## FINAL REPORT

on the

## GIS DATABASE DEVELOPMENT OF

# A GROUND-BASED STATEWIDE VEGETATION SURVEY

Submitted to

The Kansas Department of Administration,

Division of Information Systems and Communications

and

The Kansas GIS Policy Board

by

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## INTRODUCTION

The Kansas BiologicalSurvey (KBS) and the Kansas Applied Remote Sensing Program (KARS) at the University of Kansas recently completed (Egbert et al. 2001) a detailed land cover and vegetation map of Kansas for use in the Kansas Gap Analysis Program (GAP). GAP projects are conducted on a stateby-state basis and are coordinated by the USGS Biological Resources Division. The mission of GAP is to provide regional assessments of the conservation status of native vertebrate species and natural land cover types and to facilitate the application of this information to land management activities. In general, three main geographic information systems (GIS) databases are developed: land cover, distribution of vertebrate species, and areas managed for conservation. These databases are then overlayed and analyzed to evaluate the representativeness of biological diversity in our network of conservation lands.

KARS and KBS have worked jointly to produce the first digital, detailed map of the vegetation of Kansas. This map was created using multi-seasonal satellite imagery in a two-phase remote sensing/GIS approach. The first phase was to perform an unsupervised classification of the digital imagery and assign spectral classes to either cropland or natural vegetation. Because many herbaceous vegetation types have similar spectral responses, spring, summer, and fall Landsat Thematic Mapper (TM) images were used to increase the likelihood of detecting differences among these types. In the second phase, supervised classifications of the TM imagery were conducted to produce vegetation maps at the alliance level for all 16 TM scenes that cover Kansas.

The supervised approach was possible because spectral data could be extracted from numerous ground truth sites. Field staff collected ground-based data from all vegetation types across Kansas during

the growing seasons from 1996 to 1998, and this effort resulted in more than 3000 data records. Sites were sampled in a systematic, random fashion. At each site, information was obtained on the type of vegetation (classified to the alliance level), plant composition and vegetation condition from brief observation, and georeferencing data using global positioning system (GPS) units. These vegetation data were organized using the hierarchical classification scheme for the natural vegetation of Kansas developed by Lauver et al. (1999). This scheme follows the standard system for classifying natural vegetation adopted by the Federal Geographic Data Committee. A summary of the U.S. National Vegetation Classification System with examples from Kansas is included in Table 1. The state and national GAP goal is to map land cover and vegetation at the alliance level.

Table 1. A summary of the U.S. National Vegetation Classification System with examples from Kansas (Grossman et al. 1998, Lauver et al. 1999).

<u>LEVEL</u>	PRIMARY BASIS FOR CLASSIFICATIO	<u> EXAMPLE</u>			
Class	Structure of vegetation	Forest			
Subclass	Leaf phenology Deciduous Forest				
Group	Leaf types, corresponding to climate Cold-Deciduous Forest				
Formation	Additional physiognomic and environmentalTemporarily Floodedfactors, including hydrologyCold-Deciduous Fe				
Alliance	Dominant/diagnostic species of the uppermost or dominant stratum	Cottonwood Temporarily Flooded Forest Alliance			
Association Additio	nal dominant/diagnostic species from Cottony any strata	wood-Black Willow Forest			

### **OBJECTIVES and DATA SET DESCRIPTION**

The specific objective of this project was to create a GIS data set of the more than 3300 ground-based vegetation sites from across Kansas that were obtained during field surveys conducted for the creation of the Kansas GAP Analysis land cover map. The data set contains attribute files and metadata documentation.

