Version 2

National Park Service
Cultural Resource Spatial Data Transfer Standards: Guidelines for Use and Implementation

Cultural Resource GIS Facility
Preservation Assistance Programs
National Park Service

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Cultural Resource Spatial Data Transfer Standards Guidelines
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Executive Summary

Protecting, managing and preserving our cultural resources is a National Park Service mandate and remains fundamental to our understanding of the nationally significant landscapes, monuments and sites we steward. The ability to use geographic information systems (GIS) to help manage all aspects of park operations, including cultural resource management, provides the National Park Service with a powerful tool. In order to take advantage of this tool to adequately plan, respond to disasters in a timely way and maintain cultural resources among other daily activities however, we must maintain accurate locational information for cultural resources. The National Park Service Cultural Resource Spatial Data Transfer Standards are intended to provide a framework for organizing our cultural resource spatial data, documenting its lineage and facilitating data integration as well as data sharing.

OMB Circular A-16 creates the Federal Geographic Data Committee, an interagency organization designed to coordinate spatial data development and dissemination also identifies the National Park Service as the lead Federal agency for the cultural resource spatial data theme. This responsibility includes the establishment of data standards. Before creating Federal agency-wide standards, the National Park Service needs to have an established internal standard. The National Park Service GIS Council established formal procedures for creating internal standards and approved the Cultural Resource Spatial Data Transfer Standard in February 2010.

The primary benefit of using the standards remains the organization and documentation of cultural resource data to allow users to share spatial data between parks, parks and regions, among regions, between parks/regions and programs and among programs. The standards will help insure spatial data consistency, quality and accuracy. Using location as a way of linking the 15 existing descriptive cultural resource databases together further allows users to explore all facets of a cultural resource in ways that are not currently possible.

As a spatial data transfer standard, the cultural resource standards only address the spatial representation of cultural resources, accuracy of data and feature level metadata which describes how each of the spatial entities was created. The standards do not address descriptive information already captured in existing National Park Service cultural resource databases. The standards do establish a series of 18 data layers, based on National Register of Historic Places cultural resource types as well as 34 fields of feature level metadata to describe the geographic parameters of each feature and how they relate to individual parks/regions. To accompany the standards themselves a data model, in the form of a GeoDatabase, has been created to assist users in complying with the standards, providing a platform for parks/regions/programs to quickly migrate data into the standards to accommodate data sharing.

This Guideline document is intended to be used as a reference for cultural resource managers, GIS Specialists and others at park, regional and program levels. The document explains the background and history of the standard creation, what the standard contains, how the standard is

organized, as well as the data model, how to create cultural resource spatial data that complies with the standards and plans for implementing the standard throughout the National Park Service. Depending on individual familiarity with GIS and/or cultural resources portions of the Guidelines may be more helpful than others. Technical support for the cultural resource spatial data standards is available through the Cultural Resource GIS Facility in Washington, DC.

- For information on the history of the cultural resource spatial data transfer standard creation process, see the *Background* section.
- For information on what a spatial data transfer standard is, as opposed to a data content standard or other forms of standards see the *Definition of a Spatial Data Transfer Standard* section.
- For information on what the cultural resource spatial data standards contain and define, see the *Contents of the Cultural Resource Spatial Data Standards* section.
- For information on what data may be required to comply with the standards, and what data is not required to comply with the standards, see the *Who the Cultural Resource Standards Apply To* section.
- For a detailed summary of the feature level metadata fields and their potential values, see the *Feature Level Metadata Field Definitions, Potential Values and Examples* section.
- For commonly asked questions regarding the specifics of migrating data into the standards, posed by parks and regions who tested the cultural resource spatial data transfer standards, see the *Frequently Asked Questions* section.
- For definitions of terms used throughout the Guidelines and with cultural resource management, as well as GIS disciplines, see the *Glossary* section.

- For an explanation of the GeoDatabase data model and how it works in conjunction with the cultural resource spatial data standards, see the *Introduction to the Implementation Model* section**.**
- For an explanation of how the use of the implementation model can improve cultural resource analysis capabilities using National Park Service database examples in general resource management, as well as in emergency situations, see the *How the Implementation Model can Improve Analysis Capabilities* section.
- For detailed explanation of how to create new cultural resource spatial data using a variety of common methods, and incorporate that data into the standards, see the *Data Creation Methods* section.
- For detailed procedures to fill in and complete the feature level metadata required as part of the cultural resource spatial data standard, see the *Completing Feature Level Metadata* section.
- For a detailed explanation of how to fully take advantage of the GeoDatabase implementation model to integrate cultural resource databases, see the *Completing the CR_Link Table* section.

- For an overview of the plans to implement the cultural resource spatial data standards at park, regional and program levels, see the *Cultural Resource Spatial Data Standards Implementation Plan* section.

- For a detailed explanation of the plans to migrate legacy cultural resource data into the standards, see the *Migrating Legacy Data into the Standards and Implementation Model* section.
- To find help, guidance and technical support in creating data, migrating data or complying with the cultural resource spatial data transfer standards, see the *Assistance and Guidance Available to Assist in Complying with the Standards* section.

The cultural resource spatial data transfer standards represent a minimum amount of feature level metadata required to describe the quality of our cultural resource spatial data and the appropriate use of that data. The implementation model provides one tool to assist in complying with the standards and in organizing cultural resource data for quickly sharing data when necessary, in addition to providing the foundation for integrating our various cultural resource databases. It is not necessary for parks/regions/programs to use the implementation model to be in compliance with the standards, and parks/regions/programs do not need to alter their daily working procedures to be in compliance with the standards. Parks/regions/programs must be able to quickly get their data into the standards when necessary to facilitate data sharing however.

The cultural resource spatial data transfer standards are intended to be flexible enough to meet the daily needs of cultural resource managers, but powerful enough to integrate the cultural resource databases which currently remains a hurdle to efficient stewardship of our cultural resources. Using the cultural resource spatial data standards will enable parks/regions/programs to gain perspective on their resources, perform more sophisticated analysis and be better prepared to respond to inquiries of all types. This Guideline document should provide the general user with the necessary information to comply with the standards and learn more about them if desired.

Cultural Resource Spatial Data Standards Introduction

Throughout the field of historic preservation, accurate locational data remains a fundamental component to understanding cultural resources. Examining resources in a geographic context allows preservationists to study the interaction of those resources and to identify larger trends across landscapes. Using technological tools such as Geographic Information Systems (GIS) to better manage and protect our cultural resources is, therefore, increasingly critical. With the implementation of such systems, however, comes the need for improved data management, which in turn necessitates the development of standardized elements to facilitate data sharing and dissemination.

Within the National Park Service Cultural Resource Program, at park, regional and program levels, spatially we consider each resource as a single entity. Yet the NPS Cultural Resource Program experts in various disciplines view those individual sites from differing perspectives, be they architectural, archeological, cultural landscapes or other. These viewpoints manifest in a series of many separate park, regional and program level databases cataloging the same resources with terminology for characteristics specific to each field of study and the differing needs of each office. These perspectives are important to preserve and maintain, however geography can integrate these disparate databases by using one location to reference multiple sources of descriptive information. To accomplish this efficiently and effectively, locational data must be standardized to ensure consistency and quality.

The majority of existing cultural resource databases allow for the inclusion of coordinate pairs, however these are often fields where data entry is not required. Other than the specifications outlined by the National Register of Historic Places, few of the NPS Cultural Resource programs provide guidelines regarding what kind of locational information to collect, how to collect that information or what level of detail that information should take. Providing a foundation for the creation of true spatial data (points, lines, polygons), and a standardized method of documenting where that data originated, how it originated and how it can be used, allows all cultural resource specialists throughout the NPS cultural resource programs to share data more effectively and use that data for planning, compliance as well as protection of these important resources.

Background

OMB Circular A-16 (revised in 2002) defines the Federal Geographic Data Committee (FGDC) as an interagency organization promoting the coordinated development, use, and dissemination of geospatial data on a national basis. The FGDC, chaired by the Department of the Interior is composed of 19 members representing the Executive Office of the President and independent Federal agencies. Organized into subcommittees based on individual data themes and cross-cutting working groups, the FGDC creates the National Spatial Data Infrastructure and is the framework within which all federal agencies operate to generate and share their geospatial data.

The same OMB Circular designates the NPS as the primary agency to steward the cultural resource spatial data theme, which includes the responsibility for the establishment of data standards. Within the NPS, the Cultural Resource GIS Facility (CRGIS) has been given the lead in this effort inside the NPS and through the FGDC. CRGIS brought together GIS and cultural resource subject matter experts within NPS and developed a draft set of cultural resource spatial data standards as well as an implementation model for use by the park service to assist NPS cultural resource specialists in data sharing, and to serve as a basis from which to begin developing consensus on Federal-wide standards, as outlined in OMB Circular A-16.

CRGIS entered into the formal NPS spatial data standard creation process in 2005, posting a conceptual model of the proposed standards on the NPS intranet, based on a set of guiding principles articulated by representatives of the major NPS Cultural Resource Program databases, parks, regional offices, cultural resource specialists and GIS specialists. CRGIS posted a first draft of the standards in 2006 and solicited comments from the NPS cultural resource and GIS communities. Together with the Midwest Archaeological Center, CRGIS formed a Cultural Resource Subcommittee of the NPS GIS Council to continue developing the standards and moving them forward. In 2008 and 2009 the Cultural Resource Subcommittee posted a working draft and a review draft of the standards, both circulated throughout the entire NPS for comment. Based on the comments received as well as testing conducted by parks and programs, CRGIS finalized the standards in 2010. The NPS GIS Council adopted the standards formally in February 2010.

Following the release of the standards in February 2010, the Cultural Resource Subcommittee turned its attention to the implementation of the standards, developing guidance documentation and training. Additionally, the Subcommittee explored incorporating changes to the standards, establishing a change/review policy. In May 2013, after implementing the standards more thoroughly through the regions, several significant changes were made to the structure of the standards to eliminate confusion and address concerns raised by users. This guidance document reflects those changes, as well as the corresponding changes made to the GeoDatabase data model and updates in the GIS software itself.

Definition of a Spatial Data Transfer Standard

The NPS cultural resource standards represent a spatial data transfer standard, as defined by the FGDC. Spatial data transfer standards focus on reporting what the data contains. These types of standards do not address descriptive information about the subject matter represented as points, lines or polygons, but do address documentation of where the data was created, who created it, and how it was created, enabling others to use the data more effectively. The format of a data transfer standard is designed to support blind transfer of data between different hardware and software platforms without losing data. These types of standards do not replace databases already in use or replace the existing organization of spatial data already established. Spatial data transfer standards do provide the necessary structure to exchange data relating to the same subject.

The NPS cultural resource spatial data standards only address the spatial representation of cultural resource data, not the descriptive information catalogued in existing cultural resource

databases at park, regional and national program levels. In this way, the NPS cultural resource managers can begin to standardize how resources are represented spatially, insure the accuracy of the data and accurately document how legacy spatial data was obtained and incorporated with current spatial data.

Purpose and Benefit of Using the Standards

The purpose of creating and utilizing such cultural resource spatial data standards is to consolidate our spatial representations of resources and integrate this data with the existing descriptive attribute databases. Creating a foundation of accurate locations, based on agreed upon methods of spatially representing cultural resources, which can then be associated with any existing database will significantly enhance our collective ability to manage and share cultural resource data in a meaningful way. Additionally, by using a data transfer standard we can better document the origins of our spatial data to insure the data is used appropriately.

The primary benefit of using the cultural resource spatial data standards remains the organization and documentation of cultural resource data to allow users to share spatial data between parks, parks and regions, among regions, between parks/regions and programs and among programs themselves. The standards will help to insure spatial data consistency, quality and accuracy so that users can be confident in incorporating cultural resource data in any application they may need. By using location as a way of linking external, existing descriptive databases together, the standards also allow users to explore all facets of a cultural resource in ways that are not currently possible. Visualizing trends in cultural resource data geographically through a GIS and accessing all available descriptive information at the same time, without needing to physically combine databases creates a powerful cultural resource management tool. In this way, planners, resource managers, superintendents and cultural resource specialists can bring all of the various perspectives which may relate to a single cultural resource together via a GIS, enabling them to visualize trends and explore how resources of different types may relate to each other and their contexts.

Ultimately, use of the cultural resource standards will lead to more comprehensive access to all of our available cultural resource data and provide a more integrated approach to cultural resource data management across the NPS and at all levels: park, region and program. The use of feature level metadata as the primary focus of the standards records the lineage of our current as well as legacy cultural resource data, insuring it can be used appropriately for applications such as park planning, Section 106, Section 110, daily resource management, or integration with other programs such as facilities, fire or law enforcement. Establishing one location for a resource that can be shared among all programs reduces redundancy and clarifies the cultural resource data as a whole, verifying that everyone accessing the data is indeed referring to the right resource at the right location.

As cultural resource specialists and managers continue to move their legacy data into the standard and collect new data in the standard, it will allow the NPS Cultural Resource Program to participate in the NPS Enterprise GIS (EGIS) effort. Enterprise GIS consists of service-wide GIS data layers, centrally stored and maintained but managed at a local level. Cultural resource specialists would create and control their spatial data at a park or regional level, yet the data

would be rolled up to a central location for storage and access purposes. In this way, all NPS cultural resource specialists would have access to a single authoritative data source, insuring that the data is always current, accurate and the best available. This type of data set (with restrictions applied) could be made available to the public, State/Tribal historic preservation offices, other Federal agencies or researchers.

Contents of the Cultural Resource Spatial Data Standards

In order to accommodate the needs of cultural resource managers and gain the most benefit from integrating cultural resource data, the cultural resource spatial data standards address two aspects of cultural resource data: the lineage of the data (feature level metadata) and the physical parameters of the spatial data. Metadata, often referred to as, "data about your data," records necessary information that describes where the data originated, how it originated, who created it and other critical information needed to assess whether the data is appropriate for any one specific task. The physical parameters of the spatial data include items such as coordinate system, datum, and level of accuracy to insure that data can be shared, integrated and combined into a single spatial data layer if necessary.

The FGDC requires all Federal agencies to complete data set metadata for any spatial data layer that they produce and share. This data set metadata describes the data layer as a whole, it's source, persons to contact about distribution, the overall accuracy of all features contained within the data layer and the physical parameters of the data set such as coordinate system or datum. The cultural resource spatial data standards focus on feature level metadata. Because cultural resource specialists have been collecting spatial data for their resources for many years, using many different methods, documenting how each of those various features was created becomes important when combining all the cultural resource spatial data together for a single park, region or program. For instance, the Historic American Buildings Survey has collected coordinate pairs for many of the resources it has documented beginning in the 1930s. Some of this data takes the form of latitude/longitude coordinates, some takes the form of UTM coordinates, some UTM coordinates are based on the North American Datum of 1927 and some on the North American Datum of 1983. To create a single data layer of all HABS documented sites, or even the documented sites within a single park, all of these parameters must be documented and reconciled.

Further, because cultural resource specialists use many methods of collecting spatial data for their resources, the existing spatial data may reflect multiple levels of accuracy. For instance, a UTM coordinate collected for an archaeological site, based on a USGS topographic quadrangle map will be significantly less accurate than a UTM coordinate generated from a GPS unit. Additionally, different GPS units reflect different levels of accuracy, some being accurate to 30 meters and some as accurate as a single meter. When integrating our cultural resource data together, it is critical for the data users to understand the origins of this data, the methods used to create this data and consequently what the appropriate use of the data may be.

Although the cultural resource spatial data standards focus primarily on this type of feature level metadata, the standards do also address several key data content/parameter issues which will enable users to share, integrate and combine data together in a useful way. Primary among these

content issues is the need to create cultural resource spatial data. Currently, collecting and creating spatial data (points, lines or polygons) to represent cultural resources is not required by all the cultural resource programs. In order for planners and cultural resource managers to have useful tools to protect and steward our cultural resources within the NPS we must have a complete picture of the resources the NPS is responsible for. For instance, this would include resources that contribute to a larger landscape or historic district, or even the multiple loci of a single archaeological site.

Other content issues relate to the relative accuracy of the spatial data created and incorporated into the cultural resource spatial data layers themselves. In order to capture the best possible data to spatially represent cultural resource locations, new data should be created with the most accurate tools available, whether that means GPS, digitizing from aerial photographs or the use of total stations tied to GPS. Cultural resource specialists may never be able to improve upon the accuracy of legacy data collected via other less accurate methods, particularly if the resources no longer exist, however seeking out the most accurate means to collect new data insures that the quality of our cultural resource data will only improve over time, thus our analysis will improve and the range of tasks we can use the data with will grow.

The cultural resource standards similarly address the parameters of the data itself, insuring that should cultural resource specialists choose to share data or combine their data with other parks and regions this can be accomplished easily. Currently, most parks and regions collect coordinate pairs that can be converted into a point location and displayed in a GIS. These coordinate pairs most commonly take the form of UTM locations. These UTM coordinates are divided into zones that span across the globe. For instance, the state of Virginia is divided across two UTM zones, preventing the points from both zones from being easily displayed in a GIS at the same time. As a result, combining data from parks in the eastern half of Virginia with those in the western half of Virginia requires conversion to another coordinate system. To avoid such issues, the cultural resource standards establish a common coordinate system that will allow cultural resource specialists to combine data from anywhere on the globe: decimal degrees (or geographic), with a NAD83 datum. This does not prevent local users from continuing to maintain their data in UTM or other local coordinate systems, however it provides a common platform to share or combine data when necessary.

Who the Cultural Resource Standards Apply To

If the goal of creating the cultural resource spatial data standards is to promote the sharing of more accurate, reliable and authoritative cultural resource spatial data for the purposes of resource stewardship within the NPS, then the standards apply to anyone creating or collecting cultural resource data that others would need access to for planning, protection or maintenance purposes. Certainly if one of the existing park, regional or program descriptive databases contains information regarding a cultural resource, spatial data should be created for that resource that meets the standards. Similarly, legacy data, or locational information stored in an existing database, should be converted into spatial data (points, lines, polygons) that meet the standards, bearing in mind the accuracy exceptions for this older data.

In general, the cultural resource spatial data standards serve as a platform that will accept legacy data and can be built upon with newly collected or created cultural resource data. Cultural resource specialists can reasonably expect that data related to specific projects, regular inventory, Section 106, etc., will be shared across the various disciplines within a park, between parks, with regional offices and beyond. As a result, cultural resource specialists should make every effort to create spatial data that meets the standards to enable sharing of this information. Regional GIS coordinators, park GIS staff, program GIS staff and others will assist cultural resource specialists in achieving this goal.

The cultural resource spatial data standards are intended to serve as a starting point, or a minimum requirement for NPS cultural resource spatial data. If cultural resource specialists require additional descriptive information or more accurate locations for a specific project, the standards remain flexible enough to accommodate specific applications. Spatial data created to meet any NPS regulatory requirements will necessarily need to meet the NPS cultural resource spatial data standards. Meeting the standards is not intended to be an onerous task, however complying with the standards will improve the ability of cultural resource managers to better protect their resources, improve the quality of their data and widen the scope of analysis that can be performed with their data, allowing for better interpretation, better protection and enhanced awareness of cultural resource needs within the NPS.

Organization of the Cultural Resource Spatial Data Standards

As spatial data transfer standards, the NPS cultural resource spatial data standards do not specify a particular format for spatial data. Within the NPS, Environmental Systems Research Institute (ESRI) products remain the standard for GIS and spatial data however. ESRI allows several different file types for spatial data ranging from shapefiles (the most common) to GeoDatabases (the most recent). To accommodate the various methods that parks, regions and programs may already be using to create and store cultural resource spatial data, the standards have been organized around individual data layers, rather than a particular file type. These data layers would translate into a single shapefile for instance. Gathered together they could form a GeoDatabase (see the discussion of the implementation data model below).

