1946	1:62500	USGS/Army	Paper	1
T 18	Topo Map Catalog	N/A	N/A	1:24000	SC Land Res. Comm.	Paper	1
T 19	USGS Topo Map	COSW Elevation	N/A	N/A	USGS	Paper (6), Mylar (3)	9
T 20	Waterree Quadrangle	COSW	1982	1:24000	USGS/Army	Paper	6
T 21	Wedgefield Quad	Wedgefield Quad	1953	1:24000	USGS/Army	Paper	3

Map ID	Remote Sensing Maps	Description	Date	Scale	Author	Material	No. of Maps
RS 1	197	East COSW	1983	1:24000	N/A	Photo, B/W	1
RS 2	199	West COSW	1983	1:24000	N/A	Photo, B/W	1
RS 3	1-120	Northeastern COSW	1983	1:24000	N/A	Photo, B/W	1
RS 4	1-122	Southeastern COSW	1983	1:24000	N/A	Photo, B/W	1
RS 5	45017 173, 137L	Sikes Pond	N/A	N/A	N/A	Photo, B/W	3
RS 6	45017 173, 137R	Lord Lake	N/A	N/A	N/A	Photo, B/W	2
RS 7	45017 173, 138L	Braddy Lake	N/A	N/A	N/A	Photo, B/W	2
RS 8	45017 173, 138R	Kingsnake Logging Road	N/A	N/A	N/A	Photo, B/W	2
RS 9	45017 173, 139L	Sox/Goff Property	N/A	N/A	N/A	Photo, B/W	1
RS 10	45017 173, 139L (53 series)	Development Zone	N/A	N/A	N/A	Photo, B/W	1
RS 11	45017 173, 139R	Big Lake	N/A	N/A	N/A	Photo, B/W	1
RS 12	45017 173, 139R (53 series)	Cedar Creek Access	N/A	N/A	N/A	Photo, B/W	1
RS 13	45017 173, 140L	Development Zone	N/A	N/A	N/A	Photo, B/W	1
RS 14	45017 173, 140L (53 series)	West Boundary Road	N/A	N/A	N/A	Photo, B/W	2
RS 15	45017 173, 140R	South Cedar Creek	N/A	N/A	N/A	Photo, B/W	1
RS 16	45017 173, 140R (53 series)	Duffy's Pond	N/A	N/A	N/A	Photo, B/W	2
RS 17	45017 173, 141L	Bluff/Old Bluff Intersection	N/A	N/A	N/A	Photo, B/W	1
RS 18	45017 173, 141L (53 series)	Cook's Lake	N/A	N/A	N/A	Photo, B/W	2
RS 19	45017 173, 141R	Duffy's Pond	N/A	N/A	N/A	Photo, B/W	1
RS 20	45017 173, 142L	West Boundary/Bannister's	N/A	N/A	N/A	Photo, B/W	1
RS 21	45017 173, 142L (53 series)	Mullers Big Lake	N/A	N/A	N/A	Photo, B/W	2

RS 22	45017 173, 142R	River Trail	N/A	N/A	N/A	Photo, B/W	1
RS 23	45017 173, 142R (53 series)	Big Beaver Creek	N/A	N/A	N/A	Photo, B/W	1
RS 24	45017 173, 143R	Gregory Pond	N/A	N/A	N/A	Photo, B/W	1
RS 25	45017 173, 195R (53 series)	Calhoun County	N/A	N/A	N/A	Photo, B/W	3
RS 26	45017 173, 196R	Mill Creek	N/A	N/A	N/A	Photo, B/W	3
RS 27	45017 173, 92L	Devil's Elbow	N/A	N/A	N/A	Photo, B/W	2
RS 28	45017 173, 92R	601 Bridge	N/A	N/A	N/A	Photo, B/W	3
RS 29	45017 173, 93L	Blue Hole/Georgia Pacific	N/A	N/A	N/A	Photo, B/W	2
RS 30	45017 173, 94L	Red Bluff	N/A	N/A	N/A	Photo, B/W	2
RS 31	45017 173, 94R	Kingville	N/A	N/A	N/A	Photo, B/W	2
RS 32	45017 173, 95L	Old Dead River	N/A	N/A	N/A	Photo, B/W	2
RS 33	45017 173, 95R	Running Lake	N/A	N/A	N/A	Photo, B/W	2
RS 34	45017 173, 96L	Calhoun County	N/A	N/A	N/A	Photo, B/W	2
RS 35	45017 173, 96R	Calhoun County	N/A	N/A	N/A	Photo, B/W	2