The field surveys conducted during 1996 through 1998 generated more than 3300 sites and are composed of 39 different vegetation types. A listing of the vegetation alliances and other land cover types for this data set is shown in Table 2. The sites generally have low locational error; they were delineated using location data collected by the surveyor in the field and visual analysis of recent Landsat TM images (the TM images have a positional accuracy or root mean square (RMS) error of +/-15 m). The TM images were obtained during spring, summer, and fall months from 1991 to 1997 (see Egbert et al. 2001 for further details). Initially, the vegetation sites were represented as "areas of interest" or AOI's in the ERDAS Imagine image processing software used by KARS to classify the TM images. To create a GIS data set of these sites, the UTM coordinates obtained by surveyors at each site were used to generate an ArcInfo point coverage (see methods section below). A Microsoft Access spreadsheet database was created to maintain data collected on each site. These data include: a unique ID number, date of survey, 1:100K Quad, Township, Range, Section, GPS Northing and Easting, vegetation alliance number, vegetation alliance name, and notes by the surveyors on plant composition and vegetation condition. All of these data are included as attributes in the GIS data set.

### Table 2. The 39 vegetation alliances and other land cover types contained in the Kansas

vegetation survey GIS data set.

#### FOREST (60 - 100% tree cover)

Maple - Basswood Forest Oak - Hickory Forest Post Oak - Blackjack Oak Forest Pecan Floodplain Forest Ash - Elm - Hackberry Floodplain Forest Cottonwood Floodplain Forest Mixed Oak Floodplain Forest Maple Floodplain Forest

#### WOODLAND (25-60% tree cover)

Bur Oak Floodplain Woodland Mixed Oak Ravine Woodland Post Oak - Blackjack Oak Woodland Cottonwood Floodplain Woodland

#### **HERBACEOUS**

Tallgrass Prairie Sand Prairie (with Sand Bluestem) Western Wheatgrass Prairie Sandstone Glade / Prairie (with Little Bluestem & Threeawn) Mixed Prairie (with Little Bluestem & Sideoats Grama) Alkali Sacaton Prairie Shortgrass Prairie Grass Playa Lake (with Western Wheatgrass and/or Buffalograss) Salt Marsh / Prairie (with Saltgrass) Spikerush Playa Lake Playa Lake (with Smartweed and/or Barnyard grass) Low or Wet Prairie (with Prairie Cordgrass and Sedges) Freshwater Marsh (with Bulrush & Cattail) Bulrush Marsh Cattail Marsh

#### SHRUBLAND

Sandsage Shrubland Willow Shrubland Buttonbush (Swamp) Shrubland

#### **OTHER** (Non-native; disturbed)

Evergreen Forest - Disturbed Land Deciduous Forest - Mined Land Deciduous Woodland Salt Cedar or Tamarisk Shrubland Mixed Prairie - Disturbed Non-native Grassland CRP (Conservation Reserve Program) Land Weedy Marsh Weedy Upland

### **METHODS AND MATERIALS**

This study utilized ERDAS Imagine image processing software to display Landsat TM images, and all GIS manipulations were conducted with ArcInfo and ArcView GIS software. To document the groundbased vegetation survey information, data collected at each field site were entered into a Microsoft Access database. Using the AutoNumber tool in Access, a unique sequential number was assigned to each field site. The database was then reviewed for inconsistencies and typographical errors, and necessary corrections were made. Recent changes to Kansas vegetation alliances in the US National Vegetation Classification System were also changed in the database.

After the database was updated, six point vector data files (corresponding to the six Landsat TM paths in Kansas) were generated in ArcInfo using UTM coordinates of the field sites (collected by surveyors) and the unique (Access) identifier. Each field site in the vector point files was checked for positional and attribute accuracy. Positional accuracy of the field sites was checked by displaying the satellite imagery onscreen and overlaying the field sites on the TM images using ERDAS Imagine software. Public land survey system (PLSS) digital line graphs (DLG's) at the 1:100,000 scale and AOI (ERDAS Imagine's "areas of interest") data files were also displayed onscreen and used as georeferencing tools. Data displayed in the viewers and information in the Access database and on field sheets were used to validate the positional adtribute accuracy of the field sites. For convenience and efficiency reasons, most UTM coordinates obtained by the surveyors were collected along roadsides and property edges. To represent the "true" location of field sites initially digitized (the AOI's) for use in the development of the Kansas GAP Analysis land cover map, most vector points were moved to the center of the corresponding AOI's. Field sites with questionable positional or attribute accuracy were checked by a second analyst using the same visual and text information. If the accuracy of the field site remained questionable after review by a second analyst, the site was flagged and deleted from the Access database and the point vector files. After final review of all sites, Easting and Northing UTM coordinates were extracted from the point files and appended to the list of file attributes in the database.