The Cultural Resource Subcommittee felt the best way to organize these various data layers and express their unique needs was to separate them by cultural resource type, then by spatial feature type (point, line and polygon). As a result, 18 cultural resource spatial data standards exist, each one reflecting a resource type and spatial feature, such as an historic site polygon or a building point. The cultural resource types are based on National Register of Historic Places resource types, familiar to cultural resource specialists: sites, structures, buildings, objects, districts, etc.

Organized in this way, cultural resource specialists in a specific discipline can focus on their specific data layers, rather than working with all cultural resources should they choose to do so. However, cultural resource managers or planners who wish to view all of the cultural resources related to a specific park or region can view the various data layers together via a GIS, yet distinguish the cultural resource types visually.

The cultural resource types and spatial data types include (see National Register Bulletin 16A, "How to Complete the National Register Registration Form," p, 15):

- Historic Building Point or Polygon

Historic buildings are a resource created principally to shelter any form of human activity, such as a house. These resources would include features such as: farmhouses, homesites, mansions, churches, museums (if the building is historic), courthouses, offices, prisons, train depots, etc. Historic buildings most often function primarily as dwellings. The point may represent the center of the building, an entrance, a corner, etc., while the polygon may represent the building footprint.

- Historic Structure Point, Line or Polygon

Structures are a functional construction made for purposes other than creating shelter, such as a bridge. These resources would include features such as: fortifications, earthworks, roads, fences, canals, dams, engineering features, outbuildings, arsenals, ships, manufacturing facilities, etc. These resources represent sites that do not function primarily as dwellings, however they may serve temporarily to house humans, although their primarily purpose is not a permanent shelter. The point may represent the location of a culvert, while a line may represent a fence or road, and a polygon may represent the circumscribed boundary of a manufacturing plant.

- Historic Object Point, Line or Polygon

Historic objects are a construction primarily artistic in nature or relatively small in scale and simply constructed, such as a statue or mile-post marker. These resources would include features such as monuments to individuals, individual tombs, etc. The point may represent a single survey marker, while a line may represent an element of a memorial or a decorative landscape element and a polygon may represent the boundary of a large memorial element, such as a plaza.

- Historic Site Point, Line or Polygon

Historic sites are resources that have yielded or may be likely to yield information important to prehistory or history, or the location of a significant event. These resources may lie below ground, or may have above ground evidence indicating that the location possesses historic, cultural or archaeological value. These resources may include features such as: ruins of a building, the location of where a historic building, structure, or landscape may have once been, a battlefield, site of treaty signings, areas of land, designed landscapes or natural features. The point may represent a randomized point inside the archaeological site boundary, while a line may represent the excavated remains of a wall, and a polygon may represent the known extent of a cultural landscape or traditional cultural property.

- Historic District Polygon

Historic districts are a significant concentration, linkage, or continuity of sites, buildings, structures or objects united historically or aesthetically by plan or physical development. These resources may represent a local urban historic district within a city containing buildings related to a similar theme (such as commerce, manufacturing, college campus, etc.), or they may represent a rural area containing a series of plantations all from the same era that provide a representative example of typical residences in an area. An Historic District may also contain a cultural landscape or a series of archaeological sites or other resource types which exhibit some

significant connection. The polygon represents the boundary of the district itself, encompassing all of the various contributing elements. Contributing elements to the district should be included in the appropriate data layer for each element: historic building, structure, site, or object. If a contributing element to a district does not fit within these defined cultural resource type categories, they can be included in the Cultural Resource Other data layers, with the specification of what type of feature they represent recorded.

- Cultural Resource Other Point, Line or Polygon

Cultural Resources Other represent those features which do not fit easily into the defined cultural resource categories of historic building, structure, object, or site. These include elements which contribute to cultural landscapes, sites or districts. One contributing element of a landscape may include historic vegetation, such as an historic tree, a tree alee, a garden bed or parterre, etc. The point may represent a single artifact or tree, while a line may represent a tree alee and a polygon may represent a garden boundary. A Type field associated with the Cultural Resource Other data layers allows users to define more specifically what each feature is whether artifact, vegetation, water feature or some other cultural resource.

- Survey Point, Line or Polygon

A survey does not necessarily represent a cultural resource, but an area within which qualified individuals have made observations to locate cultural resources. These investigations may be undertaken as part of a specific project, in support of compliance with various historic preservation laws, or at the request of another agency, etc. The point may represent a generalized area within which searches were conducted or something as specific as a shovel test pit. While the line may represent a transect along which survey was conducted. The polygon represents a defined area within which survey was conducted.

Using the terminology associated with an ESRI GeoDatabase file type, the data layers described here represent *feature classes*. Any GIS software functions by abstracting the real world into data layers which contain the same type of features, such as roads, rivers, county boundaries, or park boundaries. Stacking these data layers on top of each other in the GIS software allows the user to view how they relate to each other spatially, and to further perform analysis by using one data layer to ask questions of another. For instance, an architectural historian may use the GIS to view point locations of buildings in relationship to polygon boundaries of historic districts, then ask the GIS software to count how many resources lie within each particular district. The feature classes defined here represent those individual data layers which the GIS stacks up visually.

Casual users of GIS may be familiar with the ESRI *shapefile* file type. Similar to a feature class, a shapefile constitutes a data layer which can be incorporated into the GIS. A feature class will look and act like a shapefile inside the GIS software, but a feature class represents a more sophisticated object that participates in a GeoDatabase structure (see the implementation model discussion below). Critical for the use of the cultural resource spatial data standards however is that these various data layers, whether stored as a shapefile or a feature class, provide the organization necessary to archive and share cultural resource spatial data for use in a GIS.

Tables of information containing descriptive data associated with each of these data layers allow GIS users to select an individual point, line or polygon and determine what it represents. For the

purposes of the cultural resource spatial data standards, these *attributes*, or fields of information, comprise the feature level metadata. The implementation model provides a means for the GIS to link from the spatial representation of a cultural resource to any of the various NPS databases which may contain the actual descriptive information related to the individual resource, thus avoiding the need to combine databases together or otherwise consolidate the various perspectives which may be associated with any one resource.

The feature level metadata contained in the attribute tables therefore forms the primary substance of the cultural resource spatial data standards. These fields of information document the lineage of any one point, line or polygon allowing cultural resource specialists to understand the source and accuracy of each spatial representation. Filling in the feature level metadata equates to compliance with the cultural resource spatial data standard.

In general, the same fields of feature level metadata apply to all of the cultural resource data layers included in the standards, with two exceptions. The Cultural Resource Other and the Cultural Resource Survey data layers require different information to help identify what type of survey or cultural resource is represented. In order to further standardize the cultural resource spatial data to accommodate data sharing and to make completing the feature level metadata easier, many of the fields have associated menu values, allowing users to choose from set pick lists as opposed to filling in free text. Created by the Cultural Resource Subcommittee, these feature level metadata fields, and their associated menu or *domain values* have been reviewed by cultural resource and GIS specialists to determine the minimum necessary information required to document and identify the appropriate uses of the data.

The Cultural Resource Subcommittee arranged the feature level metadata fields in a logical order, consistent among all of the data layers to reduce confusion and make completing the documentation as easy as possible. The fields themselves are generally the same for all of the cultural resource data layers, however the menu values may change to better reflect a specific cultural resource type.

The feature level metadata fields associated with the Historic Site, Historic Building, Historic Object, Historic Structure, and Historic District data layers consist of:

CR_ID
SURVEY_ID
GEOM_ID
RESNAME
BND_TYPE
BND_OTHER
IS_EXTANT
EXTANT_OTH
CONTRIBRES
RESTRICT_
SOURCE
SRC_DATE
SRC_SCALE
SRC_ACCU
VERT_ERROR
SRC_COORD
MAP_METHOD
MAP_MTH_OT
CREATEDATE
EDIT_DATE
EDIT_BY
ORIGINATOR
CONSTRANT
CR_NOTES
ALPHA_CODE
UNIT_CODEO
UNIT
UNIT_OTHER
UNIT_TYPE
GROUP_CODE
REG_CODE
META_MIDF

The feature level metadata fields associated with the Cultural Resource Other data layers consist of (those in italics represent those specific to the Cultural Resource Other data layers):

CR_ID	SOURCE	CONSTRANT
SURVEY_ID	SRC_DATE	CR_NOTES
GEOM_ID	SRC_SCALE	ALPHA_CODE
RESNAME	SRC_ACCU	UNIT_CODEO
BND_TYPE	VERT_ERROR	UNIT
BND_OTHER	SRC_COORD	UNIT_OTHER
IS_EXTANT	MAP_METHOD	UNIT_TYPE
EXTANT_OTH	MAP_MTH_OT	GROUP_CODE
TYPE	CREATEDATE	REG_CODE
TYPE_OTR	EDIT_DATE	META_MIDF
CONTRIBRES	EDIT_BY	
RESTRICT_	ORIGINATOR	

The feature level metadata fields associated with the Cultural Resource Survey data layers consist of (those in italics represent those specific to the Survey data layers):

SURVEY_ID	SOURCE	ORIGINATOR
GEOM_ID	SRC_DATE	CONSTRANT
RESNAME	SRC_SCALE	CR_NOTES
SRVY_TYPE	SRC_ACCU	ALPHA_CODE
TYPE_OTHER	VERT_ERROR	UNIT_CODEO
SRVY_LEVEL	SRC_COORD	UNIT
LEVEL_OTH	MAP_METHOD	UNIT_OTHER
SRVY_MTHD	MAP_MTH_OT	UNIT_TYPE
BND_TYPE	CREATEDATE	GROUP_CODE
BND_OTHER	EDIT_DATE	REG_CODE
RESTRICT_	EDIT_BY	META_MIDF

Although the field names may seem abstract, in order to accommodate the ability to share data across any type of spatial data file type, the field names may not contain any blank spaces and must be kept to 10 characters or less. As a result, some of the field names represent abbreviations to fit these parameters. In order to make the field names and meanings more clear, the Cultural Resource Subcommittee assigned an "alias" to each field name. As a result, when viewing the attribute tables in the GIS, users will not see, "CR_ID," but will see, "Cultural Resource GUID." Additionally, some fields represent *mandatory* information, some *mandatory if applicable* and some *optional*. Ultimately, filling in all information in all of the fields would provide the most complete documentation of our cultural resource spatial data, however to comply with the standards users must input data only in the required fields.

Feature Level Metadata Field Definitions, Potential Values and Examples

The Cultural Resource Subcommittee designed each of the feature level metadata fields to contain specific information to assist those who might use the spatial data in understanding how

the spatial data was originally created, when it was created, whether it has been edited, whether the spatial data is restricted, etc. Detailed definitions describing what the Subcommittee intended for each field, definitions of any menu or domain values and examples of what should be entered for these fields should provide help in migrating legacy data as well as incorporating new cultural resource data into any of the various data layers.

Standard fields and definitions for the Historic Site, Historic Building, Historic Object, Historic Structure, Historic District and Cultural Landscape data layers:

- CR_ID (Mandatory)
  Alias: Cultural Resource GUID

The CR_ID represents a unique identifier for the cultural resource which takes the form of a "globally unique identifier (GUID)." A globally unique identifier is a 38 character alpha/numeric randomly generated identifier commonly used in database development. Generated via a Microsoft application, the length and variation in the identifier virtually guarantees its uniqueness helping to insure that each one of the cultural resources in any of the data layers will have at least one ID that does not repeat and can be used to link to any other external NPS database. The CR_ID does not replace existing identifiers in any of the existing NPS databases and the CR_ID does not need to be added to any of the existing NPS databases. The implementation model described in this documentation allows users to take advantage of the spatial representations of cultural resources, using the geography itself to crosswalk between the NPS databases. In order to accomplish this, a single unique identifier must be assigned for each point, line or polygon used to represent a cultural resource. This guidance document contains information regarding methods of generating these GUIDs automatically (see the implementation model discussion below).

Example of a GUID:
{53D8A74E-AD5A-460A-BA71-D79CE2641AAA}

- SURVEY_ID (Mandatory if Applicable)
  Alias: Survey GUID

The SURVEY_ID represents a unique identifier for the survey through which the cultural resource represented was identified. Similar to the CR_ID, the SURVEY_ID takes the form of a GUID. Because the NPS does not maintain a central database of the various surveys conducted within the parks, entering information into this field is mandatory only if applicable. The Cultural Resource Subcommittee intended the inclusion of this identifier as a means to link to survey information maintained at parks or regional offices. Additionally, assigning an identifier to a survey will allow users to link individual cultural resources to the cultural resource survey data layers. The same methods employed to generate the CR_ID GUID can be used to create the SURVEY_ID.

Example of a GUID:
{37D1B949-ABCB-4C5E-A21E-1033606CD200}

- GEOM_ID (Mandatory)
  Alias: Locational GUID

The GEOM_ID (Geometry ID) represents a unique identifier for the geometry (point, line or polygon) describing the cultural resource in the data layer. Similar to the CR_ID and SURVEY_ID, the GEOM_ID takes the form of a GUID. The primary reason for assigning a geometry ID is to allow for the potential that a single cultural resource may have multiple spatial representations. For instance, an historic building may be represented by a point for the building entrance or as a polygon to describe the building footprint. In these cases, the building point and polygon would have the same CR_ID but two different GEOM_IDs. In the GIS, a user would be able to determine quickly that these two geographic features refer to the same cultural resource. Because maintaining this connection is crucial to understanding what cultural resource spatial data exists to represent a resource, and determining what data may best fit your specific analysis or application, filling in the GEOM_ID field is mandatory.

Example of a GUID:
{17432F80-794D-4DD9-819E-8A8893334A12}

- RESNAME (Optional)
  Alias: Resource Name

The RESNAME field allows users to enter an historic name or site name for the cultural resource. Although the standards are not intended to address descriptive data, the Cultural Resource Subcommittee felt that there should be some way to identify a cultural resource using something other than a GUID that may be difficult to decipher or more familiar to resource specialists. Because any one cultural resource may be known by multiple names or identities, entering information into this field is optional. The RESNAME field is free text (no domain values) with space for 250 characters, therefore it could contain anything from a building name or address to a Smithsonian trinomial number for an archaeological site.

Example:
Mount Vernon

- BND_TYPE (Mandatory)
  Alias: Boundary Type

The BND_TYPE field is intended to allow users to indicate what the spatial data represents relative to the cultural resource. For instance, users may describe whether a point location for a building represents the entrance, the center of the building or a corner of the building. Similarly, with polygon features, users may describe whether the area represents a circumscribed boundary, a buffered boundary, etc. In order to insure consistency in entering data and articulating what the spatial data depicts, the Cultural Resource Subcommittee developed menus or domain values for the Boundary Type field. However, because the type of cultural resource and the type of spatial feature determine what the boundary type may be, different menus apply to different data layers. Users should select one of the values to describe the boundary represented by the spatial data.

Domain values for Historic Site Points:

Site datum point	The point data represents the site datum
Center point	The point data represents the center of the site

Vicinity point	The point data represents a user selected point in relationship to another feature whose location is known, such as near a city or other boundary
Derived point	The point data represents a computer generated point based on site boundaries or other data and is computed or derived by a geo-processing function, such as a centroid
Arbitrary point	The point data represents a user selected point arbitrarily located on or near the feature, such as points generated from representative coordinate pairs or digitized based on other data
Other point	The point data represents some other point on or near the site

Domain values for Building Points:

Entrance point	The point data represents the entrance of the building
Center point	The point data represents the center of the building footprint
Façade point	The point data represents a location on the façade of the building, other than the entrance
Corner point	The point data represents a corner of the building
Arbitrary point	The point data represents a user selected point arbitrarily located on or near the feature, such as points generated from representative coordinate pairs or digitized based on other data
Derived point	The point data represents a computer generated point based on site boundaries or other data and is computed or derived by a geo-processing function, such as a centroid
Other point	The point data represents some other point near the building

Domain values for Building Polygons:

Footprint polygon	The polygon data represents the actual building footprint, at the foundation
Circumscribed polygon	The polygon data represents a general area including the building
Perimeter polygon	The polygon data represents a detailed perimeter of the building, including rooflines, porches or other features
Buffer polygon	The polygon data represents a computer generated area based on building points or another type of building polygon
Other polygon	The polygon data represents some other polygon area describing the building

Domain values for all line features:

Center line	The line data represents the center line of any linear cultural resource
Edge line	The line data represents the bounding edge of any linear cultural resource
Perimeter line	The line data represents a line beyond the exact edge of the linear cultural resource, at a specific distance
Arbitrary line	The point data represents a user selected line arbitrarily located on or near the feature, such as lines digitized based on other data
Derived line	The line data represents a computer generated feature based on site boundaries or other data and is computed or derived by a geo-processing function
Other line	The line data represents some other line describing the linear resource

Domain values for all point features, other than Site and Building Points:

Corner point	The point data represents a corner of the cultural resource
Center point	The point data represents the center of the cultural resource
Vicinity point	The point data represents a user selected point in relationship to another feature whose location is known, such as near a city or other boundary
Arbitrary point	The point data represents a user selected point arbitrarily located on or near the feature, such as points generated from representative coordinate pairs or digitized based on other data
Derived point	The point data represents a computer generated point based on site boundaries or other data and is computed or derived by a geo-processing function, such as a centroid
Other point	The point data represents some other point on or near the cultural resource

Domain values for all polygon features, other than Building Polygons:

Derived polygon	The polygon data represents a computer generated polygon based on another spatial representation of the cultural resource
Circumscribed polygon	The polygon data represents a general boundary including the cultural resource
Perimeter polygon	The polygon data represents a detailed perimeter of the cultural resource
Buffer polygon	The polygon data represents a computer generated boundary describing a specified distance or buffer away from another spatial representation of the cultural resource
Other polygon	The polygon data represents some other polygon describing the cultural resource

- BND_OTHER (Mandatory if Applicable)
  Alias: Boundary Type Comment

The BND_OTHER field is intended to allow users to provide additional information related to the Boundary Type identified. Specifically, if users choose an Other Point, Other Line or Other Polygon menu value, they must enter some explanation of what the spatial data represents into the BND_OTHER field. Additionally, if users wish to provide more clarification related to the Boundary Type value chosen the BND_OTHER field can accommodate up to 250 characters of free text.

Example:
BND_TYPE value: Other point
BND_OTHER value: point represents location of building chimney, as seen on aerial image

BND_TYPE value: Corner point
BND_OTHER value: point represents the northwest corner of the building

- IS_EXTANT (Mandatory)
  Alias: Is Extant?

The IS_EXTANT field is intended to allow users to indicate if the cultural resource is currently extant. Some points, lines or polygons included in the cultural resource data layers may represent cultural resources identified, recorded or documented many years ago. For instance, the Historic American Buildings Survey has recorded locations of resources beginning in the 1930s. As a result, the cultural resource spatial data layers may include points, lines or polygons that represent features no longer in existence or only partially in existence following damage, disaster or some other change to its status. In order to insure consistency in data entry for the IS_EXTANT field, the Cultural Resource Subcommittee developed a menu, or domain, containing specific options to describe the resource condition.

Domain values for the IS_EXTANT field:

True	The cultural resource is intact with little disturbance
False	The cultural resource is no longer intact
Unknown	The condition/status of the cultural resource in not known
Partial	The cultural resource is partially extant (partially excavated or in a state of ruin)
Other	The cultural resource is in some other extant status

- EXTANT_OTH (Mandatory if Applicable)
  Alias: Is Extant Comment

The EXTANT_OTH field is intended to provide additional information related to the Extant status indicated in the IS_EXTANT field. Specifically, if users choose the Other menu value, they must enter some explanation of what condition or intact status of the cultural resource. Additionally, if users wish to provide more clarification related to the Extant value chosen the IS_EXTANT field can accommodate up to 250 characters of free text.