RS 36	Climatic Classification of Vegetation	COSW habitats (sweetgum & mixed hardwoods)	1976	5" = 1 mile	NASA	Satellite, color	1
RS 37	Climatic Classification of Vegetation	COSW habitats (water tupelo & bald cypress)	1976	5" = 1 mile	NASA	Satellite, color	1
RS 38	Congaree Swamp	COSW	1972	1:129000	U2	Photo, color	1
RS 39	Congaree Swamp (front)	Aerial Image	N/A	1" = 1000'	SCMaps	Poster-size paper	8
RS 40	Historic Camden	Historic Camden, SC	N/A	N/A	N/A	Photo, B/W	1
RS 41	Image 0101	NAPP Orthophoto, Gadsden NW Quad	N/A	1:12000 Enlarged from 1:80000	Paper	Paper, B/W	1
RS 42	Image 0102	NAPP Orthophoto, Gadsden NE Quad	N/A	1:12000 Enlarged from 1:80000	Paper	Paper, B/W	1
RS 43	Image 0105	NAPP Orthophoto, Gadsden Quad SW	N/A	1:12000 Enlarged from 1:80000	Paper	Paper, B/W	1
RS 44	Image 0106	NAPP Orthophoto, Gadsden Quad SE	N/A	1:12000 Enlarged from 1:80000	Paper	Paper, B/W	1
RS 45	Image 0107	NAPP Orthophoto, Wateree Quad SE	N/A	1:12000 Enlarged from 1:80000	Paper	Paper, B/W	1
RS 46	Marion and Moultrie (front)	Satellite Image	N/A	1" = 10 miles	SCMaps	Poster-size paper	22
RS 47	North Inlet (back)	Aerial Image	N/A	1" = 1000'	SCMaps	Poster-size paper	8
RS 48	Table Rock (back)	Satellite Image	N/A	1" = 1500'	SCMaps	Poster-size paper	22
RS 49	Vegetation Classification Multispectral Scanner Data	COSW habitats	1976	5" = 1 mile	NASA	Satellite, color	1
	SC Maps Congaree Swamp	Study Site #6A	1989	1" = 1000"	SCDNR/SCDOE/CU	Photo -CIR	
Map ID	Topo Quad Maps	Description	Date	Scale	Author	Material	No. of Maps
T 1	Congaree Quad	McIntire Air Base	1972	1:24000	USGS/Army	Paper	4
T 2	COSW	Gadsden Quadrangle	1992	1:24000	SC Maps	Paper	1
T 3	COSW	COSW	N/A	1:24000	NPS	Paper	10
T 4	COSW	COSW	N/A	1:24000	NPS	Mylar	1
T 5	COSW	COSW, Elevation Topo				Mylar	1
T 6	Eastover	Eastover, SC	1982	1:24000	USGS/Army	Paper	3
T 7	Elloree	Elloree, SC	1946	1:62500	USGS/Army	Paper	2
T 8	Fort Jackson South Quad	Fort Jackson, SC	1982	1:24000	Army/USGS	Paper	2
T 9	Fort Motte Quad	Fort Motte Quad	1987	1:24000	USGS	Paper	1
T 10	Francis Marion National Forest	Francis Marion NF	1979	1" = 2 miles	USDA/Forest Service	Paper	1
T 11	Gadsden Quad	COSW	1982	1:24000	USGS/Army	Paper	1
T 12	Lexington Quad	Lexington, SC	1982	1:24000	USGS	Paper	1
T 13	Lonestar Quad	Lonestar Quad	1988	1:24000	USGS	Paper	1
T 14	Poinsett State Park	Poinsett State Park	1953	1:24000	USGS/Army	Paper	4
T 15	Saylor's Lake	Saylor's Lake	1982	1:24000	USGS/Army	Paper	4
T 16	Southwest Columbia Quad	Columbia, SC	1982	1:24000	USGS	Paper	1
T 17	St. Matthews	St. Matthews, SC	1946	1:62500	USGS/Army	Paper	1
T 18	Topo Map Catalog	N/A	N/A	1:24000	SCDNR-Land Resources	Paper	1