After validation of the positional and attribute accuracy of the field sites, the point files were appended in ArcInfo to create one statewide point vector file. Attributes from the Access database (Table 3) were then exported and joined to the point file's attribute table.

 Table 3. Attributes of the vegetation alliances and other land cover types contained in the statewide

 vegetation survey GIS data set.

**DESCRIPTION** 

ID	Unique ID number
Date	Date of survey
Quad_Name	Name of 1:100,000 quad
Township	PLSS Township
Township-dir	Township direction
Range	PLSS Range
Range-dir	Range direction
Section	PLSS Section
Section2	Additional PLSS Section of site
Easting	Longitude coordinate location (UTM)
Northing	Latitude coordinate location (UTM)
Alliance_Name	Vegetation alliance or land cover name
Alliance_Code	Vegetation alliance number
Notes	Listing of plant species present and other notes

**NAME** 

### **RESULTS and DISCUSSION**

There are a total of 3,326 field sites contained in the GIS data set from the ground-based vegetation surveys conducted during 1996 through 1998 in conjunction with development of the Kansas GAP Analysis land cover map. The sites are distributed throughout Kansas in an even fashion (Figure 1), reflecting the systematic approach of the sampling design (see Egbert et al. 2001). There are some parts of Kansas, mainly to the southwest, where relatively few field sites were collected (Figure 1), and these areas correspond to extensive and near-continuous agricultural (i.e., cultivated) land cover. Because the primary objective of the Kansas GAP land cover study was to map natural vegetation, few field sites were obtained in these areas.

Figure 1. Location of the ground-based vegetation sites included in the Kansas GIS data set.



A listing of the number of field sites by alliance or land cover type is provided in Table 4. As expected, the alliances with the greatest number of field sites in the GIS data set correspond to those natural vegetation or land cover types that dominate the terrestrial landscape of Kansas (Egbert et al. 2001). These include tallgrass prairie (466 field sites), CRP land (428), mixed prairie (345), non-native grassland (334), and shortgrass prairie (312 sites). According to the Kansas GAP analysis land cover map, tallgrass prairie occurs on 13.2% of Kansas, followed by mixed prairie on 9.8%, non-native grassland on 5.2%, CRP land on 4.9%, and shortgrass prairie on 3.6% of Kansas (Egbert et al. 2001). The relatively high number of field sites from CRP land compared to its land cover may indicate a bias in the field sampling design to obtain data from roadsides and property edges rather than from the middle of sections. If the field sites obtained from the mixed prairie-disturbed type are added to those from mixed prairie, the total number of field sites from mixed prairie sites at 18, reflecting the high coverage of this grassland type in Kansas.

The alliances or land cover types with the fewest number of field sites were vegetation types that are generally small, disturbed, or occupy wet areas (wetlands) (Table 4). This result was expected because the field sampling design was configured to sample vegetation data from the dominant landscapes, and was somewhat biased against aquatic systems. Alliances and types with the fewest number of field sites in the GIS data set include sandstone glade/prairie, buttonbush (swamp) shrubland, evergreen forest-disturbed land, weedy marsh, post oak-blackjack oak woodland, salt marsh/prairie, willow shrubland, maple floodplain forest, deciduous forest-mined land, and spikerushplaya lake. Collectively, these nine vegetation alliances and other cover types (the GAP map does not include sandstone glade/prairie) cover only 0.44% of Kansas (Egbert et al. 2001).