Example:
IS_EXTANT value: Other
EXTANT_OTH value: landscape feature suffered from flooding and is being restored

- CONTRIBRES (Mandatory)
  Alias: Contributing Resource Flag

The CONTRIBRES field is intended to allow users to indicate if the cultural resource represented contributes to a larger historic district (of any resource type) or historic site. The Cultural Resource Subcommittee included this field to provide a means for users to record contributing and non-contributing resources to larger districts or sites, as well as individually significant resources. NPS cultural resource programs do not require the recordation of non-contributing resources with the same detail as contributing resources, however regional and park practices vary. Documenting the locations of both contributing and non-contributing resources in historic districts can significantly aide resource management and protection, however locational information for non-contributing resources in particular is not consistently collected, therefore flagging these resources easily constitutes an important resource management tool. In order to insure consistency in data entry for the CONTRIBRES field, the Cultural Resource Subcommittee developed a menu, or domain, containing specific options to describe the contributing status of individual resources.

Domain values for the CONTRIBRES field:

Yes	The cultural resource contributes to an historic district or site
No	The feature is a non-contributing element in an historic district or site
Individual	The cultural resource does not contribute to an historic district or site yet is historic or significant individually
Unknown	It is not possible to determine if the resource contributes to an historic district or site

- RESTRICT_ (Mandatory)
  Alias: Restriction

The RESTRICT_ field is intended to allow users to indicate if the spatial data related to a specific cultural resource should be restricted from release to other parties or general distribution. The Cultural Resource Subcommittee recognizes the sensitivity of cultural resource spatial data and the need to restrict its distribution to the general public. Currently, distribution of cultural resource locational data is primarily determined at the data set level. For instance, all archaeological data is restricted from release. The Cultural Resource Subcommittee acknowledged that a finer level of detail for restricting cultural resource data would be helpful for cultural resource managers, planners and others, resulting in the addition of a field to identify the specific restriction status for each cultural resource point, line or polygon. Providing more flexibility in the restriction status itself by establishing a menu or domain of options also insures consistency in data entry for the RESTRICT_ field. (Note: The RESTRICT_ field contains a trailing "_" character because the word "restrict" is a reserved word in database construction and cannot be used as a field name. Adding the "_" allows the word to be altered enough so that it can be used as a field name.)

Domain values for the RESTRICT_ field:

Unrestricted	There are no restrictions on the release or distribution of the spatial data for the cultural resource
Restricted: No third party release	The spatial data for the cultural resource is restricted to a limited distribution of the data requestor only
Restricted: Affected Program or group concurrence	The affected or affiliated cultural resource program or group must concur before the cultural resource spatial data is distributed
Restricted: Originating agency concurrence	The originating agency that created the cultural resource spatial data must concur before the data is distributed
Restricted: No release	The spatial data associated with the cultural resource should not be released

- SOURCE (Mandatory)
  Alias: Source

The SOURCE field is intended to allow users to indicate or identify the source from which the point, line or polygon was derived. For instance, if the spatial data was created through a GPS survey, the source would be GPS. Other options might be the name of the image used in digitizing cultural resources or the name of the database tables from which coordinate pairs were used to create point features. The Cultural Resource Subcommittee felt that identifying the

source of the geographic data would help cultural resource specialists assess the quality of the data and the utility of the data for specific tasks. Making the distinction between data derived from coordinate pairs in a database and data collected via GPS may directly address the accuracy of the data. Because users may generate points, lines and polygons from many different sources, particularly when working with legacy data, the SOURCE field has no menu or domain values and remains a free text field into which users can enter up to 250 characters. If the original source is not known, users may enter "Unknown" into the field.

Example:
Cultural Landscapes Inventory database

Example:
PA Map Program 2005 Color Orthophotos of PA

- SRC_DATE (Mandatory)
  Alias: Source Date

The SRC_DATE field is intended to allow users to record the date associated with the document, image, file or other data used to create the cultural resource spatial data, and identified in the SOURCE field. The Cultural Resource Subcommittee felt that indicating the date of the source was as important as identifying the source, as the date may provide clues as to the actual parameters of maps or images used to digitize points, lines or polygons. Because of the possible variations in the SOURCE field, the Cultural Resource Subcommittee did not develop a menu or domain for the SRC_DATE field, however the SRC_DATE field is formatted as a date field, as opposed to a text or number field. Date fields always take the form of month/day/year. If the date of the source data is not known, users may leave the field blank.

Example:
4/23/2010

- SRC_SCALE (Mandatory)
  Alias: Source Scale

The SRC_SCALE field is intended to allow users to record the original scale at which the cultural resource was mapped. For instance if a set of UTM coordinates was generated from a USGS quadrangle map, the scale would be 1:24,000. If the point, line or polygon was digitized from an aerial photograph, the resolution of the image (such as 1 foot per pixel) should be indicated. Note that data collected with GPS will not have a scale, but will have an accuracy (see the SRC_ACCU field) assessment. The Cultural Resource Subcommittee felt that because of the large array of possible sources for cultural resource points, lines and polygons used to generate spatial data, documenting the original scale of the source would provide important information to cultural resource specialists and other users of the data regarding the quality of the data and its potential utility for specific applications. If the scale of the source data is not known, users may enter "Unknown" into the field.

Example:
SOURCE: USGS 7.5 minute quadrangle

SRC_SCALE: 1:24,000
(note: users can find scale information for the various standardized USGS map products by looking at the map collar information, located in the border of the map)

SOURCE: GPS
SRC_SCALE: not applicable

- SRC_ACCU (Mandatory)
  Alias: Source Horizontal Accuracy

The SRC_ACCU field is intended to allow users to record the horizontal accuracy of the source data used to generate the spatial data. Like the SRC_SCALE, recording the Source Horizontal Accuracy provides important details regarding the quality of the cultural resource spatial data, which affects the possible uses of the data itself. Because of the variety of possible sources of data and possible scales, the SRC_ACCU field is also a free text field with no menu or domain values, which can hold up to 250 characters. Note that base maps commonly used by cultural resource specialists, such as USGS quadrangle maps, all have a standardized accuracy assessment, which can be found in the National Map Accuracy Standards. For instance, a typical 7.5 minute USGS quadrangle map accuracy assessment is +/- 12 meters. Similarly, data collected with GPS will have an accuracy assessment related to the quality of the GPS unit used to collect the data, and may range from +/- 20 meters to +/- 1 meter depending on the data collection procedures. Additionally, many horizontal accuracy statements include information regarding the percentage of features on the map that may meet the accuracy. For instance a full map accuracy statement may take the form of a statement such as: +/- 12 meters for 90% of the points tested. If the accuracy of the source data is not known, users may enter "Unknown" into the field.

Example:
SOURCE: USGS quadrangle
SRC_SCALE: 1: 100,000
SRC_ACCU: +/- 50 meters

SOURCE: PA Map Program 2005 Color Orthophotos of PA
SRC_SCALE: 1 foot resolution per pixel
SRC_ACCU: 5 feet for 95% of check points
SOURCE: GPS
SRC_SCALE: not applicable
SRC_ACCU: +/- 3 meters

- VERT_ERROR (Mandatory if Applicable)
  Alias: Vertical Error

The VERT_ERROR field is intended to allow users to record the vertical error for geographic data collected or created in a 3-D format. In general legacy cultural resource data does not contain vertical or Z values, with the exception of some archaeological data. New data collected with GPS or other survey tools have the option of recording a Z value, although accuracy of this measure vary greatly in comparison to horizontal accuracy. The NPS GIS Council felt that if Z values are being collected, vertical error must be similarly documented with each spatial feature.

In order to make data entry more consistent and efficient, the NPS GIS Council developed a menu or domain of potential values to describe the vertical error associated with this type of 3-D data. For cultural resource spatial data, where Z values are rarely collected, users can enter the, "Not Applicable," menu option or value.

Domain values for the VERT_ERROR field:

Unknown	The amount of vertical error is not known
Not Applicable	Vertical data was not collected, therefore vertical error is not applicable
>10 meters	Vertical error is greater than 10 meters
>5 meters <=10 meters	Vertical error is greater than 5 meters but less than or equal to 10 meters
>1 meter <= 5 meters	Vertical error is greater than 1 meter but less than or equal to 5 meters
>15 centimeters <=1 meter	Vertical error is greater than 15 centimeters but less than or equal to 1 meter
<= 15 centimeters	Vertical error is less than or equal to 15 centimeters

- SRC_COORD (Mandatory)
  Alias: Source Coordinate System

The SRC_COORD field is intended to allow users to record the coordinate system associated with the source data used to create the cultural resource point, line or polygon. Many of the NPS cultural resource databases store coordinate pairs as locations. These coordinate pairs were generated from a source such as a USGS quadrangle map. Each of these map sources has a coordinate system, or map projection, associated with it. This critical information defines what form the coordinate pair numbers take and how they can be mapped or overlaid with data from other sources, such as GPS or aerial photographs. Recording these coordinate systems, and the associated datums that the coordinate systems are measured from is one of the most important aspects of the cultural resource spatial data standards, allowing data to be shared and used with other data types. For instance, the National Register of Historic Places records at least one coordinate pair for each resource listed in the database. These coordinate pairs are based on the UTM coordinate system. Some are measured from the North American Datum established in 1927 while some are measured from the North American Datum established in 1983. If users map the locations collected based on the 1927 datum with the locations based on the 1983 datum without defining which locations came from each datum, the locations could be up to 200 meters off. Because of the variety of SOURCE options however, the Cultural Resource Subcommittee felt that no menu or domain values should be established. The SRC_COORD field is a free text field with up to 250 characters for users to describe the coordinate system and datum related to their source. If a user is unsure of the Source Coordinate System or datum, this information is often written in the collars or borders of standard quadrangle maps or stored in metadata files that are associated with aerial images and GPS data. If the coordinate system of the source data is not known, users may enter "Unknown" in the field.

Example:
SOURCE: USGS 7.5 minute quadrangle map
SRC_COORD: UTM zone 18 North, NAD83

SOURCE: PA Map Program 2005 Color Orthophotos of PA
SRC_COORD: PA State Plane, NAD83

SOURCE: GPS
SRC_COORD: Geographic, decimal degrees, NAD83
(Note: all GPS data is collected in decimal degrees, World Geodetic System 1984, however the GPS data can be exported from the GPS receiver in any number of coordinate systems. Be sure the coordinate system of the data, as it is exported, is recorded)

- MAP_METHOD (Mandatory)
  Alias: Map Method

The MAP_METHOD field is intended to allow users to indicate the method through which the cultural resource point, line or polygon was created or generated. The method used to create the spatial data will provide important information regarding the quality of the data and any potential applications the data could be incorporated into. In order to insure consistency of data entry, the Cultural Resource Subcommittee developed a menu or domain with a set of values to describe how the spatial data was created.

Domain values for the MAP_METHOD field:

Differential GPS	The spatial data was created via GPS and differentially corrected
Autonomous GPS	The spatial data was created via GPS and was not post-processed
Digitized	The spatial data was created by tracing or drawing features based on a base map or aerial photograph
Derived by XY event point or centroid generation	The spatial data was computer generated from a table of X/Y coordinate pairs to create points, or computer generated to find a center point of a polygon
Geo-coded	The spatial data was created by interpolating a location based on a street address
Total Station	The spatial data was created by using a geo-referenced survey grade total station
Theodolite	The spatial data was created by using a surveying instrument geo-referenced to real world coordinates
Other	The spatial data was created via some other method

- MAP_MTH_OT (Mandatory if Applicable)
  Alias: Map Method Comment

The MAP_MTH_OT field is intended to provide additional information related to the Map Method indicated in the MAP_METHOD field. Specifically, if users choose the Other menu value, they must enter some explanation of what method was used to create the point, line or polygon representing the cultural resource. Additionally, if users wish to provide more clarification related to the MAP_METHOD value chosen, the MAP_MTH_OT field can accommodate up to 250 characters of free text.

Example:
MAP_METHOD: Other

MAP_MTH_OT: point location generated via transit and geo-referenced with GPS

- CREATEDATE (Mandatory if Applicable)
  Alias: Creation Date

The CREATEDATE field is intended to allow users to enter the date the point, line or polygon was initially created. Because NPS cultural resource specialists have generated spatial data through various means at different times, if the original creation date is not known, entering data into this field is mandatory only if applicable. The Cultural Resource Subcommittee did not develop a menu or domain for this field because of all the possible variations, however the field is configured as a date field, as opposed to a text or number field. Date fields always follow a month/day/year format.

Example:
7/24/2005

- EDIT_DATE (Mandatory if Applicable)
  Alias: Last Edit Date

The EDIT_DATE field is intended to allow users to enter the date the point, line or polygon was last edited or spatially modified. Because cultural resource specialists do not always revisit the spatial representations of their resources, an edit date subsequent to the Creation Date may not exist. In these cases the field may be left blank. The Cultural Resource Subcommittee did not develop a menu or domain for this field because of all the possible variations, however the field is configured as a date field, as opposed to a text or number field. Date fields always follow a month/day/year format.

Example:
8/19/2009

- EDIT_BY (Mandatory if Applicable)
  Alias: Edited By

The EDIT_BY field is intended to allow users to document the name of the individual who last edited the point, line or polygon, associated with the Last Edit Date. Because cultural resource specialists often move from park to park, it is important to know who actually made the edits to the spatial data if users need to ask additional questions or get more information about the edits performed. If the data has not been edited since it's original creation, this field may be left blank. The EDIT_BY field is a free text field to accommodate any text entry for the name of the editor.

Example:
EDIT_DATE: 8/19/2009
EDIT_BY: Deidre McCarthy

- ORIGINATOR (Mandatory)
  Alias: Originating Institution

The ORIGINATOR field is intended to allow users to document the institution which originally created the point, line or polygon feature. Because NPS cultural resource data originates in

many various places, such as an individual park, a regional office or a larger program office, it is important to identify the originator if users need to understand more about the spatial data itself, it's creation process or any of its parameters. Individuals identified in the EDIT_BY field may no longer remain in the office which originally generated the data. This free text field will provide an additional point of contact.

Example:
National Park Service, Cultural Resource GIS Facility

Example:
National Park Service, Midwest Archaeological Center

- CONSTRANT (Mandatory)
  Alias: Use Constraint

The CONSTRANT field is intended to allow users to identify the appropriate use of the point, line or polygon or indicate what issues may be relevant for other data users to understand about the spatial data itself and any information that would affect how the spatial data could or should be incorporated into GIS applications. Due to other parameters documented through the cultural resource data feature level metadata, such as date, extant, source, source scale or source accuracy, it may be important for users to understand that some features within the larger cultural resource feature class may not be appropriate for all uses or legal uses in particular. The CONSTRANT field is a free text field which can accommodate a brief statement as necessary.

Example:
None

Example:
Extant status and datum information for resource not recorded by source; coordinate pairs used to generate points not checked for accuracy by source

Example:
Data not suitable for identifying resources potentially affected by a Section 106 undertaking

- CR_NOTES (Optional)
  Alias: Comment on Resource

The CR_NOTES field is intended to allow users a free text field into which general comments regarding the specific resource or the specific spatial data representation can be placed. This optional field can accommodate any brief comment (up to 255 characters) that may be relevant to the point, line or polygon representing the cultural resource.

Example:
Although the point represents a resource listed on the National Register, corrected locational data from the State Historic Preservation Office has been used to replace the original UTM coordinates stored in the National Register Information System.

- ALPHA_CODE (Mandatory if Applicable)
  Alias: NPS Unit Code

The ALPHA_CODE field is intended to allow users to identify the National Park that a particular resource may lie within. Some cultural resources within cultural resource databases maintained by the National Park Service, such as the National Register of Historic Places or the HABS/HAER/HALS, may inventory resources outside NPS property or responsibility. As a result, data entry into the ALPHA_CODE is mandatory only if applicable, or if the specific resource lies within a National Park. To make data entry easier, the ALPHA_CODE field may select park unit names from a domain that contains all of the park unit 4-letter acronyms. All park units, associated monuments, memorials, seashores, etc., are represented in the domain values.

Example Domain values for the ALPHA_CODE field:

ACAD	Acadia National Park
ADAM	Adams National Historic Site
AFAM	African American Civil War Memorial
AFBG	African American Burial Ground Memorial

- UNIT_CODEO (Mandatory if Applicable)
  Alias: Other NPS Unit Code

The UNIT_CODO field is intended to allow users to indicate if the specific resource represented by the point, line or polygon is related to more than one National Park unit. The UNIT_CODO field, like the ALPHA_CODE allows the user to identify the associated National Park that a resource may relate to. The UNIT_CODO field uses the same set of domain values used for the ALPHA_CODE field, including all possible park units.

Example Domain values for the UNIT_CODEO field:

AGFO	Agate Fossil Beds National Monument
ALKA	Ala Kahakai National Historic Trail
ALAG	Alagnak Wild River
ALCA	Alcatraz Island

- UNIT (Optional)
  Alias: NPS Unit Name

The UNIT field is intended to allow users to spell out the entire text name of the National Park that the specific resource may lie within. The free text field should contain the full text of the park name identified in the ALPHA_CODE field.

Example:
Acadia National Park

- UNIT_OTHER (Optional)
  Alias: Other NPS Unit Name

The UNIT_OTHER field is intended to allow users to spell out the entire text name of any related National Park that is relevant to the specific resource represented by the point, line or

polygon. The free text field should contain the full text of the park name identified in the UNIT_CODO field.

Example:
Agate Fossil Beds National Monument

- UNIT_TYPE (Optional)
  Alias: NPS Unit Type

The UNIT_TYPE field is intended to allow users to identify the type of NPS unit that the specific resource lies within. Because not all cultural resources inventoried in NPS cultural resource databases fall within a National Park unit, data entry into the field remains optional. To assist data entry, users may choose values from the domain that describes all the possible NPS unit types:

Domain values for the UNIT_TYPE field:

National Historical Park	The park unit is classified as a National Historical Park
National Park	The park unit is classified as a National Park
National Monument	The park unit is classified as a National Monument
National Historic Trail	The park unit is classified as a National Historic Trail
National Historic Area	The park unit is classified as a National Historic Area
National Historic Site	The park unit is classified as a National Historic Site
National Recreation Area	The park unit is classified as a National Recreation Area
National Monument and Preserve	The park unit is classified as a National Monument and Preserve
National Battlefield	The park unit is classified as a National Battlefield
National Cemetery	The park unit is classified as a National Cemetery
National Lakeshore	The park unit is classified as a National Lakeshore
National Scenic Trail	The park unit is classified as a National Scenic Trail
National Memorial	The park unit is classified as a National Memorial
National Seashore	The park unit is classified as a National Seashore
Parkway	The park unit is classified as a Parkway
National Preserve	The park unit is classified as a National Preserve
National Heritage Corridor	The park unit is classified as a National Heritage Corridor
National Scenic River	The park unit is classified as a National Scenic River
Historical Park	The park unit is classified as a Historical Park
National Battlefield Site	The park unit is classified as a National Battlefield Site
National River	The park unit is classified as a National River
Park	The park unit is classified as a Park
National Military Park	The park unit is classified as a National Military Park
National Historical Reserve	The park unit is classified as a National Historical Reserve
National Heritage Area	The park unit is classified as a National Heritage Area
National Battlefield Park	The park unit is classified as a National Battlefield Park

- GROUP_CODE (Mandatory if Applicable)
  Alias: NPS Administration Group Code

The GROUP_CODE field is intended to allow users to indicate the NPS unit code of the NPS unit responsible for administering the unit identified in the ALPHA_CODE field. Some National Park units are jointly administered by a larger unit, forming a group of parks under a single umbrella. If this is the case, users may use the GROUP_CODE field to indicate the four letter acronym for the administering unit. Because not all cultural resources inventoried in NPS cultural resource databases fall within a National Park unit, data entry into the field remains optional. The GROUP_CODE field uses the same set of domain values used for the ALPHA_CODE field, including all possible park units.