T 19	USGS Topo Map	COSW Elevation	N/A	N/A	USGS	Paper (6), Mylar (3)	9
T 20	Wateree Quadrangle	COSW	1982	1:24000	USGS/Army	Paper	6
T 21	Wedgefield Quad	Wedgefield Quad	1953	1:24000	USGS/Army	Paper	3
Map ID	Land Acquisition Maps	Description	Date	Scale	Author	Material	No. of Maps
LA 1	COSW	Tracts South of River (topo)	N/A	1:24000	DOI/NPS	Paper	2
LA 2	COSW, Segment 101	Land Tract (old)	1988	1" = 2000'	DOI/NPS, Div. of Land Acq.	Paper	18
LA 3	NPS Tracts 101-09 thru 101-12	Tract Map of COSW (NW corner)	1989	1" = 100'	Survey and Mapping Services	Paper	2
LA 4	NPS Tract 101-13	Burnside Tract	1989	1" = 200'	Survey and Mapping Services	Paper	3
LA 5	NPS Tracts 101-14, 101-15	Copeland and Burnside Tracts	1989	1" = 60'	Survey and Mapping Services	Paper	2

LA 6	NPS Tract 101-22	Skinner Tract	1990	1" = 100'	Survey and Mapping Services	Paper	2
LA 7	NPS Tract 101-23	Purvis Tract	1989	1" = 100'	Survey and Mapping Services	Paper	2
LA 8	NPS Tract 101-24	Portee Tract	1989	1" = 50'	Survey and Mapping Services	Paper	2
LA 9	NPS Tract 101-31	Joyner Tract	1990	1" = 100'	Survey and Mapping Services	Paper	2
LA 10	Wise Tract	Wise Tract of COSW	1973	1" = 200'	Assoc. Eng. and Survey., Inc.	Paper	1
Map ID	Environmental Maps	Description	Date	Scale	Author	Material	No. of Maps
E 1	Beidler Tract and Environs	Beidler Tract	1976	1:24000	N/A	Paper	2
E 2	Beidler Tract and Environs	Preserve Alternatives	1975	1:24000	Aichele	Paper	1
E 3	Central Midlands Streams	Water Quality of Central Midlands Streams in SC	1975	1" = 2 miles	N/A	Paper	1
E 4	Cretaceous and Tertiary Formations of SC	State of South Carolina, geologic boundaries	1936	1:500000	C. Wythe Cooke	Paper	1
E 5	Existing Conditions COSW	Land Use for COSW	1978	1" = 2000'	DOI/NPS	Paper	1
E 6	Flood Map	Flood Areas of Columbia North Quadrangle	1975	1:24000	USGS/DOI	Paper	1
E 7	Habitats COSW	Vegetation Types and Land Use	N/A	1:24000	Gaddy and Swanson	Mylar	1
E 8	Land Use Lower Savannah Region	Land Cover in SRP, SC	1977	1:250,000	General Electric Space Division	Paper	1
E 9	Land Use/Cover Map of Richland County	Land Use Cover Map for Richland County, SC	1983	1:100,000	SCLRC/University of New Mexico	Paper	1
E 10	Manual Photo Interpretation of Vegetation	Vegetation types of COSW	N/A	1:24000	N/A	Mylar	1
E 11	Map of Flood Prone Areas	Saylor's Lake Quad	N/A	1:24000	USGS/DOI	Paper	1
E 12	Map of Flood Prone Areas	Fort Jackson North Quad	N/A	1:24000	USGS/DOI	Paper	1
E 13	Map of Flood Prone Areas	Fort Jackson South Quad	N/A	1:24000	USGS/DOI	Paper	1
E 14	Map of Flood Prone Areas	Edmund, SC	1969	1:62500	USGS/DOI	Paper	1