Table 4. Number of field sites and alliance codes by vegetation alliance or other land cover

Alliance Code	<b>Field Sites</b>	Vegetation Alliance or Land Cover Type
1	13	Maple - Basswood Forest
2	67	Oak - Hickory Forest
3	23	Post Oak - Blackjack Oak Forest
4	20	Pecan Floodplain Forest
5	255	Ash - Elm - Hackberry Floodplain Forest
6	138	Cottonwood Floodplain Forest
7	41	Mixed Oak Floodplain Forest
8	24	Bur Oak Floodplain Woodland
9	37	Mixed Oak Ravine Woodland
10	5	Post Oak - Blackjack Oak Woodland
11	129	Cottonwood Floodplain Woodland
12	93	Sandsage Shrubland
14	6	Willow Shrubland
15	4	Buttonbush (Swamp) Shrubland
17	466	Tallgrass Prairie
18	70	Sand Prairie
20	119	Western Wheatgrass Prairie
21	1	Sandstone Glade/Prairie
22	345	Mixed Prairie
24	15	Alkali Sacaton Prairie
25	312	Shortgrass Prairie
26	18	Grass Playa Lake
27	5	Salt Marsh / Prairie
28	7	Spikerush Playa Lake
29	24	Playa Lake
30	63	Low or Wet Prairie
31	28	Freshwater Marsh
32	38	Bulrush Marsh
33	56	Cattail Marsh
40	334	Non-native Grassland
41	428	CRP (Conservation Reserve Program) Land
42	22	Salt Cedar or Tamarisk Shrubland
50	7	Deciduous Forest - Mined Land
51	6	Maple Floodplain Forest
52	4	Evergreen Forest - Disturbed Land
55	16	Deciduous Woodland

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type	that are	contained	1n	the	Kansas	vegetation	survey		data set.
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60	73	Mixed Prairie - Disturbed
70	4	Weedy Marsh
71	10	Weedy Upland
TOTAL	3326	

This GIS data set represents the first comprehensive and georeferenced survey of the diversity of natural vegetation in Kansas. This spatial data set reflects the dynamic and varied land cover of the Kansas landscape, and is publicly available for further investigations of the terrestrial and palustrine vegetation in Kansas. The vegetation survey GIS data set is available as part of the Core GeoDatabases of the State of Kansas Data Access and Support Center (DASC) maintained by the Kansas Geological Survey. It can be obtained by accessing the DASC website at: http://gisdasc.kgs.ukans.edu/dasc.html. The metadata associated with the data set are also available from DASC and are included at the end of this report.

#### ACKNOWLEDGEMENTS

We thank all of the surveyors who spent many hours in the field collecting and interpreting vegetation data that were integral and essential to this study and the development of the Kansas GAP Analysis land cover layer, including Jack Cully, Ellen Ellis, Kevin James, Hillary Loring, Caleb Morse, Amy Paulin, Brett Rubenstein, and Wildfire Wanderning. We also thank Jeff Severin for his patience and hard work in visually inspecting the locations and data of most of the field sites.

## LITERATURE CITED

- Egbert, S.L., D.L. Peterson, A.M. Stewart, C.L. Lauver, C.F. Blodgett, K.P. Price, and E.A. Martinko. 2001. The Kansas Gap Land Cover Map: Final Report. Kansas Biological Survey Report No. 98. Lawrence, Kansas.
- Grossman, D.H. et al. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume 1. The National Vegetation Classification System: development, status, and applications. The Nature Conservancy, Arlington, VA.
- Lauver, C.L., K. Kindscher, D. Faber-Langendoen, and R. Schneider. 1999. A classification of the natural vegetation of Kansas. Southwestern Naturalist 44: 421-443.

## METADATA

## **Ground-Based Statewide Vegetation Survey**

Identification\_Information:

Citation:

*Citation\_Information*:

Originator: Kansas Biological Survey Publication\_Date: 2001 Title: Ground-Based Statewide Vegetation Survey Publication\_Information:

Publication\_Place: Lawrence, Kansas Publisher: Kansas Biological Survey

Online\_Linkage: http://gisdasc.kgs.ukans.edu/dasc.html

# Description:

Abstract:

Locations of the field sites used to help create the Kansas Gap Analysis Land Cover map. The field sites, consisting of 39 different vegetation alliances and other land cover types, were obtained from field surveys conducted during the growing seasons from 1996 to 1998. The database consists of a single point coverage with attributes. *Purpose*: Assessment and planning purposes.