Example Domain values for the GROUP_CODE field:

AGFO	Agate Fossil Beds National Monument
ALKA	Ala Kahakai National Historic Trail
ALAG	Alagnak Wild River
ALCA	Alcatraz Island

- REG_CODE (Mandatory if Applicable)
  Alias: NPS Region Code

The REG_CODE is intended to allow users to indicate the NPS regional office associated with the NPS unit identified in the ALPHA_CODE field. Because not all cultural resources inventoried in NPS cultural resource databases fall within a National Park unit, data entry into the field remains optional. To assist data entry, users may choose values from the domain that describes all the possible NPS regions:

Domain values for the REG_CODE field:

Alaska Region	The park is within the Alaska Region jurisdiction
Intermountain Region	The park is within the Intermountain Region jurisdiction
Midwest Region	The park is within the Midwest Region jurisdiction
National Capital Region	The park is within the National Capital Region jurisdiction
Northeast Region	The park is within the Northeast Region jurisdiction
Pacific West Region	The park is within the Pacific West Region jurisdiction
Southeast Region	The park is within the Southeast Region jurisdiction
Washington Service Office	The resource is within the Washington Service Office jurisdiction

- META_MIDF (Mandatory if Applicable)
  Alias: Metadata file GUID

The META_MIDF field is intended to allow users to indicate the unique ID associated with an exterior metadata file associated with an individual point, line or polygon. If parks or other resources contribute locational data from their own sources, additional metadata from those sources may exist in an exterior data file. The META_MIDF field holds a GUID value that would provide a primary key to link to such an exterior metadata file. Because not all resources will have separate associated metadata files, the META_MIDF field is mandatory only if applicable. Similar to the CR_ID, SURVEY_ID and the GEOM_ID, the META_MIDF field takes the form of a GUID.

Example of a GUID:
{17432F80-794D-4DD9-819E-8A8893334A12}

Fields and definitions added to the standard group, specific for with the Cultural Resource Other data layers (see list of fields for each feature class above).

- TYPE (Mandatory)
  Alias: Resource Type

The TYPE field is intended to allow users to define what cultural resource type the point, line or polygon classified as, "other," represents. Because the Cultural Resource Other feature classes are intended to provide a category to place resources that do not fit easily into the other defined cultural resource feature classes it is critical to identify what type of resource the point, line or polygon is intended to represent. To assist data entry, users may choose values from the domain that describes possible resource types:

Domain values for the TYPE field:

Vegetation	The resource represents some type of vegetative feature that contributes to a site, district or other cultural feature
Hydrology	The resource represents some type of hydrologic feature that contributes to a site, district or other cultural feature
Terrain	The resource represents some type of topographic or terrain feature that contributes to a site, district or other cultural feature
Geology	The resource represents some type of geologic feature that contributes to a site, district or other cultural feature
Artifact	The resource represents an artifact collected as part of a identified site or an isolated artifact find
Land Use	The resource represents some type of land use feature that contributes to a site, district or other cultural feature
Views and Vistas	The resource represents a viewshed, view point associated with a site, district or some other cultural feature
Management/Character Area	The resource represents a spatial organization landscape characteristic, categorized as a management or character area
Other	The resource represents some other type of cultural feature

- TYPE_OTR (Mandatory if Applicable)
  Alias: Resource Type Comment

The TYPE_OTR field is intended to provide additional information related to the Resource Type indicated in the TYPE field. Specifically, if users choose the Other menu value, they must enter some explanation of what type of resource the point, line or polygon represents. Additionally, if users wish to provide more clarification related to the TYPE value chosen, the TYPE_OTR field can accommodate up to 250 characters of free text.

Example:
TYPE: Other
TYPE_OTR: garden parterre used to delineate areas within a formal garden

Fields and definitions added to the standard group, specific for with the Cultural Resource Survey data layers (see list of fields for each feature class above).

- SRVY_TYPE (Mandatory)
  Alias: Survey Type

The SRVY_TYPE field is intended to allow users to identify the type of cultural resource targeted with the survey undertaken and represented by the point, line or polygon. Because multiple surveys may have taken place within an area, it is critical to identify the type of cultural resource targeted by each individual survey effort. To assist data entry, users may choose values from the domain that describes possible cultural resource types that could be the subject of a survey:

Domain values for the SRVY_TYPE field:

Archaeology	Archaeological resources are the primary subject of the survey delineated
Architecture	Architectural resources are the primary subject of the survey delineated
Structure	Structural resources are the primary subject of the survey delineated
Cultural Landscape	Cultural landscapes and related resources are the primary subject of the survey delineated
Ethnography	Ethnographic resources are the primary subject of the survey delineated
Multiple resource types	Multiple cultural resource types are the subject of the survey delineated
Other	Some other cultural resource, or combination of resources, are the subject of the survey delineated

- TYPE_OTHER (Mandatory if Applicable)
  Alias: Survey Type Comment

The TYPE_OTHER field is intended to provide additional information related to the Survey Type indicated in the SRVY_TYPE field. Specifically, if users choose the Other menu value, they must enter some explanation of what type of survey or the type of cultural resource that is the subject of the survey that the point, line or polygon represents. Additionally, if users wish to provide more clarification related to the SRVY_TYPE value chosen, the TYPE_OTHER field can accommodate up to 250 characters of free text.

Example:
SRVY_TYPE: Other
TYPE_OTHER: National survey of Civil War battlefields in response to 2003 legislation

- SRVY_LEVEL (Mandatory)
  Alias: Level of Survey

The SRVY_LEVEL field is intended to allow users to describe the intensity or level of the survey conducted and represented by the point, line or polygon delineated. Because multiple surveys may have taken place within an area, it is critical to identify the intensity of each survey

undertaken in each survey effort. To assist data entry, users may choose values from the domain that describes possible survey intensity levels, as defined by the National Register of Historic Places:

Domain values for the SRVY_LEVEL field:

Reconnaissance survey	Survey conducted with a minimal or reconnaissance level methodology
Intensive survey	Survey conducted with a detailed or intensive level methodology
Other	Some other level or intensity of survey conducted

- LEVEL_OTH (Mandatory if Applicable)
  Alias: Survey Level Comment

The LEVEL_OTH field is intended to provide additional information related to the Survey Level indicated in the SRVY_LEVEL field. Specifically, if users choose the Other menu value, they must enter some explanation of what level of survey, or intensity of survey, was conducted in the survey that the point, line or polygon represents. Additionally, if users wish to provide more clarification related to the SRVY_LEVEL value chosen, the LEVEL_OTH field can accommodate up to 250 characters of free text.

Example:
SRVY_LEVEL: Other
LEVEL_OTH: windshield form of reconnaissance survey conducted

- SRVY_MTHD (Mandatory)
  Alias: Survey Method

The SRVY_MTHD field is intended to allow users to describe the field methods used in the survey undertaken, regardless of intensity level. Because multiple surveys may have taken place within an area, and with differing levels of intensity, the free text SRVY_MTHD field provides a location to describe the actual field procedures related to a specific survey, adding to the detail of the intensity selected. The SRVY_MTHD field can accommodate up to 250 characters of free text.

Example:
Shovel test pits dug at 10 meter intervals on transects 15 meters apart and 50 meters long

These feature level metadata fields, for all of the various resource type data layers, are intended to document the lineage of the data and provide information necessary for the user to determine the most appropriate application of the data itself. Additionally, filling in these feature level metadata fields documents the quality and accuracy of the data being shared, avoiding misinterpretation of the data itself.

Complying with the Standards

Completing feature level metadata for all of the cultural resource spatial data created at park, regional and program levels constitutes the majority of the task of complying with the standards. Storing that feature level metadata in a shapefile or GeoDatabase format with the spatial

parameters outlined, such as coordinate system and datum; as well as creating new cultural resource spatial data based on the accuracy defined in the standards constitutes the remainder of the job of complying with the standards.

The Cultural Resource Subcommittee, together with several parks and regional offices, has conducted several tests and embarked on projects to convert legacy cultural resource spatial data into the appropriate format to comply with the standards, in addition to collecting new data and documenting it to the extent required by the standards. As a result, several questions frequently arose which may assist users as they begin to examine their own cultural resource data and move it into the standard format.

Frequently Asked Questions

1. Why are there so many different data layers and cultural resource types referenced in the cultural resource spatial data standards?

It is important to make the distinction between the implementation model (the GeoDatabase template) and the standards themselves. The implementation model has been structured as a file GeoDatabase with the various feature classes which describe each cultural resource type (buildings, structures, objects, sites, districts, and surveys). In addition the GeoDatabase contains a link table to accommodate the need to create relationships between the geometry and the descriptive information about any one cultural resource that will remain contained in the appropriate NPS database (LCS, ASMIS, CLI, etc.). These data layers were established based on the users need to work with specific resource types, and also to view those various resource types in relation to other cultural resources geographically.

This implementation model represents one way to comply with the cultural resource spatial data standards, however there are other possible models that can be used, including those that do not involve GeoDatabases and rely on flat files alone. It is intended that this approach will provide the user with the flexibility to choose how they need to interact with the data depending on the application.

In using the implementation model provided there will be overlap in the definitions of some of the feature classes. The feature classes are based on resource types that are clearly defined by the National Register of Historic Places and have been established for over 40 years.

2. Why are there multiple feature classes for the same resource type, for instance an historic site point, line and polygon?

After discussing the existing cultural resource data and data sources, and considering future cultural resource data collection methods, the Cultural Resource Subcommittee felt it was important to account for the possibility of having multiple geometry types that might represent the same cultural resource, such as a point for a building and polygon for the same building footprint. If this were to occur, both features would receive the same CR_ID, but different Geometry_IDs.

3. How do I categorize the cultural resources I work with into the various feature classes available in the model?

Definitions for each of the cultural resource categories used in the implementation model can be found through the National Register of Historic Places, including: historic buildings, historic structures, historic objects, historic sites, historic districts and surveys.

4. Is the Historic Site Polygon feature class intended to include contributing site features, only site boundaries, or a combination of the two?

The Historic Site Polygon feature class is intended to accommodate both intrasite features and full site boundaries. It is intended that elements which contribute to sites would be included in the appropriate resource type feature class, such as a building, structure, or object. However, there may be instances where intrasite elements contribute to a larger site boundary. In these cases users may include both these features and the encompassing boundary in the historic site point, line or polygon feature classes.

5. When representing narrow features like fences, trails or roads, should these be delineated as lines or as polygons if the width is known?

It was intended that these features would be represented in line feature classes. A width field was not included in the feature level metadata as we considered that to be a descriptive attribute that would be contained in external databases linked to the geography. However, the standards are intended to represent a minimum set of data needed to describe a feature; any user can add additional fields as they find a need for them. A width field could be added to the line feature classes at any point to allow users to buffer lines and create polygon features. In these cases, both the line and polygon features would receive the same CR_ID but different Geometry_IDs.

6. What do I put in the Source Scale field if I do not know the scale of the source data from which my data was derived?

It was intended that the Source Scale field would contain a typical scale ratio, such as 1:24,000 or 1:100,000 to indicate what scale the source information provided. If the source data, such as a paper map or aerial photograph that you are digitizing from does not have a defined scale, or you do not know what the source scale was, we suggest you enter, “Unknown” into the field to indicate that the value is unknown, as opposed to not filled in.

7. What information do I need to include in the Source Accuracy field?

The Source Accuracy field is a free text field which allows the user to enter as much or as little information about the accuracy of the source data as is available. It was intended that users follow the National Map Accuracy standards if the source data is a known entity, such as a topographic quadrangle map at 1:24,000 scale. In this case, the source accuracy would be +/- 12 meters. For data collected with GPS, entering the source accuracy will depend on the receiver used, and whether data has been differentially corrected. If additional information is available, such as the percentage of points that fall within any given distance range are available, these can be expressed as well. For instance, +/- 12 meters for 90% of vertices, would express the accuracy and a confidence

level. If no information is available, we suggest you enter, "Unknown" into the field to indicate that the value is unknown as opposed to not filled in.

8. Does the Source Coordinate System field have a domain?

No, the Source Coordinate System field is free text. After some discussion with cultural resource subject matter experts it appeared that there was the possibility of many coordinate systems, particularly when working with features digitized from historic maps or georeferenced images, therefore a domain would be difficult to create.

9. What is the appropriate domain value to choose for the Map Method field when features have been professionally surveyed?

The Map Method field is intended to capture how the point, line or polygon feature was originally created. Currently there is no domain value for the Map Method field that indicates a professionally surveyed feature collected using traditional survey methods. This can be addressed in later versions of the standards however by adding a domain value to represented "cadastral survey" features. We recommend using the "other" option in the Map Method field, then defining the actual survey method in the Map Method Comment field. Additions such as this to the Map Method field will be brought to the NPS GIS Council, Cultural Resources Subcommittee to discuss.

10. What is the difference between the domain values used for the Boundary Type field for polygons, specifically the difference between footprint polygons, circumscribed polygons and perimeter polygons?

Because the same Boundary Type domain values are used for multiple feature classes, some of the options are more appropriate for specific feature classes. A "footprint" should represent a polygon that describes the outline of the building at the ground, not a roofline for instance. A "perimeter" could represent a polygon that was digitized off of an aerial, or a feature such as a polygon representing the extent of an archaeological excavation that may not delineate the entire boundary of the archaeological site itself. A "circumscribed" polygon would more likely represent a boundary that is only generally defined, such as a National Register of Historic Places district.

11. What is the difference between the Use Constraints field and the Restriction field?

The Use Constraints field is intended to reflect what the appropriate use of the data may be, indicating how accurate the data may be for instance, or whether the locations are good enough to use in a legal setting. The Restriction field is intended to reflect whether the release of the geographic information may be restricted due to the sensitive nature of the resource. Domain values have been provided for the Restriction field reflecting the various types of data release that may be acceptable.

12. Can I add other ID fields to the cr_link table?

The cr_link table is part of the GeoDatabase implementation model that allows users to crosswalk between all of the various NPS databases and other databases that may contain descriptive information about any single cultural resource. The cr_link table is NOT part of the cultural resource standards, but is part of the implementation model. If users find the need to add more fields to the cr_link table, such as a field for Smithsonian

Trinomials for archaeological sites, they are free to do so. Users can add as many fields to the link table as they find useful for their own applications.

13. Should I include contributing and non-contributing features in the feature classes?
    Individual features may contribute to a larger historic district, archaeological district or cultural landscape. Certainly any feature which contributes, or has been determined eligible should be included in the geographic data. In many cases non-contributing elements are not recorded, however in some cases they are. The Cultural Resource Subcommittee has included a field to describe whether the resource is contributing to a larger whole, not contributing at all, or significant on its own merit. In some cases non-contributing elements may be historic on their own, but not contributing to the particular district or landscape, and these should be included in the spatial data. Non-contributing elements which ARE NOT historic will be absorbed by other data standards and should not be included in the cultural resource data.

Adding Additional Fields

Not included in the "Frequently Asked Questions," but an issue that is often raised by those testing or using the cultural resource spatial data standards is whether additional descriptive fields of information can be added. The fields of feature level metadata described in this guidance document represent the cultural resource data standards minimal requirements. These fields can be stored with the points, lines or polygons that represent cultural resources in a shapefile, GeoDatabase or other spatial data format. In order to be as flexible as possible in accommodating any cultural resource type as well as all descriptive information that is collected at park, regional or program levels, the Cultural Resource Subcommittee purposefully avoided trying to standardize such descriptive information to include with the feature level metadata fields. The Subcommittee intended for this type of information to remain in the already established databases that address the various cultural resource types across the NPS.

For ease of use however, users may find it helpful to include some of this descriptive data with the spatial data for display, planning or map creation purposes. The implementation model discussed below offers one method of linking external databases to the spatial data to allow for such functionality. The implementation model represents only one way to meet the spatial data standards and users do not necessarily have to create such a GeoDatabase to comply with the standards. In these instances, users may wish to add more descriptive information directly to the shapefiles or other data formats. The cultural resource spatial data standards do not prevent this and users may join or add as many fields as they need for their particular application. When sharing the spatial data however, these descriptive fields of information may need to be dropped if data sets from multiple sources are being combined together.

To assist cultural resource specialists and GIS specialists to comply with the cultural resource spatial data transfer standards, both specialists need to understand the terminology involved in cultural resource management as well as GIS data management. The glossary of terms included here is meant to assist cultural resource specialists better understand the implementation model components and provide definitions of common terms that GIS specialists use. This same glossary of terms should help to provide GIS specialists with some understanding of the various cultural resource types and how they may complement each other when included in a GIS application.

Alias	For the purposes of use in an ArcGIS context an, "alias," is an alternative name for a field in a table, for a feature class name or for a shapefile file name. The alias represents a more "user-friendly" description of the field or data layer content. Most importantly, aliases do not have to adhere to the rules of the GeoDatabase or shapefile. An alias can contain special characters and exceed the 10 character limit for a regular field name. When users look at the data in ArcGIS they will be able to read the alias as opposed to the sometimes abbreviated and difficult to understand field or file names.
Archaeological Sites Management Information System (ASMIS)	Archaeological Sites Management Information System (ASMIS) is a data management system designed to inventory the prehistoric and historic archeological sites on NPS land and maintain key management information on sites, such as use, condition, threats and disturbances, and National Register status. The database is updated and maintained primarily at the park level. There is one annual aggregation of park data to the national level in Washington, DC. Many NPS archeologists in centers and parks have integrated ASMIS with GIS. The database does contain UTM coordinates for some sites.
Attribute	A characteristic of a geographic feature taking the form of a field or column, stored in a tabular format resembling a database. Each attribute is linked to individual an individual map feature through geographic locators (points, lines, or polygons). Shapefiles and GeoDatabase feature classes all have an associated attribute table that contain attribute fields. For the cultural resource standards, feature level metadata fields make up the attributes.

Attribute value	A characteristic of a geographic feature described by numbers or characters, stored in an attribute field inside a tabular format resembling a database. Valid values, domains or menus can be established in a GeoDatabase to insure consistent data entry for any one particular attribute. For the cultural resource standards, attribute values take the form of feature level metadata and many of the attributes or fields have domains established to ease data entry.
Buildings	Historic buildings are a cultural resource created principally to shelter any form of human activity, such as a house. For the cultural resource standards, buildings may be represented as points or polygons. The definition of a building is drawn from the established National Register of Historic Places resource type definitions.
Conceptual model	A conceptual model is a typical element in database data modeling. For the purposes of the cultural resource standards, the Cultural Resource GIS Facility was required to create a conceptual model of the cultural resource spatial data transfer standard as the first step in the National Park Service spatial data standard creation process. The conceptual model represents a basic outline of the basic elements of the standard and how they relate to each other.
Coordinate pair	A coordinate pair consists of a pair of numbers which represent an X and Y location on a geographic grid. Many of the NPS databases store coordinate pairs as UTM coordinates (easting and northing) while others may store coordinate pairs as latitude/longitude. A coordinate pair stored in a database does not equate to geographic data for use in a GIS. A coordinate pair may be converted into point geographic data for use in a GIS.
Coordinate system	A coordinate system, or projection, is the geographic grid created to represent a 3-dimensional world on a 2-dimensional map. Representing a 3-dimenstional globe in a 2-dimensional map space will cause distortion in shape, area, distance and direction. Various different coordinate systems, or projections, are used to preserve one of these areas of distortion and try to replicate a 3-dimenstional globe in as accurate a method as possible. • Unprojected data is in a latitude/longitude coordinate system, using degrees, minutes and seconds to represent a location on a globe. In a GIS latitude/longitude coordinates are converted into decimal degrees, a decimal version of degrees, minutes and seconds.