E 15	Proposed Wilderness Maps	Wilderness and Potential Wilderness	1988	1" = 2000'	N/A	Paper	2
E 16	Vegetation	Vegetation of COSW	N/A	1" = 4000'	DOI/NPS	Paper	1
Map ID	General Highway Maps	Description	Date	Scale	Author	Material	No. of Maps
H 1	Calhoun County	Calhoun County, SC	1974	1" = 2 miles	SCDOT	Paper	1
H 2	Lexington County	Lexington County, SC	1970	1" = 2 miles	SCDOT	Paper	1
H 3	Richland County	Richland County, SC	1972	1" = 2 miles	SCDOT	Paper	1
Map ID	GMP Maps	Description	Date	Scale	Author	Material	No. of Maps
GMP 1	Authorized Boundary Map	Map of Authorized Boundaries of COSW	1978	1" = 4000'	DOI/NPS	Paper	1
GMP 2	Boundary Presently Under Consideration	(Old) Boundary of COSW	1980	1" = 4000'	DOI/NPS	Paper	1
GMP 3	Citizens' Boundary Proposal	Boundary Proposal for COSW	1988	1" = 2000'	NPS	Paper	1
GMP 4	Columbia	General Area Map of Columbia, SC	N/A	1" = 2 miles	PBS&J	Paper	1
GMP 5	Development Zoning	Alternative #2	N/A	N/A	NPS	Paper	1
GMP 6	Development Zoning	Alternative #3	N/A	N/A	NPS	Paper	1
GMP 7	Development Zoning	Alternative #4	N/A	N/A	NPS	Paper	1
GMP 8	Development Zoning	Alternative #5	N/A	N/A	NPS	Paper	1
GMP 9	Development Zoning	Alternative #6	N/A	N/A	NPS	Paper	1
GMP 10	Existing Conditions	Land Use of COSW	1978	1" = 4000'	DOI/NPS	Paper	2
GMP 11	General Development Management Zoning Plan	Development Zones of COSW	1980	1" = 4000'	DOI/NPS	Paper	3
GMP 12	General Development Management Zoning Plan	Development Zones of COSW	1980	1" = 2000'	DOI/NPS	Paper	2
GMP 13	Land Classification Alternatives	Land Classification Development Zones of COSW	1978	1" = 4000'	DOI/NPS	Paper	1
GMP 14	Proposed Boundary and Management Zoning	GMP for COSW (Old)	1987	1" = 2000'	NPS	Paper	1
GMP 15	Regional Location	State of South Carolina	1978	1" = 20 miles	DOI/NPS	Paper	6
Map ID	GIS Program Products Maps	Description	Date	Scale	Author	Material	No. of Maps
	Canopy Interpolation Using Lidar Data	Canopy Lidar Data	2002	~1.25" = 1 mile	SREL	Paper	2
	Surface Interpolation Using Lidar Data	Surface Lidar Data	2002	~1.25" = 1 mile	SREL	Paper	2
	Contours derived from Lidar Data	Contours Lidar Data	2002		SREL	Paper	2
	COSW Wetlands	Wetland areas on the COSW	2002		SREL	Paper	2
	COSW Soils	Soils of the COSW	2002		SREL	Paper	2
	COSW TNC Vegetation	TNC Vegetation of the COSW	2002		SREL	Paper	2
	COSW Facilities and Utilities	Location of Facilities and Utilities on the COSW	2002		SREL	Paper	2
	Photo Composite of 1994 DOQQ and 1938/39 imagery	Photo Composite of 1994 DOQQ and 1938/39 imagery	2002		SREL	Paper	1
	Comprehensive Research poster of the COSW	Research poster of the COSW	2001		NPS-COSW	Paper	