Time\_Period\_of\_Content:

Time\_Period\_Information: Single\_Date/Time: Calendar\_Date: 2001 Currentness\_Reference: publication date

Status:

*Progress*: Complete

*Maintenance\_and\_Update\_Frequency*: none planned

# Spatial\_Domain:

Bounding\_Coordinates:

West\_Bounding\_Coordinate: 102.5 East\_Bounding\_Coordinate: -94.6 North\_Bounding\_Coordinate: 40.0 South\_Bounding\_Coordinate: 37.0

# Keywords:

Theme:

*Theme\_Keyword\_Thesaurus*: none *Theme\_Keyword*: Vegetation Alliance, Natural Vegetation

## Access Constraints: None

## Use Constraints:

Data should be used for preliminary assessment and planning purposes only, and is inappropriate for fine-scale analyses. To be used at minimum scale of 1:100,000. The Kansas Biological Survey is not responsible for database integrity following download and publication.

# *Point\_of\_Contact*:

Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Kansas Biological Survey
Contact_Address:
Address_Type: mailing and physical address
Address: 2021 Constant Avenue
City: Lawrence
State_or_Province: Kansas
<i>Postal_Code</i> : 66047-3729
Contact_Voice_Telephone: (785)864-7725
Data_Set_Credit: Kansas Biological Survey and Kansas GIS Policy Board
Native_Data_Set_Environment: Windows NT ArcInfo 8.0.2

## *Data\_Quality\_Information*:

Attribute\_Accuracy:

*Attribute\_Accuracy\_Report*:

Attribute entries have been individually checked and verified against source material. Quantitative Attribute Accuracy Assessment:

*Attribute\_Accuracy\_Value: 99%* Attribute Accuracy Explanation:

The Access database and the vector point file were compared to identify inconsistencies between the two data sources. The database was inspected for invalid attribute information and the database and vector point file were inspected for duplicate entries. After the attributes for each point in the data set were validated against the source material, 10% of the points were randomly selected for a quantitative attribute accuracy assessment. The attributes listed in the Access database for the selected points were then validated against attribute information on the field data sheets.

Logical\_Consistency\_Report:

The database was then reviewed for inconsistencies, invalid values, and typographical errors, and necessary corrections were made.

## Completeness Report:

Each point represents the approximate center location of the area digitized and used for the development of the Kansas GAP Analysis land cover map.

*Positional\_Accuracy*:

*Horizontal\_Positional\_Accuracy:* 

*Horizontal\_Positional\_Accuracy\_Report:* 

The positional accuracy of each point has been verified against source material.

Lineage:

*Source\_Information*: Source Citation: Citation Information: *Originator*: Kansas Geological Survey Publication Date: 19970827 *Title*: U.S. Public Land Survey System (PLSS) **Publication Information:** Publication\_Place: Lawrence, Kansas Publisher: State of Kansas Geographic Information Systems Initiative's Data Access and Support Center (DASC) Online Linkage: <a href="http://gisdasc.kgs.ukans.edu">http://gisdasc.kgs.ukans.edu</a>> Source\_Scale\_Denominator: 24000 *Type\_of\_Source\_Media*: digital database file Source Time Period of Content: *Time\_Period\_Information*: Single\_Date/Time: Calendar Date: 19970827 *Source\_Currentness\_Reference*: publication date Source Citation Abbreviation: KGS *Source\_Contribution*: spatial reference Source Citation: Citation Information: Originator: Earth Observation Satellite (EOSAT), Inc. *Publication\_Date*: image date *Title*: Landsat Thematic Mapper Imagery Type of Source Media: 8 mm tape, compact disc *Source\_Time\_Period\_of\_Content: Time\_Period\_Information*: *Range\_of\_Dates/Times*: Beginning\_Date: 19910614 Ending\_Date: 19970630 Source Currentness Reference: publication date Source Citation Abbreviation: EOSAT, Inc. *Source\_Contribution*: Provided spatial and visual information. Source Information:

*Source\_Citation*:

*Citation\_Information*:

Originator: Kansas Biological Survey Publication\_Date: 1996-1998 Title: Ground-based Vegetation Survey

Type of Source Media: Paper

*Source\_Time\_Period\_of\_Content:* 

*Time\_Period\_Information*:

Range\_of\_Dates/Times: Beginning Date: 1996

Ending\_Date: 1998

Source\_Currentness\_Reference: date of field survey

*Source\_Contribution*: Provided attribute and spatial information.