	• UTM data is in a universal transverse mercator projection, designed to help preserve local area and is used most frequently on USGS quadrangle maps. NPS cultural resource databases frequently store UTM coordinate pairs. Rather than degrees, minutes and seconds, UTM coordinates are measured in meters and are based on a zone system which divides the globe into a variety of zones on either side of the prime meridian. Because of the zone system, UTM coordinates can only be displayed properly in one zone at a time. In order to view all of the cultural resource data for a particular state or in a particular geographic location that splits UTM zones, the geographic data must be converted into another coordinate system, such as decimal degrees, that will allow users to see the entire world
Cultural landscapes	Cultural landscapes are a geographic area (including both natural and cultural resources and the wildlife or domestic animals therein), associated with a historic event, activity or person exhibiting other cultural or aesthetic values. These resources have contributing elements which may consist of built or natural features. For the cultural resource standards, cultural landscapes may be represented as polygons in the Historic Site or Historic District feature classes, while the contributing elements may be represented as points, lines or polygons. The definition of a cultural landscape is drawn from the NPS Cultural Landscape program resource type definitions.
Cultural Landscape Inventory (CLI)	The Cultural Landscapes Inventory (CLI) is an evaluated inventory of all cultural landscapes in the NPS having historical significance, in which the Service has or plans to acquire any enforceable legal interest. The CLI data is entered and updated by trained Historical Landscape Architects located in the regional NPS offices. Once a year, the regions upload their data to the national office in Washington. Once all the regional data has been compiled at the national level, that official data is redistributed to the regional offices. UTM coordinates for specific landscapes features have been entered into the database, but are not required for each landscape element in the database.
Cultural resource	A building, site, structure, object, landscape, traditional cultural property or district evaluated as having significance in pre-history or history.
Cultural Resource GIS Facility (CRGIS)	The Cultural Resource GIS Facility is a program within the Washington Area Service Office of the NPS. The

	mission of CRGIS is to institutionalize the use of GIS, Global Positioning Systems (GPS), and remote sensing technologies in historic preservation within the NPS as well as with State and Tribal Historic Preservation Offices.
Cultural Resource Subcommittee	The Cultural Resource Subcommittee is a chartered subcommittee of the NPS GIS Council. Chaired by CRGIS together with the NPS Midwest Archaeological Center, the subcommittee has 16 voting members representing the major NPS cultural resource databases, each NPS regional office, cultural resource specialists and GIS specialists. Voting members, alternates and non-voting participants contribute to the creation of the cultural resource spatial data standards, and work to incorporate GIS and GPS technologies into the NPS cultural resource programs.
Data layer	A data layer constitutes one layer of spatial data and usually contains the geographic representation (points, lines or polygons) as well as the descriptive attribute information related to a single feature type, such as historic buildings, roads or county boundaries.
Data model	A data model describes the structure of the data within a given GeoDatabase and, by implication, the underlying structure of that GeoDatabase itself. A data model represents classes of entities (kinds of things) about which a user wishes to hold information, the attributes of that information, the relationships among those entities and relationships among those attributes. The model describes the organization of the data to some extent irrespective of how data might be represented in a computer system. For the cultural resource spatial data transfer standards the data model describes how all of the various cultural resource data layers interact with each other and link to the existing NPS external cultural resource databases.
Datum	A datum represents the 0,0 or beginning point of a coordinate system grid. Each of the various coordinate systems or projections must start measuring X and Y coordinates from a central point. Some datums are centered on the surface of the earth while others originate in the center of the earth. The differences between these datums can sometimes equate to substantial geographic shift in any X,Y coordinates converted into GIS data. • NAD 1927 refers to the North American Datum established in 1927. This is a common datum frequently used on USGS quadrangle maps and older historic maps or local data sets. This datum is centered on the surface of the earth.

- NAD 1983 refers to the North American Datum established in 1983. This is a common datum frequently used on updated USGS quadrangle maps and more recent data collected or distributed locally. This datum originates in the center of the earth.

Domain values	Domain values consist of a set of valid values that can be input into a field or several fields. These domains equate to a menu in a standard database. Domain values can be defined for fields inside a GeoDatabase. The same domain values can be applied to any field, in any data layer inside a GeoDatabase to help in data entry and to help insure good quality data entry.
Enterprise GIS	An enterprise GIS system is a platform for organization-wide geo-spatial capabilities. Enterprise GIS centralizes data in one location, providing a single authoritative source, but allows an entire organization to draw from the data and use it in a variety of different applications to fit different needs. An enterprise GIS provides a common infrastructure and provides a more efficient means to disseminate and utilize GIS data.
Environmental Systems Research Institute (ESRI)	ESRI was founded as Environmental Systems Research Institute, Inc., in 1969 as a privately held consulting firm that specialized in land use analysis projects. The worldwide headquarters of ESRI are anchored in Redlands, CA. ESRI designs and develops the world's leading GIS technology. GIS technology is constantly evolving to meet the changing needs of business, industry, government and education. Today, ESRI has more than 4000 employees worldwide who work with thousands of business partners and tens of thousands of users.
Ethnographic resources	Ethnographic resources are landscapes, objects, plants and animals, or sites and structures that are important to a people's sense of purpose or way of life. These resources represent features understood from the viewpoint of peoples or groups for which they have a special importance. These are resources primarily significant because of their association with a community's set of beliefs and they may not necessarily be historic in terms of age. For the cultural resource standards, ethnographic resources may be represented as points, lines or polygons in any of the appropriate feature classes. The definition of an ethnographic resource is drawn from the NPS Ethnography program resource type definitions.
Ethnographic Resources Inventory (ERI)	The Ethnographic Resources Inventory database contains the inventory information on ethnographic resources within the NPS.

	Such resources might include landscapes, places, objects, and natural resources traditionally important to certain peoples before a park existed. The ERI is used in the parks, is maintained and updated at the regional level, and certified in DC, although it's use is not required so some ethnographic resources remain undocumented in the ERI. It contains information on use, consultation, site condition, as well as sacred and legendary importance. This database does not contain geographic locational information.
Feature	A feature is a physical object or an event in the real world for which you want to collect locational and descriptive information. Features are represented as points, lines or polygons in the GIS. A data set or data layer is composed of features.
Feature class	A feature class in ArcGIS is a collection of geographic features with the same geometry type (such as point, line or polygon), with the same attributes and spatial reference. Feature classes can be stored in GeoDatabases or as shapefiles. Feature classes allow homogeneous features to be grouped into a single unit for data storage purposes. In a GeoDatabase, feature classes can also store annotation and dimension information.
Feature dataset	A feature dataset in ArcGIS is a collection of feature classes stored together that share the same spatial reference; that is, they share a coordinate system, and their features fall within a common geographic area. Feature classes with different geometry types may be stored in the same feature dataset.
Federal Geographic Data Committee (FGDC)	The Federal Geographic Data Committee (FGDC) is an interagency committee that promotes the coordinated development, use, sharing and dissemination of geospatial data on a national basis. This nationwide data publishing effort is known as the National Spatial Data Infrastructure (NSDI). The NSDI is a physical, organizational and virtual network designed to enable the development and sharing of this nation's digital geographic information resources. FGDC activities are administered through the FGDC Secretariat, hosted by the National Geospatial Programs Office (NGPO) of the US Geological Survey. The Office of Management and Budget (OMB) established the FGDC in 1990 and rechartered the committee in its August 2002 revision of Circular A-16, "Coordination of Geographic Information and Related Spatial Data Activities." The FGDC is a 19 member interagency committee composed of representatives from the Executive Office of the President, and Cabinet level and independent Federal agencies. The Secretary of the Interior chairs

	the FGDC, with the Deputy Directory for Management, Office of Management and Budget as Vice-Chair. A field refers to a column in a table.
Field	In ArcGIS, fields make up the structure of attribute tables associated with point, line and polygon features. Fields in a table store the same category of data (all related to the topic of the field) and the same data type (as a text string, number or date for instance). The name of the field indicates what information is contained within that particular column. An attribute table may have as many fields as needed to describe the associated geographic features.
GeoDatabase	A GeoDatabase is a relational database with extensions for storing, querying and manipulating geographic information and spatial data. It is also known as a spatial database. Within a spatial database, vector data can be stored as points, lines or polygons which may have an associated spatial reference system. A GeoDatabase record can use a geometry data type to represent the location of an object in the physical world and other standard database data types to store the object's associated attributes. • ArcGIS supports personal GeoDatabases which are based on Microsoft Access databases. A personal GeoDatabase can contain feature classes, feature datasets, other table objects, etc., but is limited to 2Gb in size. • ArcGIS also supports file GeoDatabases which consist of a series of files linked together to form the relational database structure. A file GeoDatabase can contain all of the same feature classes, feature datasets, and other objects but is limited to 1 Tb per data set. File GeoDatabases can contain much more spatial and attribute data than a personal GeoDatabase.
Geographic Information System (GIS)	A geographic information system (GIS) is a system for capturing, storing, analyzing and managing data and associated attributes which are spatially referenced to the earth. In the strictest sense, it is a computer system capable of integrating, storing, editing, analyzing, sharing and displaying geographically-referenced information. In a more generic sense, GIS is a tool that allows users to create interactive queries, analyze the spatial information, edit data, produce maps and present the results of all of these operations.
Global Positioning System (GPS)	The global positioning system (GPS) is a fully-functional global navigation satellite system. More than two dozen GPS satellites

	are in medium earth orbit, transmitting signals allowing GPS receivers to determine the receiver's location, speed and direction. Since the first experimental satellite was launched in 1978, GPS has become an indispensable aid to navigation around the world and an important tool for map-making and land surveying. GPS also provides a precise time reference used in many applications. Developed by the United States Department of Defense, the satellite constellation is managed by the United States Air Force.
Globally unique ID (GUID)	A globally unique identifier is a pseudo-random number used in software applications. While each generated GUID is not guaranteed to be unique, the total number of unique keys (2128 or 3.40282366x1038) is so large that the probability of the same number being generated twice is very small. For an application using 10 billion random GUIDs, the probability of a coincidence is on the order of 1 in a quintillion.
Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER)	The Historic American Buildings Survey (HABS) is the nation's first federal preservation program, begun in 1933 to document America's architectural heritage. Creation of the program was motivated primarily by the perceived need to mitigate the negative effects upon our history and culture of rapidly vanishing architectural resources. At the same time, important early preservation initiatives were just getting underway, such as restoration of the colonial capital at Williamsburg and the development within the National Park Service (NPS) of historical parks and National Historic Sites. The Historic American Engineering Record (HAER) was established in 1969 by the National Park Service, the American Society of Civil Engineers and the Library of Congress to document historic sites and structures related to engineering and industry. HAER developed out of a close working alliance between the Historic American Buildings Survey (HABS) and the Smithsonian Institution's (SI) Museum of History and Technology (now the Museum of American History). From its inception, HAER focused less on the building fabric and more on the machinery and processes within, although structures of distinctly industrial character continue to be recorded.
Historic district	Historic districts are a significant concentration, linkage or continuity of sites, buildings, structures or objects united historically or aesthetically by plan or physical development. These resources may represent a local urban historic district within a city containing buildings related to a similar theme, or they may represent a rural area containing a series of plantations all from the same era that provide a representative example of typical

	residences in an area. An historic district may also contain a series of archaeological sites or other resource types which exhibit some significant connection. For the cultural resource standards, historic districts may be represented polygons while the contributing elements may be represented as points, lines or polygons. The definition of an historic district is drawn from the established National Register of Historic Places resource type definitions.
Implementation model	GIS implementation models are graphic depictions of the organization of spatial data, as well as the flow of the spatial data from collection through to distribution of a final product. An implementation model indicates how each of the various spatial data elements relates to each other, to exterior data and to products that may be generated from the data itself. Frequently an implementation model takes the form of a database relationship diagram. For the cultural resource standards the implementation model takes the form of a diagram showing the structure of a GeoDatabase and the various relationships established between the different data layers representing cultural resource types.
Join	A join is an operation performed within the GIS software between tables. Using a common field of information between two attribute tables, a join function physically appends fields from one table to another. The join function allows users to move data from one table to another without having to re-enter information. Joins also allow users to associate attribute data which does not have a spatial component with data that does have a spatial representation, expanding what can be represented visually on a map. A join operation visually moves data from one table to another, however the operation does not affect the original data sets and can be undone at any time.
Line	Line features in a GIS are entities that represent linear objects such as a road, river or fenceline. Line features are composed of a series of vertices connected together forming a larger line. Line features may range from simple straight entities composed of a start and end vertices or complex entities with many vertexes to accurately represent curved or multi-part lines. Line features have no fill pattern.
List of Classified Structures (LCS)	The List of Classified Structures database contains the inventory of all standing prehistoric and historic structures in which the National Park Service has some enforceable legal interest. As a web-based application it is maintained and updated on a continual basis via the internet primarily at the NPS regional level. Data are

	reviewed and approved at the national office in Washington. It contains information regarding the use, status, condition, and treatment of structures. This database does contain UTM coordinates for some resources.
Mandatory	In relationship to the cultural resource spatial data standards the term Mandatory refers to specific feature level metadata elements which must be filled in or completed in order to comply with the standards.
Mandatory if applicable	In relationship to the cultural resource spatial data standards the term Mandatory if Applicable refers to specific feature level metadata elements which must be filled in or completed, if they apply to a specific point, line or polygon included in a data set, or the specific circumstances surrounding the creation of the point, line or polygon.
Metadata (feature level, data set)	Metadata refers to structured text statements that describe the content, origin, parameters and definitions associated with a particular spatial data set. The Federal Geographic Data Committee oversees the creation of metadata standards which define required and optional elements of a metadata statement for various different types of spatial data. These metadata standards must be applied to any spatial data exchanged by and with Federal agencies. • In general the FGDC metadata standards refer to data set level metadata. These would be metadata statements that define an entire data set, data layer, shapefile or feature class. These metadata statements can be detailed in defining attribute values for each attribute associated with a data layer, but they do not address the origins, parameters or special circumstances related to individual points, lines or polygons within a data set. • The cultural resource spatial data standards consist mainly of feature level metadata. Feature level metadata refers to the various mandatory and optional fields that must be filled in for each point, line or polygon to explain their source, specific parameters, editing history, etc. These feature level metadata fields document the individual features, not the entire data set.
Midwest Archaeological Center	The Midwest Archaeological Center is a regional archaeological center within the National Park Service system. Members of the Midwest Archaeological Center co-chair the Cultural Resource Subcommittee of the National Park Service GIS Council, along with the Cultural Resource GIS Facility. The Midwest

	Archaeological Center engages in archaeological projects inside park units, serves as a regional archaeological resource for the parks and maintains the ASMIS database in addition to providing professional advice to State and local governments.
National Historic Landmarks (NHL)	The National Historic Landmarks database contains those cultural resources that are nationally significant. Information stored in the database somewhat overlaps that in the National Register of Historic Places database, although it maintains different, and more detailed information for each property, including current conditions. The properties themselves are monitored by the regional NPS offices for their condition and treatment. Regional offices send updates to WASO for entry into the database. This is done regularly, but updates may be sent in as needed at any time. A web version of the database is currently available where there is basic search capability for users and fact sheets on each landmark may be printed. The database contains UTM coordinates for most property locations.
National Map Accuracy Standard	In 1941, the U.S. Bureau of the Budget issued the "United States National Map Accuracy Standards," which applied to all Federal agencies that produce maps. The standards were revised several times, and the current version was issued in 1947. As applied to the USGS 7.5-minute quadrangle topographic map typically used by cultural resource specialists, the horizontal accuracy standard requires that the positions of 90 percent of all points tested must be accurate within 1/50th of an inch (0.05 centimeters) on the map. At 1:24,000 scale, 1/50th of an inch is 40 feet (12.2 meters). The vertical accuracy standard requires that the elevation of 90 percent of all points tested must be correct within half of the contour interval. On a map with a contour interval of 10 feet, the map must correctly show 90 percent of all points tested within 5 feet (1.5 meters) of the actual elevation. In testing a map, the USGS experts select 20 or more well-defined points. Positions are established on the test points by field teams using sophisticated surveying techniques to determine positions from aerial photographs. Field survey methods are the only tests accepted for official accuracy testing. Positions must be obtained by surveys of a higher accuracy. The mapped positions are checked against the field and (or) photogrammetrically determined positions results. If the map is accurate within the tolerances of the U.S. National Map Accuracy Standards, it is certified and published with the statement that it complies with those standards.
National Park Service GIS Council	Within the National Park Service Washington Service Office, the national GIS program is managed by a National GIS Coordinator,

	based in Denver, CO. As part of the national GIS program within the NPS however, the NPS has chartered a GIS Council. Regional and program GIS coordinators sit on the GIS Council and help to guide the direction and functionality of the NPS GIS program.
National Register Information System (NRIS)	The National Register of Historic Places has identified and documented in partnership with state, federal and tribal preservation programs, more than 86,000 districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering and culture. Over 1.2 million contributing resources are included in the boundaries of National Register listings. The National Register Information System database contains information about places listed on or determined eligible for the National Register of Historic Places. The NRIS is available on the internet for download. The database stores UTM coordinates for individually listed properties under 10 acres and bounding coordinates of properties greater than 10 acres.
National Register of Historic Places	The National Register of Historic Places is the official Federal list of districts, sites, buildings, structures and objects significant in American history, architecture, archaeology, engineering and culture. Administered by the National Park Service, the Register was authorized under the National Historic Preservation Act of 1966. Its goals are to coordinate and help property owners and groups identify and protect historic sites. Sites are nominated to the National Register through State and Tribal Historic Preservation Officers as well as certified local governments. Federal agencies maintain their own inventories of historic resources and under the same National Historic Preservation Act nominate resources to the National Register.
National Spatial Data Infrastructure	The National Spatial Data Infrastructure is seen as the technology, policies and people necessary to promote geospatial data sharing throughout all levels of government, the private and non-profit sectors and academia. The NSDI will provide a base or structure of relationships among data producers and users that will facilitate data sharing. The increased ability to share data through common standards and networks will, in turn, serve as a stimulus for growth. The FGDC is charged with coordinating the development of the NSDI through 3 major activities: establishing a national geospatial data clearinghouse; development of standards for data documentation, collection and exchange; and development of policies, procedures and partnerships.

Object	For the purposes of the cultural resource spatial data standards the term Objects refers to historic objects, as defined by the National Register of Historic Places. Objects constitute features which are primarily artistic or small in scale, such as a statue or a fountain. For the cultural resource standards, objects may be represented as points, lines or polygons
OMB Circular A-16	OMB Circular A-16, revised in 2002, is a circular issued by the Office of Management and Budget that defines the Federal Geographic Data Committee, it's membership, leadership and purpose. In addition, the circular defines the National Spatial Data Infrastructure and establishes the FGDC as the agency to implement the NSDI. The circular also identifies specific framework data sets important for all Federal agencies, including cultural resources. In identifying the cultural resource theme as a framework data set, the circular also identifies the National Park Service as the lead agency for that theme, laying out the tasks associated with that lead agency status, including the development of standards.
Optional	In relationship to the cultural resource spatial data standards the term Optional refers to specific feature level metadata elements which would be helpful to fill in or complete to comply with the standards, but are not required elements. Optional data fields provide additional information to help document a specific point, line or polygon, but may not be necessary.
Point	Point features in a GIS are entities that represent a set of X and Y coordinates. Point features are often used to indicate the location of a building, structure, object, archaeological site or landscape feature.
Polygon	Polygon features in a GIS are entities that represent closed boundaries such as an archaeological site, cultural landscape or building footprint. Polygon features are composed of a series of vertices connected together forming a larger boundary. Polygon features may range from simple squares or circles to more complex entities with many vertexes to accurately represent curved or irregular boundaries. Polygon features have a fill pattern.
Relational database	A relational database is a collection of data objects organized as a set of formally-described tables from which data can be accessed or reassembled in many different ways without having to reorganize the database tables. The data structure of a relational

	database assumes that collections of tables are logically associated with each other by shared fields.
Relationship class	A relationship class in ArcGIS is the definition of a persistent relationship between two tables, a table and a feature class or feature classes within a GeoDatabase. Unlike other relationships that can be formed between data layers or tables inside an individual ArcGIS document, a relationship class defined within a GeoDatabase remains attached to the datasets regardless of what GIS document is in use.
Review draft	A Review Draft represents the second step in the NPS GIS data standard creation process. The first step is a conceptual model that identifies the need for a standard. The review draft represents the first attempt at constructing the standard itself and is represented in a metadata statement which defines all of the fields associated with the standard, potential values for the fields and status as mandatory/optional. The review draft is posted on the NPS data sharing website and an announcement is sent to all NPS employees for a 14 day review/comment period. These comments are incorporated into the standard development.
Shapefile	A shapefile is a proprietary data format created by ESRI to represent spatial entities. A shapefile constitutes one layer of spatial data and contains points, lines or polygons as well as the descriptive attribute information related to a single feature type, such as roads, historic structures or archaeological sites. Shapefiles can be used within ArcGIS by themselves or they can be imported or otherwise incorporated into a feature class in a GeoDatabase.
Sites	Sites are cultural resources that have yielded or may be likely to yield information important to prehistory or history. These resources may lie below ground, but may have some above ground evidence indicating the presence of the potential to yield more information. These resources may include features such as: ruins of a building, the location of where a historic building, structure, or landscape may have once been. These resources represent the site of an event or the location of a resource which may have archaeological value. For the cultural resource standards, sites may be represented as points, lines or polygons. The definition of a site is drawn from the established National Register of Historic Places resource type definitions.
Spatial data	GIS professionals generally think of spatial data, or geospatial data, as being derived from a series of points, lines and polygons.

	These points, lines and polygons are referenced to the earth and are represented as data layers inside a GIS.
Spatial data transfer standard	A Spatial Data Transfer Standard, is a robust way of transferring earth-referenced spatial data between dissimilar computer systems with the potential for no information loss. It is a transfer standard that embraces the philosophy of self-contained transfers, i.e. spatial data, attribute, georeferencing, data quality report, data dictionary, and other supporting metadata all included in the transfer. The purpose of the data transfer standard is to promote and facilitate the transfer of digital spatial data between dissimilar computer systems, while preserving information meaning and minimizing the need for information external to the transfer. The spatial data transfer standard provides a solution to the problem of spatial data transfer from the conceptual level to the details of physical file encoding. Transfer of spatial data involves modeling spatial data concepts, data structures, and logical and physical file structures. To be useful, the data to be transferred must also be meaningful in terms of data content and data quality.
Structures	Structures are cultural resources that are functional constructions made for purposes other than creating shelter, such as a bridge. These resources would include features such as: fortifications, earthworks, roads, canals, dams, engineering features, outbuildings, arsenals, ships, manufacturing facilities, etc. These resources represent sites that do not function primarily as dwellings, however they may serve temporarily to house humans, although their primarily purpose is not a permanent shelter. For the cultural resource standards, structures may be represented as points, lines or polygons. The definition of a structure is drawn from the established National Register of Historic Places resource type definitions.
Surveys	A survey does not necessarily represent a cultural resource, but an area within which qualified individuals have made observations to locate cultural resources. These investigations may be undertaken as part of a specific project, in support of compliance with various historic preservation laws, or at the request of another agency, etc. For the cultural resource standards, ethnographic resources may be represented as points, lines or polygons. The definition of a survey is drawn from the Secretary of the Interior's Standards and National Register of Historic Places bulletin 28.
Working draft	A Working Draft represents the third step in the NPS GIS data standard creation process. The working draft incorporates comments received after the release of the review draft and is

represented in a metadata statement which defines all of the fields associated with the standard, potential values for the fields and status as mandatory/optional. The working draft is posted on the NPS data sharing website and an announcement is sent to all NPS employees for a 14 day review/comment period. These comments are incorporated into the standard development and used to produce the final draft of the standard.

Supporting Implementation Data Model for the Cultural Resource Standards

Introduction to the Implementation Model

The cultural resource spatial data transfer standards are intended to apply to any spatial data or spatial data type, including shapefiles, feature classes, GeoDatabases and others. Typically, cultural resource specialists in parks, regions and programs manage their cultural resource spatial data as coordinate pairs in a-spatial databases. This does not constitute spatial data, however when users generate points, lines or polygons from these sources in a GIS, creating shapefiles or feature classes in a GeoDatabase, that equates to spatial data which should comply with the standards.

Certainly, different users may need different spatial data types to accomplish their goals and answer their daily questions. In some cases creating simple shapefiles may suffice. In other cases, taking advantage of the benefits of a GeoDatabase may add value to the cultural resource spatial data by allowing users to link the simple points, lines and polygons to each other and to external databases more easily. Complying with the cultural resource spatial data standards requires users to include the feature level metadata fields discussed in this guidance manual but does not require users to store or exchange data in any particular format.

Shapefiles remain a data transfer standard throughout the GIS community and offer one solution to cultural resource specialists who would like to share their geographic data. In this instance, a shapefile would constitute one layer of spatial data and contain points, lines or polygons as well as the feature level metadata as attribute information related to a single feature type, such as historic sites or historic buildings. A shapefile could be created for each of the18 data layers outlined by the standards, based on cultural resource type and spatial feature type. Relying on shapefiles may be effective, however they may not allow users to take full advantage of the tools available to them with more sophisticated data types, such as GeoDatabases, which will make data entry easier in addition to providing users with more flexibility in using the data.

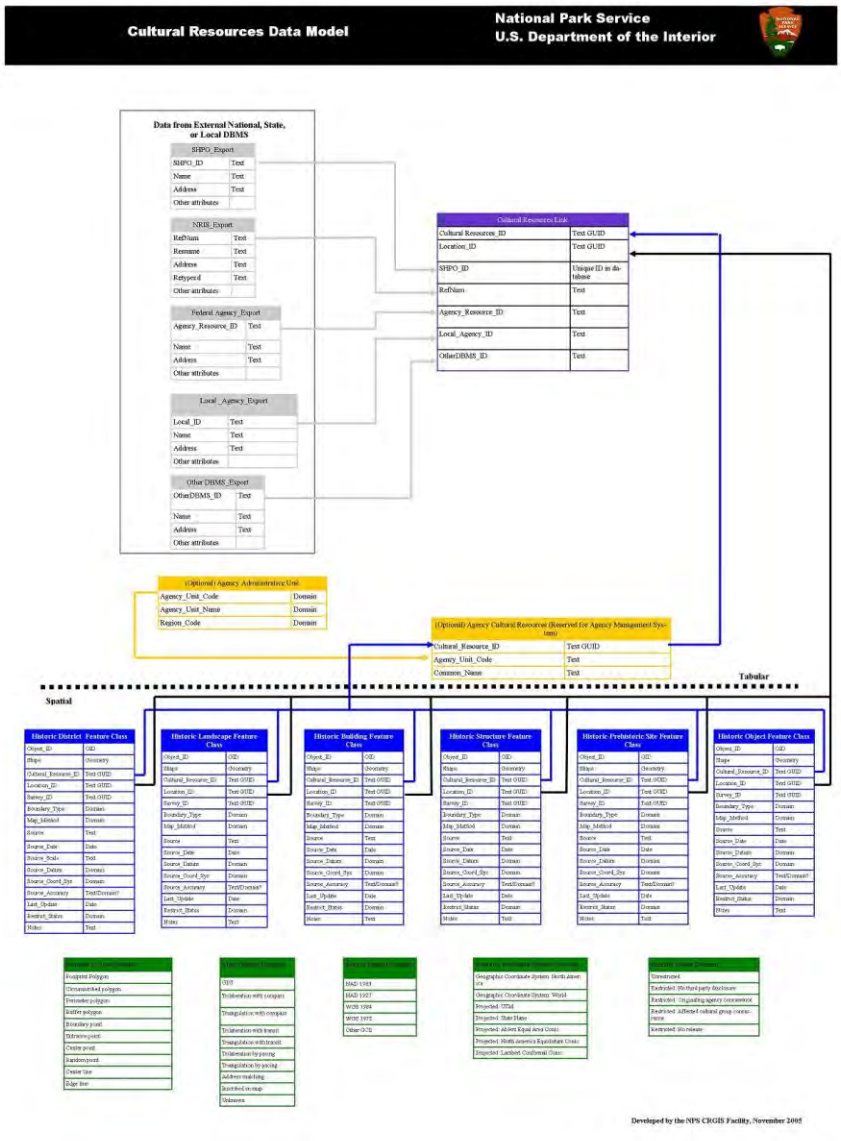
A GeoDatabase is a relational database which can store multiple data layers, or feature classes, equivalent to shapefiles. Because it is a more sophisticated data type, it offers the user more tools and options. For instance, with a GeoDatabase, users can create menus or valid values for specific attribute fields. Users may also create permanent relationships, or relationship classes, between data layers, tables and other spatial data contained within the same GeoDatabase.

In order to assist cultural resource specialists to comply with the standards, the Cultural Resource Subcommittee designed and created a GeoDatabase template or implementation model. Within

the model all of the feature level metadata fields have been created, defined and assigned menu values where appropriate. In addition, each of the 18 potential data layers outlined by the standards has been created so that users can easily load their own data into the already established feature classes. These feature classes can in turn be exported as shapefiles if preferred or necessary for exchange or specific applications. The data model is intended to be a tool for users to assist them in moving their cultural resource spatial data into compliance with the standards and to allow for the easiest possible data entry.

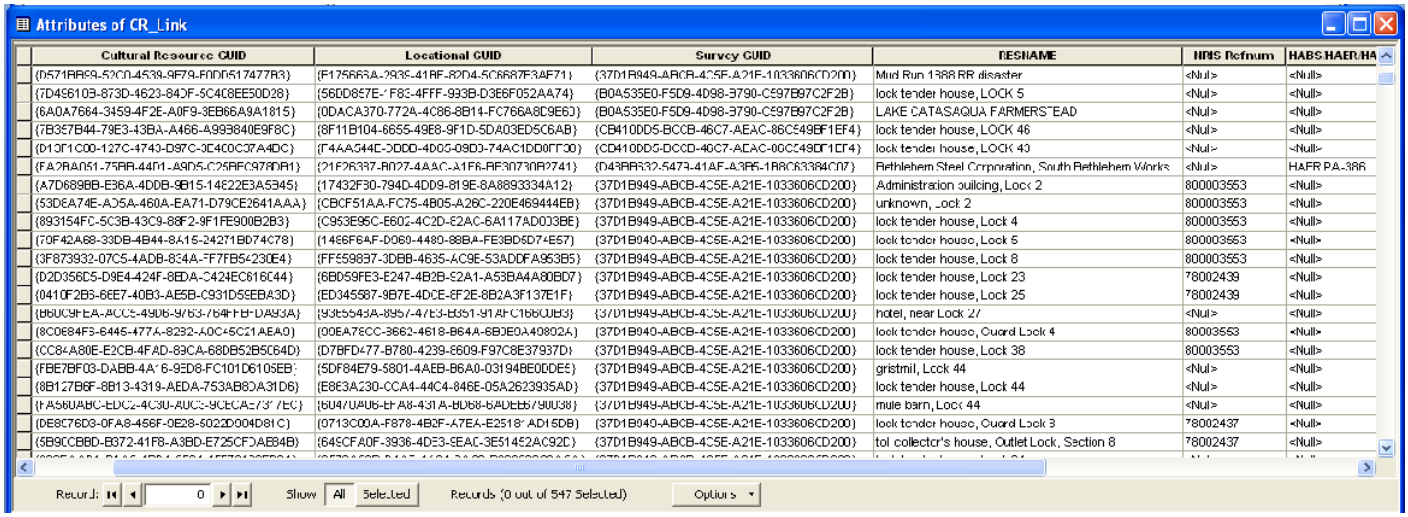
General Structure of the Implementation Model

Like any GeoDatabase, the cultural resource spatial data standard implementation model contains multiple feature classes, one for each of the 18 different data layers identified by resource type and spatial entity. These feature classes are grouped into feature datasets, which act essentially as folders to help organize the feature classes. These feature datasets group the feature classes together based on resource type. For instance, the historic site point, line and polygon feature classes are grouped together in a feature dataset called, "Historic Sites."



The feature datasets not only combine the data layers of like features into groups that make logical sense but those that share the same geographic characteristics. Because a coordinate system is the only characteristic users can define for a feature dataset, grouping data layers into feature datasets allows the user to insure geographic data loaded into the feature classes is in the correct coordinate system. Using this type of structure, with individual data layers of similar resource type grouped together provides the user with an easy way to access the specific data of interest, and using feature datasets provides a measure of quality control, making sure that all data loaded into a feature class is in the same coordinate system and can be easily shared with others.

The Cultural Resource Subcommittee also included an additional a-spatial table within the GeoDatabase design which plays a critical role in allowing the user to link the geographic entities to external tables of descriptive information, such as ASMIS, LCS, CLI or the National Register. The CR_Link table contains no spatial data, but acts as a switchboard providing one place for all of the various identification numbers related to a specific cultural resource to be stored. Frequently, cultural resource specialists address the same site from different perspectives, storing different descriptive information in the various NPS databases. However, in many cases, IDs assigned to these sites do not reference the existence of the site in any alternate database. Taking advantage of the CR_Link table in the implementation model allows the user to link all of these various databases together using the geography as a primary key. A single point, line or polygon may reference the same cultural resource described as an archaeological site, an element in a cultural landscape or in the facilities maintenance database for instance.



By entering the appropriate IDs into the a-spatial CR_Link table, the user can take advantage of the various relationship classes that compose the remaining structure of the implementation model. Relationship classes within the model establish permanent connections between the geography, the CR_Link table and any external database the user chooses to access, based on the IDs contained in the CR_Link table. The relationship classes included in the implementation model establish one-to-many bi-directional relationships. This means a user could perform a query in the descriptive data table (such as LCS), then utilize the relationship classes to see the geographic representation of the answer in the GIS. Conversely, the user could perform a spatial query in the GIS, then follow the path through the relationship classes to access the descriptive information related to the points, lines or polygons selected in an external database. Using this implementation model eliminates the need to try to combine databases together and preserves the autonomy of the existing NPS databases.

The globally unique IDs required as part of the cultural resource spatial data feature level metadata play the critical role in allowing the implementation model to perform. Each cultural resource included in any of the various feature classes is assigned a globally unique ID (GUID), along with a locational GUID and an optional survey GUID. The presence of these GUIDs

allows users to associate each resource to another geographic representation of the same resource in any other database. As a result, these GUIDs allow for the possibility that a single cultural resource may have more than one geographic depiction, as well as more than one description in the various NPS databases. By associating a single cultural resource GUID with multiple locational GUIDs, users can preserve the relationship between a point and polygon representation of the same resource for instance.

The CR_Link table contains all of the GUIDs, for all of the resources in any of the feature classes contained within the GeoDatabase, regardless of feature type or spatial entity. Because the CR_Link table does not contain any geography, all of this ID information can easily be combined in one table. As commonalities and matches are identified between the geography and the various descriptions of those resources in any of the NPS databases, the appropriate unique IDs from those external databases can be entered into the CR_Link table fields.

To facilitate using the CR_Link table for searching across the 18 different feature classes, fields that include the original feature class name for each resource or fields that indicate which program a resource is associated with can be added by the user. Often flag fields that indicate that a resource is listed on the National Register, contained with the HABS/HAER/HALS database, the CLI, LCS, etc. are added. These help the user query based on the program or database name, as opposed to requiring the user to search for a specific ID.

An alternative data model, developed in conjunction with the Alaska Region, meets the standards, including all of the same feature classes, feature datasets, and the CR_Link table, but adds an additional a spatial CR_Catalog table. Depending on how the user implements the CR_Link table, the CR_catalog can serve as an index, offering additional alternatives to make searching across the various feature classes more convenient, particularly for non-GIS users.

In the primary implementation strategy of the data model, the CR_Link table contains the GUIDs from every record in any of the feature classes to enable linking to external databases, and adds other fields, to facilitate searching. In the alternative implementation strategy of the data model, users include only one instance of any one CR_ID in the CR_Link table, rather than having multiple occurrences of a CR_ID representing different delineations of the same resource. In these cases the CR_Catalog table would contain all instances of any one CR_ID, as well as basic information about the resource such as the resource type or name, but not the IDs that link to external databases. In this way, users can search the CR_Catalog table like an index, finding which feature class a resource may be located in, or that a single resource may be represented in multiple feature classes, then use the relationships with the CR_Link table to reach the external databases.

In the primary implementation strategy the unique Geometry_ID serves as the “primary key” for the CR_Link table because multiple CR_IDs could exist. In the alternative implementation, the CR_ID serves as the “primary key” for the CR_Link table, and the Geometry_ID serves as the “primary key” for the CR_Catalog. With the alternative implementation a one-to-many relationship is established between the CR_Link and CR_Catalog tables (with the CR_Link table always having fewer records). In this way, both implementations offer ways to search across the

various feature classes, but the alternative implementation offers additional searching and indexing options.

This same type of structure can be constructed outside a GeoDatabase using join or relate functions between shapefiles. These joins and relates remain with an individual GIS project file however and do not persist with the data itself. Utilizing the implementation model for the standards allows cultural resource specialists to easily load their spatial data into feature classes with fields and valid values already established. In addition, the relationships needed to show and work with the connections between resources are already established within the structure of the relationship classes, eliminating the need to rebuild them with each GIS project.

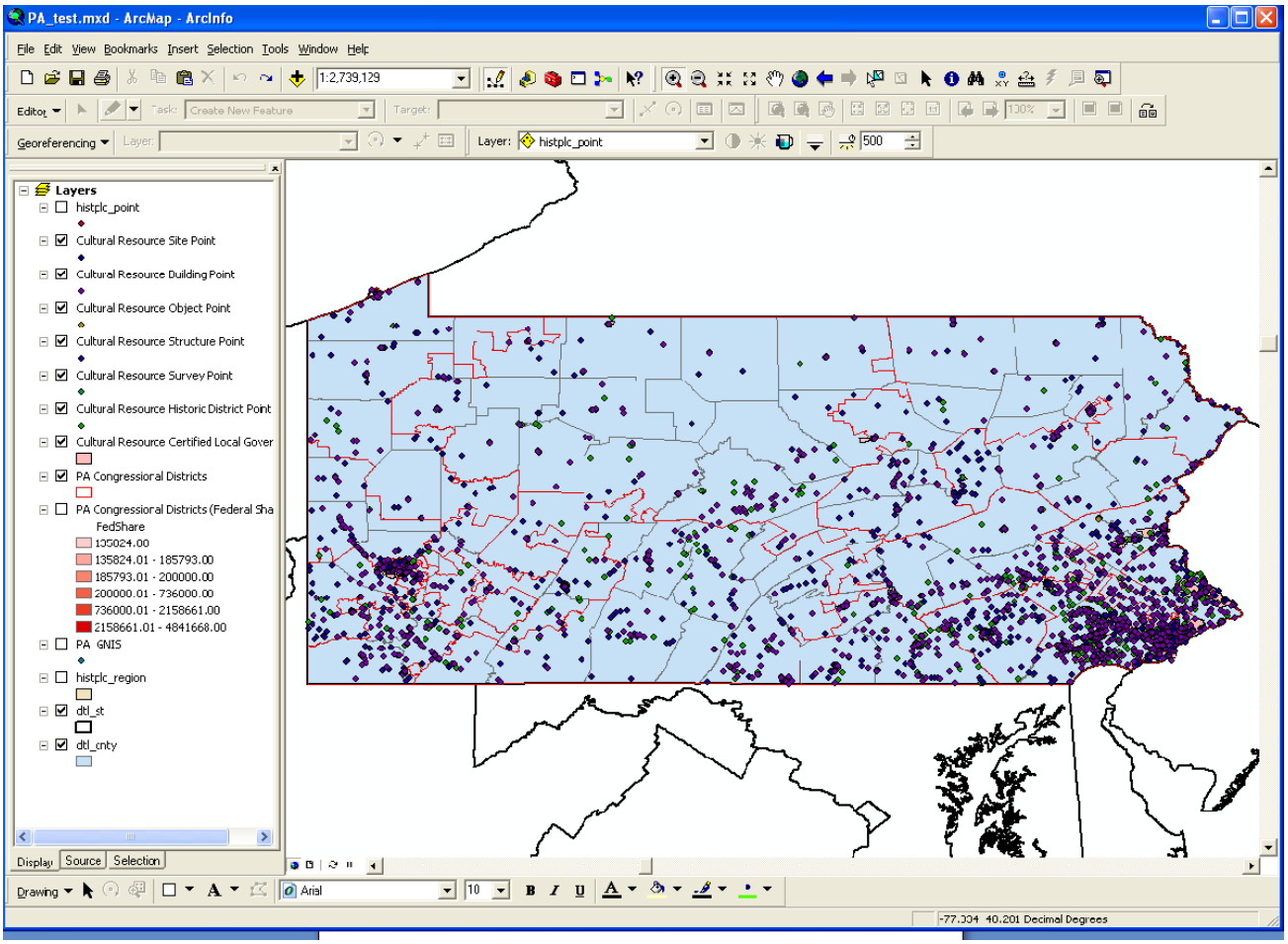
The structure of the GeoDatabase feature classes includes all of the feature level metadata required by the standards, but remains flexible enough to allow users to add as many additional fields as needed to each feature class. It is intended that the implementation model will serve as the primary tool allowing users to comply with the standards and serve as the best option for sharing cultural resource data. By providing an empty template with all of the appropriate fields and domain values already established, the user can simply load their existing data into the structure and be in compliance with the standards with relative ease, eliminating the need to recreate the same structure with each individual shapefile that a cultural resource specialist may create. Cultural resource specialists may continue to use their own shapefiles and data layers as they see fit however, or they may find that the GeoDatabase model fits their needs (with some additional fields and modifications) for daily use. Regardless of which approach users take, the implementation model can serve as the example to correctly comply with the cultural resource spatial data transfer standards.