## Process\_Step:

*Process\_Description*:

This study utilized ERDAS Imagine image processing software to display Landsat TM images, and all GIS manipulations were conducted with ArcInfo and ArcView GIS software. To document the ground-based vegetation survey information, data collected at each field site were entered into a Microsoft Access database. Using the AutoNumber tool in Access, a unique sequential number was assigned to each field site. The database was then reviewed for inconsistencies and typographical errors, and necessary corrections were made. Recent changes to Kansas vegetation alliances in the US National Vegetation Classification System were also changed in the database.

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After validation of the positional and attribute accuracy of the field sites, the point files were appended in ArcInfo to create one statewide point vector file. Attributes from the Access database were then exported and joined to the point file's attribute table.

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Process_Date: 2001
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*Process\_Contact*:

Contact\_Information: Contact\_Organization\_Primary: Contact\_Organization: Kansas Biological Survey Contact\_Address: Address: Type: mailing Address: 2021 Constant Avenue City: Lawrence State\_or\_Province: Kansas Postal\_Code: 66047 Country: USA Contact\_Voice\_Telephone: 785-864-7725 Contact\_Facsimile\_Telephone: 785-864-5093

Spatial\_Data\_Organization\_Information: Indirect\_Spatial\_Reference: The state of Kansas Direct\_Spatial\_Reference\_Method: Vector Point\_and\_Vector\_Object\_Information: SDTS\_Terms\_Description: SDTS\_Point\_and\_Vector\_Object\_Type: Point Point\_and\_Vector\_Object\_Count: 3326 *Spatial\_Reference\_Information*:

Horizontal\_Coordinate\_System\_Definition:

Planar:

Grid\_Coordinate\_System:

*Grid\_Coordinate\_System\_Name*: Universal Transverse Mercator *Universal Transverse Mercator*:

UTM Zone Number: 14

Transverse\_Mercator:

Scale\_Factor\_at\_Central\_Meridian: 1 Longitude\_of\_Central\_Meridian: -99 Latitude\_of\_Projection\_Origin: 0 False\_Easting: 500000

False\_Northing: 0

*Planar\_Coordinate\_Information*:

*Planar\_Coordinate\_Encoding\_Method*: coordinate pair *Coordinate\_Representation*:

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Ordinate\_Resolution: 30

Planar\_Distance\_Units: Meters

Geodetic\_Model:

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Entity\_and\_Attribute\_Information: Overview\_Description:

*Entity\_and\_Attribute\_Overview*:

Attributes are stored in a point attribute file (.pat file). For each point feature there are fourteen attributes: ID (unique ID number),Date (date of survey), Quad\_Name (name of 1:100,000 quad, Township (PLSS Township), Township-dir (Township direction), Range (PLSS Range), Range-dir (Range direction), Section (PLSS Section), Section2 (additional PLSS section of site), Easting (longitude coordinate location (UTM)), Northing (latitude coordinate location(UTM)), Alliance\_Name (vegetationalliance or land cover name), Alliance\_Code (vegetation alliance number), and Notes (listing of plant species present and other notes).

Distribution\_Information:

Distributor:

*Contact\_Information*:

*Contact\_Organization\_Primary*:

Contact\_Organization: Data Access and Support Center

Contact\_Address:

*Address\_Type*: mailing and physical address

*Address*: University of Kansas, 1930 Constant Avenue, West Campus

Campus

City: Lawrence State or Province: Kansas

Postal Code: 66047-3726

*Country*: USA

Contact Voice Telephone: 785-864-3965

Contact\_Facsimile\_Telephone: 785-864-5317

Contact\_Electronic\_Mail\_Address: dasc@kgs.ukans.edu

Hours\_of\_Service: 0800-1700

*Distribution\_Liability*.