How the Implementation Model Works with Cultural Resource Data

The implementation model is designed to be as flexible as possible which allows users to adapt the model for different projects and data sets on an as needed basis. The basic steps in loading existing data into the model or creating new data inside the various different feature classes remain the same regardless of the data set or project however. The overall goal of the implementation model is to allow users to quickly move their legacy or new cultural resource data into a structure which meets the cultural resource data transfer standards. As a result of fully utilizing the implementation model, users should be able to integrate their cultural resource databases for individual projects, or on a larger scale for a park, region or national level.
To serve as an example the Cultural Resource GIS Facility linked data from 7 WASO cultural resource programs in Pennsylvania to provide an example of how the standards, and the implementation model, would use geography to link databases and maintain the integrity of those databases. The programs included in the example are the National Register of Historic Places, HABS/HAER/HALS, Preserve America grants, Save America's Treasures grants, American Battlefield Protection Program grants, Certified Local Governments, and the Historic Preservation Tax Incentives. These programs all represent data gathered at the national level for external programs and uses.

Because the grant and tax incentive programs base their awards on National Register status and eligibility, the National Register locations were used as the basis for this implementation.

HABS/HAER/HALS locations were linked to National Register locations where possible, in addition to locations stored within the database itself. Point locations of resources were overlaid on top of Certified Local Government boundaries, as well as county and congressional district boundaries.



This example used existing legacy National Register and HABS/HAER/HALS locations in the form of UTM coordinates stored in the databases, along with new locations gathered through an internet-based geographic search engine for selected HABS/HAER/HALS documented properties, and tax incentive or grant resources which may contribute to a National Register historic district. Additionally, publicly available county and city boundary data was incorporated to represent the certified local governments. By matching grant awards to National Register and HABS/HAER/HALS locations, CRGIS successfully integrated the 7 databases, using a single location to reference multiple descriptive tables of information.

The total number of resources in Pennsylvania represented by these programs is 7585:

National Register: 2962	Save America's Treasures grants: 64
HABS/HAER/HALS: 3888	American Battlefield Protection Program grants: 4
Certified Local Governments: 43	Historic Preservation Tax Incentives: 615
Preserve America grants: 9	

The map displays 3439 of these resources as points and 43 Certified Local governments as polygon boundaries. The HABS/HAER/HALS database contains 791 (20%) pairs of coordinates or can be linked to existing National Register coordinate pairs. As a result, 3097 (80%) of the HABS/HAER/HALS database records are not represented on the map by points. This represents a typical scenario for NPS cultural resource databases where legacy data can be quickly incorporated into the implementation model, however it does illustrate how utilizing the standards allows managers to prioritize the next steps in finding locational information and developing a comprehensive geographic inventory. For the most part these missing properties represent resources that contribute to a historic district, whose locations are not captured in any database, or resources destroyed prior to the National Register program's inception.

In the Pennsylvania example 582 (17%) of the resources are represented in 2 or more databases and therefore receive only 1 point in the GIS and in the GeoDatabase, but allow the user to view the information stored in the various different databases related to the single site, through the use of the CR_Link table and relationship classes.

Examples of resources that appear in multiple databases:

Resource	National Register	HABS/HAER/ HALS	Save America's Treasures	Preserve America	Battlefield Protection Program	Historic Preservation Tax Incentive
Johnson House	X	X	X			
Franklin Institute	X		X			
33rd St. Bridge	X	X				
Rittenhouse Historic District	X				X	X
PA Institute for the Deaf & Dumb	X	X				X
Fairmount Park	X	X	X	X		
Girard Av. Historic District	X	X				X

The cultural resource spatial data transfer standard fields of feature level metadata document each geographic entity with information regarding the origin of the location, the creation of the point/line/polygon, restriction status and appropriate uses, etc. The various feature classes which comprise the standards store locational information based on resource type for the purposes of exchanging data (sites, buildings, objects, structures, districts, surveyed areas, etc.), however these data layers can be manipulated to represent the resources related to a single cultural resource program for the purposes of daily use and resource management. Incorporating the locations into the GeoDatabase implementation model integrates of all of the various databases/programs represented and allows the programs to explore their data quickly, performing operations and analysis that could not previously be conducted.

The CR_Link table remains the critical element for the complete implementation of the data model. Users may take advantage of the GeoDatabase to simply load their shapefiles into the feature classes to quickly fill out the feature level metadata without having to recreate those fields in each shapefile. Alternatively, filling in the CR_Link table, as shown with the Pennsylvania example allows users to see the overlap between the various cultural resource databases and perform new analysis.

How the Implementation Model can Improve Analysis Capabilities

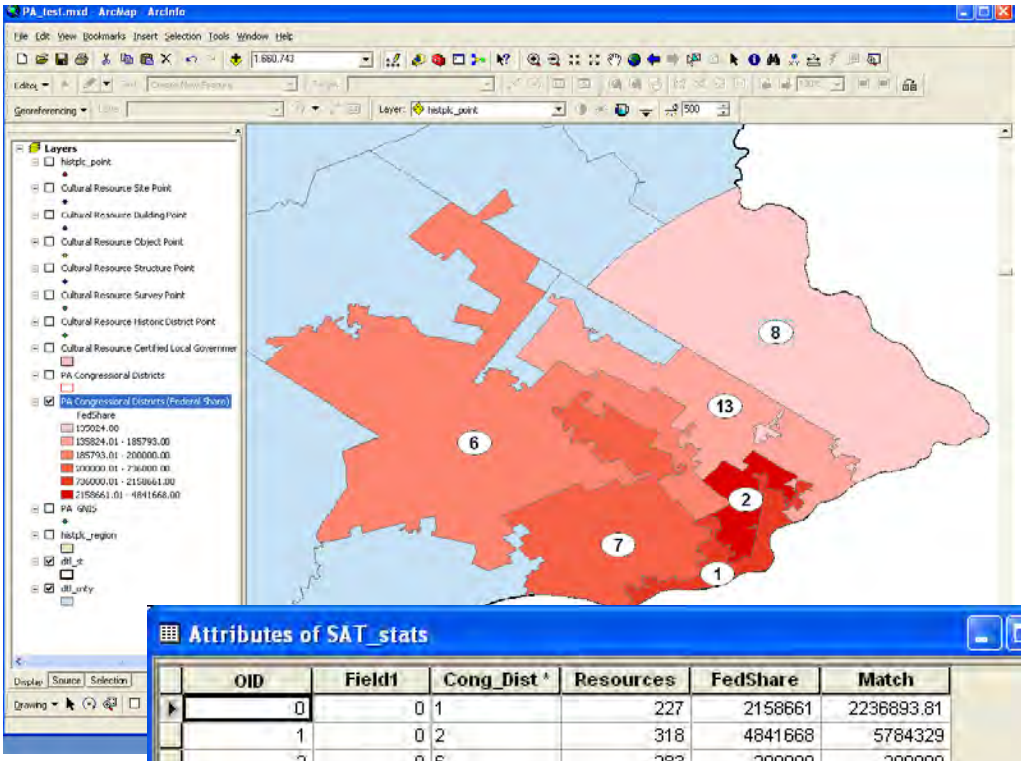
Integrating all of the separate NPS cultural resource databases through the GIS and using the standards means little or no change to the existing databases, but a great deal of value added to the analysis capabilities of these programs. NPS staff can better manage the resource programs and the resources themselves, with a more complete picture of the overlapping nature of their programs on the resources. The structure of the GeoDatabase model allows for the inclusion of any NPS cultural resource database, such as LCS, ASMIS, CLI and other commonly used internal databases.

With the Pennsylvania example, using the full implementation of the GeoDatabase model, the cultural resource programs represented could perform analysis in hours that would otherwise take days of manual exploration. By overlaying the point locations of resources receiving grants or tax credits with congressional districts in the GIS for instance produced figures that could assist in justifying the grant programs themselves and further detailing how the various NPS programs impact communities.

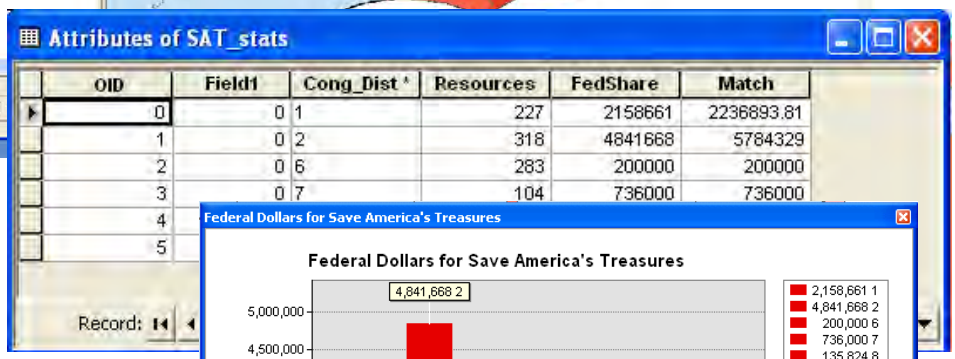
Example of the Grant and Tax Incentive Impact in Pennsylvania's 2nd Congressional District:

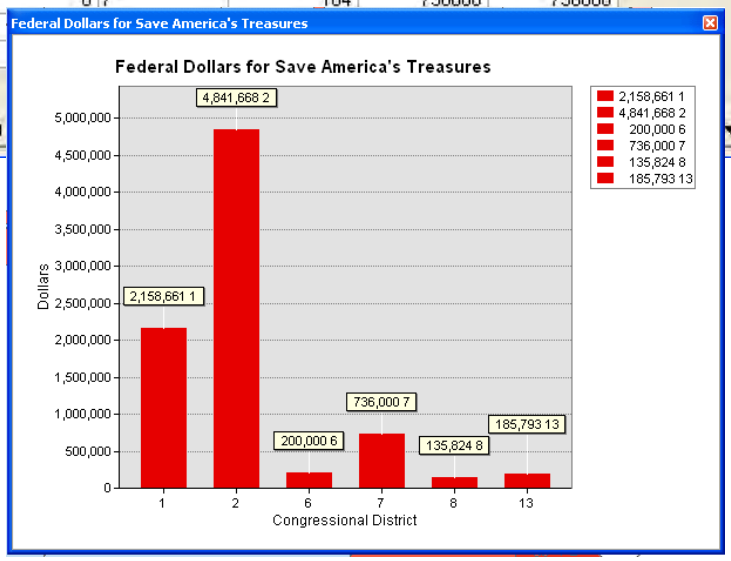
National Register resources: 291		
HABS/HAER/HALS resources: 79		
	Federal grant amount	Match amount
Preserve America grants: 3	$760,700.00	$805,625.00
Save America's Treasures grants: 19	$4,841,668.00	$5,784,329.00
American Battlefield Protection Program grant: 1	$6730.00	0
Historic Preservation Tax Incentives: 33		$414,015,117.00
Total resources in 2nd District: 426		
Total number of resources represented in more than one database: 110		

Incorporating all of these various databases together through the GeoDatabase model in the GIS for the first time also allows users to display cultural resource information using methods other than placing points on the map. This example shows 6 congressional districts surrounding Philadelphia color coded by the amount of Federal grant money awarded through the Save America's Treasures program. Darker colors indicate larger dollar amounts awarded and the legend lists the actual dollar amounts.



This same information can also be displayed as a table, graph or report. These tools provide resource managers with important new methods of reaching the public, reporting on their relevance and responding to NPS needs on a daily basis.



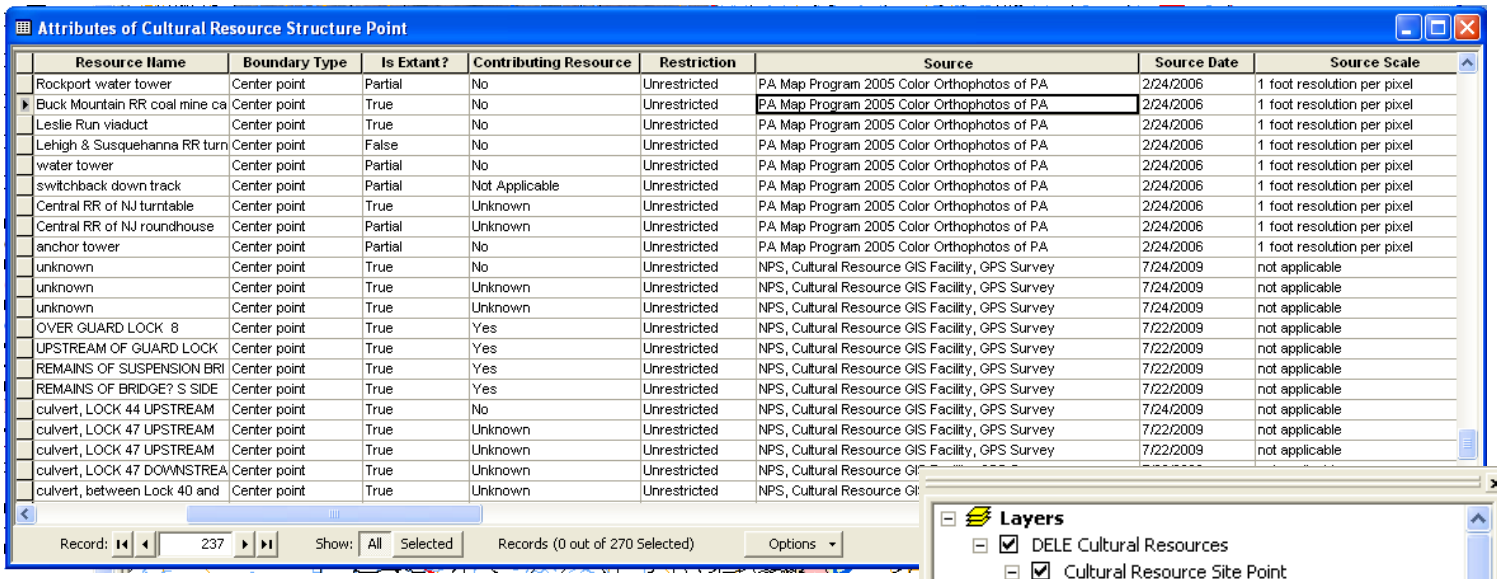


- General GIS Project Data

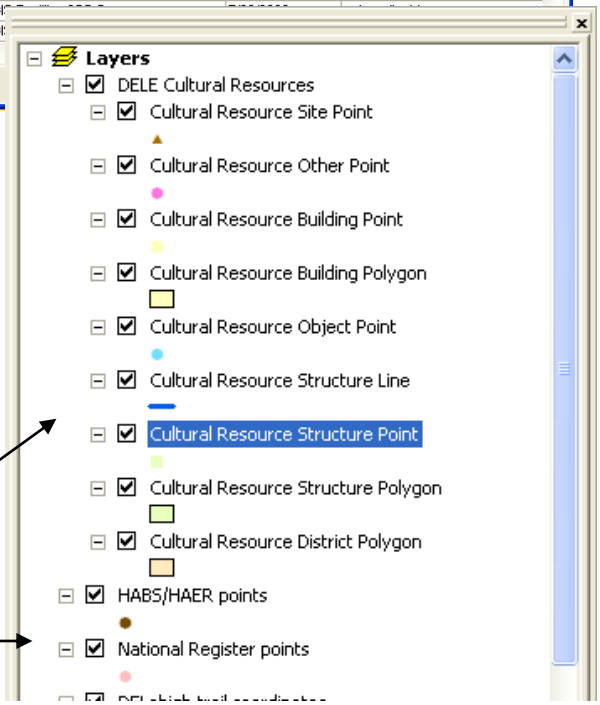
Although the Pennsylvania example shows how the use of the cultural resource standards implementation model can significantly help program-level analysis, the same can be accomplished on a much smaller scale for individual GIS projects created at a park or regional level. As with the Pennsylvania example, cultural resource spatial data is not used in a GIS alone. Typical GIS projects involve a combination of cultural resource data sets, background base data and other resource type data. Any GIS project created for park planning, resource management, fire protection, maintenance, etc., will include cultural resource data sets of all kinds. Primarily such projects will focus on internal NPS cultural resource databases, such as ASMIS or LCS, but may also include other related sources.

Typical of many park-based GIS projects, CRGIS created a GIS tool for the Delaware and Lehigh National Heritage Corridor, primarily for the purposes of tracking and monitoring their cultural resources threatened by development, but also to get a better idea of the relationship between the cultural resources and the engineered or natural resources related to the canal itself. The implementation model allows users to combine as many data sources as necessary to capture all of the various cultural resources in the Heritage Area, document their source information as well as the source data parameters so that Heritage Area staff have a better understanding of what the data can be used for.

In the Delaware and Lehigh Canal project, data was gathered from existing databases, such as the National Register, HABS/HAER/HALS and the State Historic Preservation Office. Additional data was gathered by GPS survey and through digitizing from detailed aerial photographs. The resources were categorized into their appropriate feature class (building, structure, object, site, other, or districts), with the source information clearly identified.



Using the implementation model, the Heritage Area now has data that meets the NPS cultural resource spatial data transfer standards, allowing them to interact with the local planning office, the State Historic Preservation Office and other parks. The Heritage Area can choose to use the data on a daily basis in the structure of the implementation model, or they can separate out specific data sets, such as the National Register or the HABS/HAER data as individual data layers for easy access in ArcGIS projects.