The State of Kansas Geographic Information Systems Core Database's digital data have been tested and their documentation carefully reviewed. However, the State of Kansas Geographic Information Systems Policy Board's Data Access and Support Center and its representatives make no warranty or representation, either expressed or implied, with respect to the digital data and their documentation, their quality, performance, merchantability, or fitness for a particular purpose. The digital data are distributed on "as is" basis, and the user assumes all risk to their quality, the results obtained from their use, and the performance of the data.

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Standard\_Order\_Process:

Digital\_Form: Digital\_Transfer\_Information: Format\_Name: ARCE Digital\_Transfer\_Option: Online\_Option: Computer\_Contact\_Information: *Network\_Address*:

*N e t w o r k* \_ *R e s o u r c e* \_ *N a m e* : <a href="http://gisdasc.kgs.ukans.edu">http://gisdasc.kgs.ukans.edu</a>

### Access\_Instructions:

The digitial data can be downloaded from the DASC home page or by connecting directly to the DASC anonymous FTP server at gisdasc.kgs.ukans.edu. To connect to the FTP server use the login name of anonymous and your Enmail address as the password.

## *Offline\_Option*:

*Offline\_Media*: CD-ROM, Iomega ZIP Disk, 3.5 inch floppy disk, or 8 mm cartridge tape *Recording\_Format*: ISO 9660

## Fees:

Under the Kansas Public Records Law, DASC will attempt only to recover the costs related to the processing and distribution of core database requests. The following is a description of our Basic and Supplemental Conversion Services, as well as costs associated with the distribution of digital data: Basic Conversion Services nDASC will provide conversion services to all Federal/State/municipal taxn supported agencies/entities for the cost of media and shipping and handling. Basic conversion services shall include the exportation of the Core Database in their native projection and tiling scheme into DASC supported spatial data exchange formats and technical support for the loading and importation of the data. Basic conversion services are provided to other than taxn supported organizations on a feen forn service basis.

Supplemental Conversion Services **n**DASC will provide supplemental conversion services to all organizations on a fee**n**for**n**service basis. Secondary services shall include the alteration of a Core Database's native projection, tiling scheme, or topological structure. Supplemental services also include custom map production.

Where applicable, recoverable cost include: 1. Labor to process the request 2. Computer processing time to extract/convert database 3. Magnetic media to distribute the data 4. Shipping and handling charges 5. Tax

Below are the fees associated with each of the recoverable items: 1. Labor:

\$35.00/Hour 2. Central Processing Unit (CPU) computer time: \$.14/Minute 3. Media: 3.5 inch HD floppy \$.90 DC 2120 Mini data cartridge tape \$22.00 8mm**n**112m Data cartridge tape \$19.00 4mm**n**120m Data cartridge tape \$20.00 Compact Disks \$15.00 Network Transfer No Charge 4. Shipping and Handling: Varies 5. Tax (State of Kansas): 6.90%

Metadata Reference Information: Metadata\_Date: 20010820 Metadata Contact: Contact Information: *Contact\_Organization\_Primary*: Contact\_Organization: Data Access and Support Center Contact Address: *Address\_Type*: mailing and physical address Address: University of Kansas, 1930 Constant Avenue, West Campus *City*: Lawrence State or Province: Kansas *Postal\_Code*: 66047-3726 Country: USA *Contact\_Voice\_Telephone*: 785-864-3965 Contact\_Facsimile\_Telephone: 785-864-5317 Contact\_Electronic\_Mail\_Address: dasc@kgs.ukans.edu *Hours\_of\_Service*: 0800-1700 Metadata\_Standard\_Name: FGDC Content Standards for Digital Geospatial Metadata Metadata\_Standard\_Version: FGDC-STD-001-1998