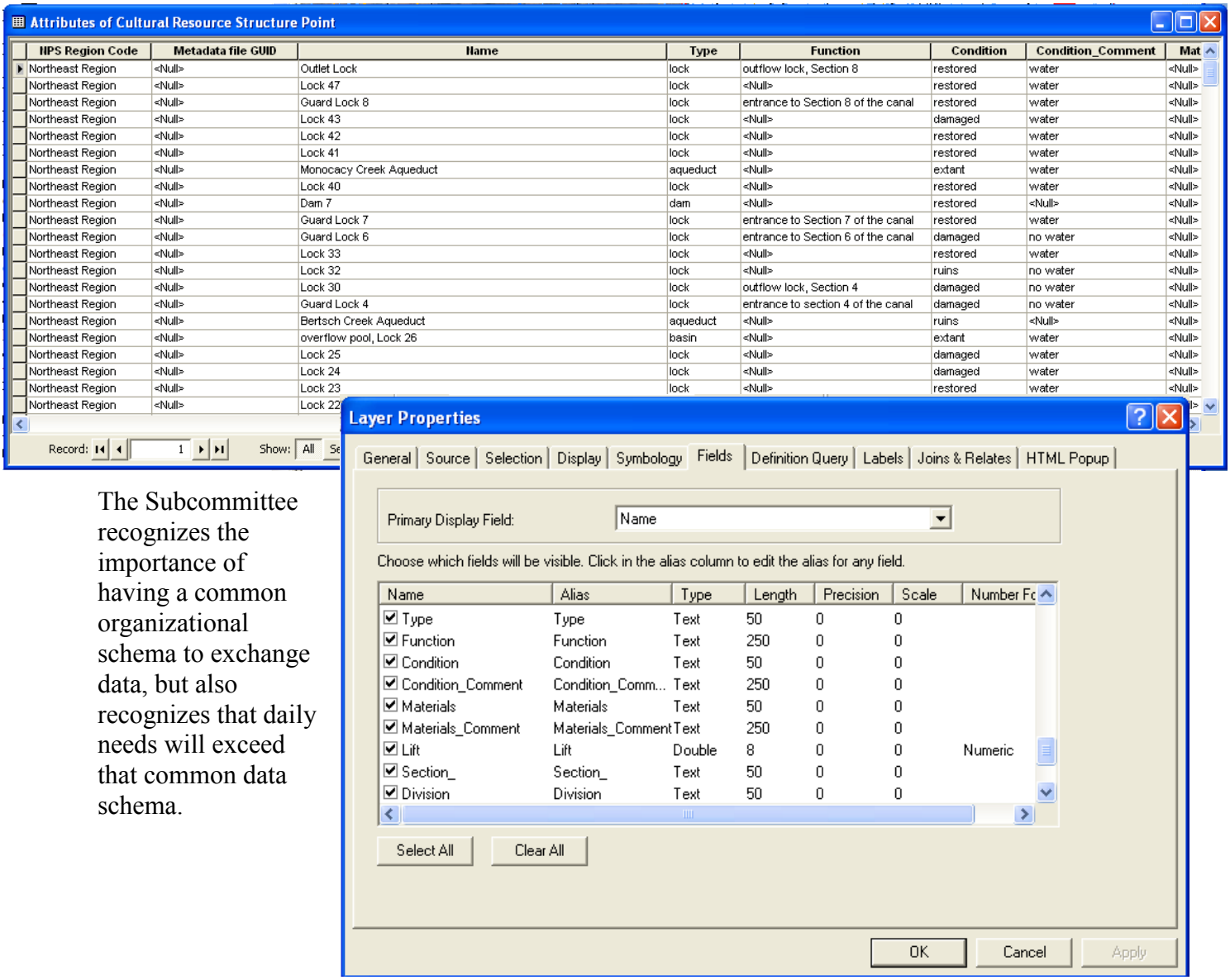


GeoDatabase feature classes from the cultural resource standards implementation model

Individual data layers based on specific databases

Note: Every GIS project will have different requirements. The flexibility of the implementation model allows users to transfer data with full documentation in a resource type based organization. Users may choose to keep the data in that format, or separate the data based on the data sources for their daily use. Moving between these two organizational formats is simple once the cultural resource data conforms to the cultural resource spatial data transfer standards.

Note: For project specific use of cultural resource data, users must include the required fields of the data transfer standards, but may also include additional fields to assist in daily analysis or simply labeling features. This descriptive data, not included in the cultural resource spatial data transfer standard, can take the form necessary to complete the GIS task required. In the Delaware and Lehigh Canal example, the Heritage Area had no inventory database, therefore additional fields of descriptive data were added to the feature classes established in the data transfer standard implementation model.



The Subcommittee recognizes the importance of having a common organizational schema to exchange data, but also recognizes that daily needs will exceed that common data schema.

- Using Cultural Resource GIS Data in an Emergency

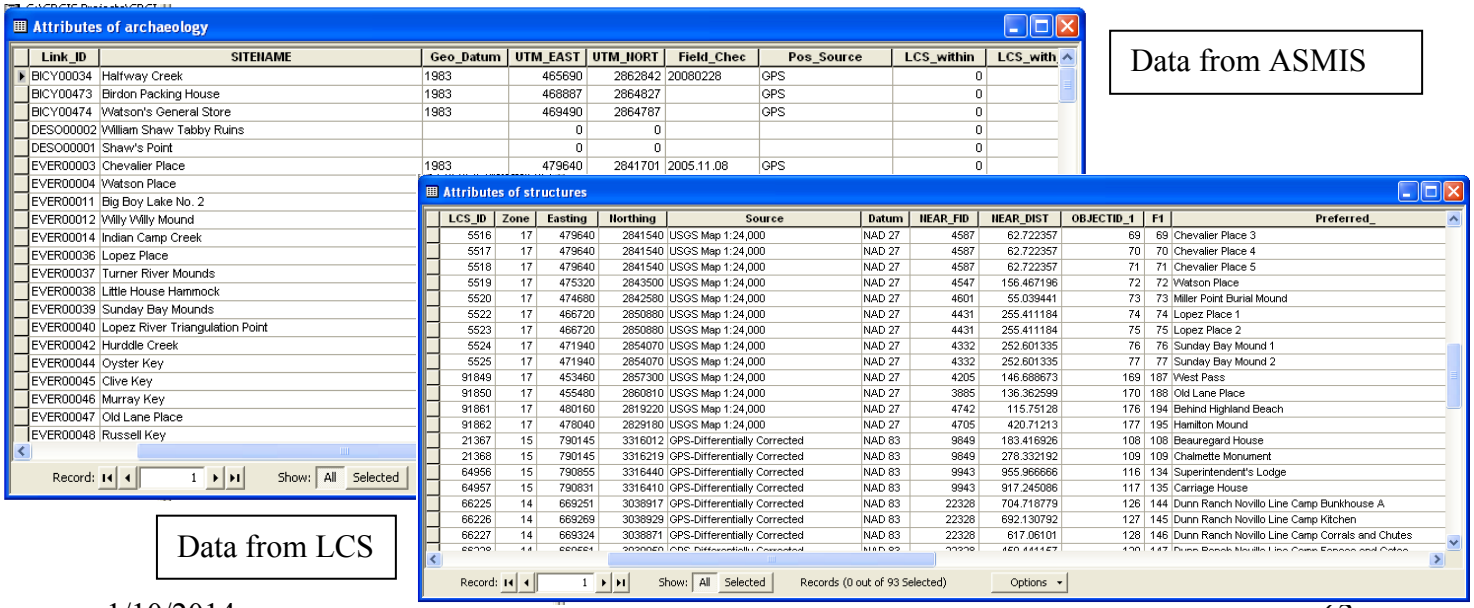
Access to cultural resource spatial data remains a critical need during responses to any type of disaster (hurricane, flood, tornado, earthquake, or wildfire). The ability to provide digital cultural resource data quickly and efficiently in response to a disaster is one of the most important and positive outcomes of generating cultural resource spatial data transfer standards. Utilizing the implementation model in these critical situations significantly enhances the speed, quality and depth of analysis necessary to protect resources. Documenting the quality of our cultural resource data and standardizing the structure of it make it an invaluable part of any disaster response effort. Additionally, as cultural resource specialists migrate their data into the standards and begin to document their data and its sources, they can begin to prioritize the data that needs improvement and inform those who need to use the data about its quality.

In response to hurricane Katrina in 2006, FEMA immediately required cultural resource inventory information from Federal, state, local and Tribal agencies to comply with its Section 106 obligations. Many of these agencies did not have digital cultural resource inventory information to assist in the disaster response, prompting FEMA to resurvey areas, create digital data and reassess the quality of existing digital data.

In response to the Deep Water Horizon oil spill in the Gulf of Mexico in 2010, the Coast Guard required cultural resource inventory information from Federal, state, local and Tribal agencies to comply with its Section 106 obligations. Although more digital data was available, complete digital inventory information could not be acquired in a timely manner, again revealing the quality of existing digital data and the lack of data in many cases.

In response to requests following the oil spill, CRGIS combined National Register, HABS/HAER/HALS, ASMIS, and LCS data to provide baseline cultural resource data to the first responders. Taking advantage of the cultural resource spatial data transfer standards, the quality, source, and restriction levels could be quickly and easily communicated.

Regardless of the source database or inventory, the resources could be categorized into the standard feature classes in the implementation model, identifying historic sites, historic buildings, historic structures, historic objects, historic districts and other features.



Data from ASMIS

Data from LCS

Data from HABS/HAER

Attributes of Database

SURVEY	SITE_NAME	DDDATUM	DDLAT	DDLON	UTMDATUM	UTMZONE	UTMEAST	UTMNORTH	NRIS#
HABS FL-539	2506 Fifteenth Street (House)	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-540	1017 East Fourteenth Avenue (Hous	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-541	1009 1/2 East Fourteenth Avenue (	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-542	Faith Temple Missionary Baptist C	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	95000979
HABS FL-543	2005 North Lamar Avenue (House)	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	95000979
habs fl-544	Monroe Station	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
HABS FL-549	El Progresso de Ybor Grocery	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-550	2502 North Thirteenth Street (Hou	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-551	1021-1025 East Fourteenth Avenue	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-552	2501 North Thirteenth Street (Hou	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-553	2305 North Twelfth Street (House)	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-554	2008 North Lamar Avenue (House)	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	95000979
HABS FL-555	1212 East Twelfth Avenue (Boardin	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-556	1216 East Twelfth Avenue (Boardin	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-557	1019 East Fourteenth Avenue (Hous	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	74000641
HABS FL-567	St. Stephen's Episcopal Church	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
HABS LA-100	Fisk-Schwartz House	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
HABS LA-104	Voisin Plantation	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
HABS LA-110	Simeon Smith House	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>
HABS LA-1100	Vieux Carre Squares, Second Distr	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	66000377
HABS LA-1100-A	Vieux Carre Squares, Antoine's An	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	<Null>	66000377

Record: 1 Show: All Selected Records (0 out of 1053 Selected) Options

Combining all of the internal NPS databases with larger national NPS databases, filling in a complete CR_Link table and documenting each of the point locations to meet the cultural resource spatial data standards took approximately 3 days. The resulting GeoDatabase contained approximately 66,000 records, covering the cultural resources east of Texas in the continental US.

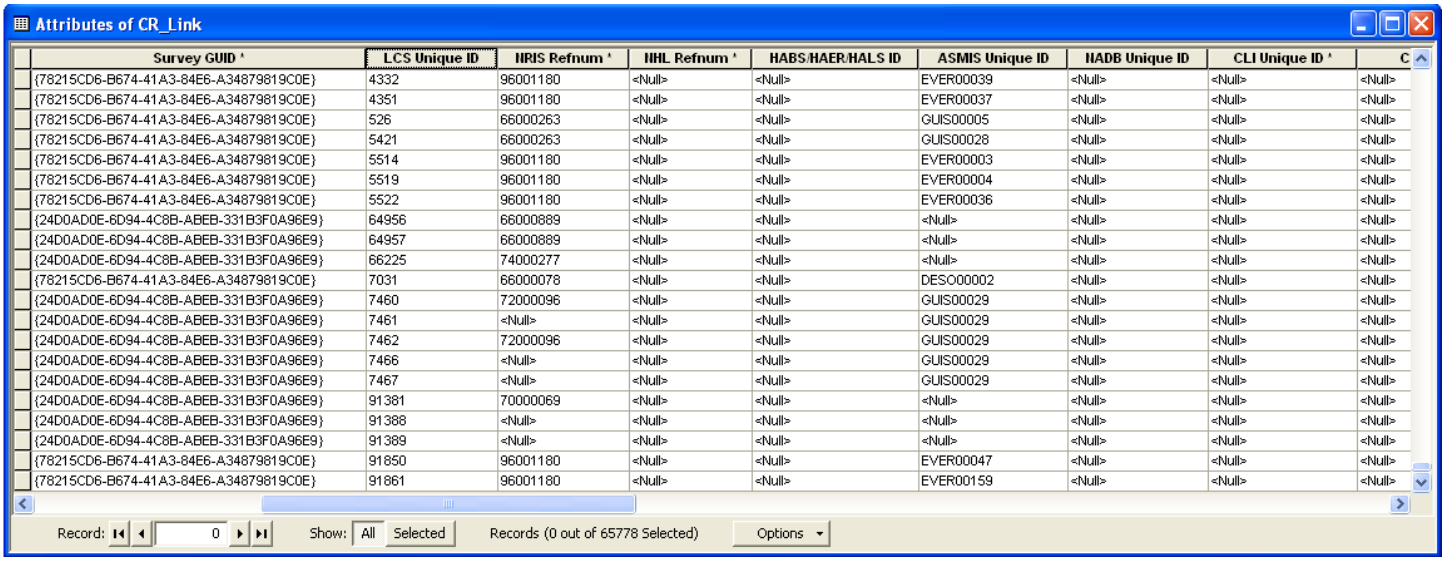
Attributes of Cultural Resource Building Point

Restriction	Source	Source Date	Source Scale	Source Horizontal Accura	Vertical Error	Source Coordinate System	Map Me
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Unrestricted	National Register Information System	5/6/2010	1:24,000	unknown	Not Applicable	UTM zone 17 north, unknown datum	Derived by XY event point or centroi
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS
Restricted: No rel	List of Classified Structures	5/20/2010	not applicable	unknown	Not Applicable	unknown	Differential GPS

Record: 1 Show: All Selected Records (0 out of 48662 Selected) Options

Note: A close examination of the resulting data transferred to the disaster response team shows that much of the feature level metadata remains "unknown." This will be the case with the majority of the cultural resource legacy data where parameters such as accuracy and datum were never recorded. Users, particularly in an emergency situation, need to understand what is known about the data itself so that the data can be appropriately used or distributed for decision making purposes.

The collection and integration of NPS data sources in response to the oil spill was possible with the cultural resource spatial data standards for the first time however. Taking advantage of the CR_Link table, users could determine which resources appeared in multiple databases and thus may have significance for more than one discipline and for more than one reason. The "switchboard" quality of the link table quickly allowed users to find the descriptive information about each resource in each of the various databases to begin assessing National Register eligibility for Section 106 purposes and to find any commonalities among the resources or trends in the data.



The ability to perform this type of analysis quickly becomes even more important in responding to disasters which may have an adverse impact on cultural resources that the NPS stewards. Following the 2010 Mississippi Canyon oil rig explosion and subsequent oil spill, CRGIS was able to quickly integrate National Register, ASMIS, and LCS data for the parks within the potential impact zone. Responding quickly and with the most complete picture of the state of a cultural resource in the event of a disaster is critical to mitigating any adverse impact. Insuring that NPS cultural resource data complies with the standards means that data can be shared with the appropriate agencies, and used in the appropriate manner because of the feature level metadata documentation.

Creating New Spatial Data Using the Implementation Model

The GeoDatabase template can be helpful to park, regional and program level cultural resource specialists in a number of ways. Users may simply load their shapefiles into the established feature classes to take advantage of the simplified data entry made possible by the menus associated with the fields of metadata in the GeoDatabase; or users may not want to recreate the fields of metadata in each of their own shapefiles. In other cases users may want to make use of the enhanced analysis capabilities provided by the use of the GeoDatabase structure, complete with the CR_Link table and relationship classes. Regardless of the ultimate purpose of using the implementation model, either as a temporary data entry tool or a more permanent means to integrate databases, parks, regions and programs will need to be able to create new points/lines/polygons to represent cultural resources to incorporate them into the model.

CRGIS has developed an implementation plan to bring legacy cultural resource data already stored in our NPS cultural resource databases, such as LCS, ASMIS, National Register, HABS/HAER/HALS, etc. (see the "Cultural Resource Spatial Data Standards Implementation Plan" section) into compliance with the standards. As a result, most parks, regions and programs will only need to work with bringing NEW cultural resource data into compliance with the standards, or project-specific cultural resource data. Users may employ a variety of methods to accomplish this ranging from digitizing points/lines/polygons to collecting GPS data to gathering locations from internet-based geographic search engines or other similar tools.

Data Creation Methods

- Digitizing New Points, Lines or Polygons

The structure of the implementation model/GeoDatabase creates 18 different feature classes or data layers, based on resource type and geographic feature. For instance, historic sites are divided into 3 feature classes, one for points, one for lines and one for polygons. These 3 feature classes are grouped within a feature dataset, which acts like a folder to help organize the GeoDatabase, but also assigns a coordinate system to those feature classes. All feature classes in the GeoDatabase have a Geographic (decimal degree), NAD1983 coordinate system.

Users can simply add one of the feature classes into an ArcGIS map document and begin to draw new points, lines or polygons using the standard editing tools. Keep in mind background data sets, such as aerial photographs, quadrangle maps or other cultural resource data should be incorporated into the same map document to facilitate the digitizing. After drawing the geographic features, users can complete the feature level metadata for individual features or groups of features (see the "Completing Feature Level Metadata" section). Users may then load those new feature GUIDs into the CR_Link table to establish connections to exterior databases, or they may export the features as a separate shapefile with the completed feature level metadata.

- Incorporating Data Collected with GPS

Frequently cultural resource specialists use GPS to collect locations of the resources that they monitor, steward or discover in their work. Higher end GPS receivers, such as Trimble units can export data as a shapefile. Users can load these shapefiles directly into the appropriate GeoDatabase feature classes (see the "Procedures to Migrate New Data into the Implementation Model" section). Other GPS receivers export data as a series of X,Y coordinates, usually in the form of decimal degrees, but other coordinate systems, such as UTM, could be specified. Users can also convert the text files or data files produced by these receivers into shapefiles which can be loaded into the appropriate GeoDatabase feature classes (see the "Creating New Data from Coordinate Pairs" section).

- Creating New Data from Internet-Based Geographic Search Engines

For many cultural resource specialists high quality GPS is not available to create locations and other alternatives may provide a means to collect a location for a resource in a more detailed way than acquiring a UTM location from a quadrangle map. One popular means of doing this is through internet-based geographic search engines, and free applications that users download. Using aerial imagery and other tools in these applications allows user to create markers that can be converted into GIS points or to gather latitude/longitude coordinate pairs.

Finding a cultural resource, particularly above ground features, through the aerial photography in internet-based geographic search engines can provide very detailed locational data. Users must understand however that different scales and resolutions of photography cover different areas of the country, making the feature level metadata in the cultural resource standard very important to complete. Most engines do not supply metadata for their aerial photography. As a result, the majority of geographic features created with these applications will have an unknown datum, an unknown level of horizontal accuracy and other spatial parameters that are part of the feature level metadata.

Once users locate the resource of interest in an internet-based geographic search engine however, placing a cursor over the feature, creating a marker or supplying an address will provide a coordinate pair in the form of degrees/minutes/seconds of latitude and longitude or a decimal equivalent. These coordinate pairs can be stored in a table or spreadsheet and converted into a shapefile (see the "Creating New Data from Coordinate Pairs" section), however the user must convert any coordinate pairs supplied in a degrees/minutes/seconds format into decimal degrees. A variety of free of internet-based applications will perform this conversion.

Placing a cursor on the image or creating a marker will often result in the display of the latitude/longitude coordinates on the screen. Depending on the application, the imagery and the zoom factor, users can very easily get detailed locational data without the use of any technology other than what is on their desktop computer.

With the coordinate pairs identified, users can select a tool on the internet that meets their needs to convert the degrees/minutes/seconds into decimal degrees:

The user can then input the decimal degrees into a table, spreadsheet or other document to convert into a shapefile (see the "Creating New Data from Coordinate Pairs" section).

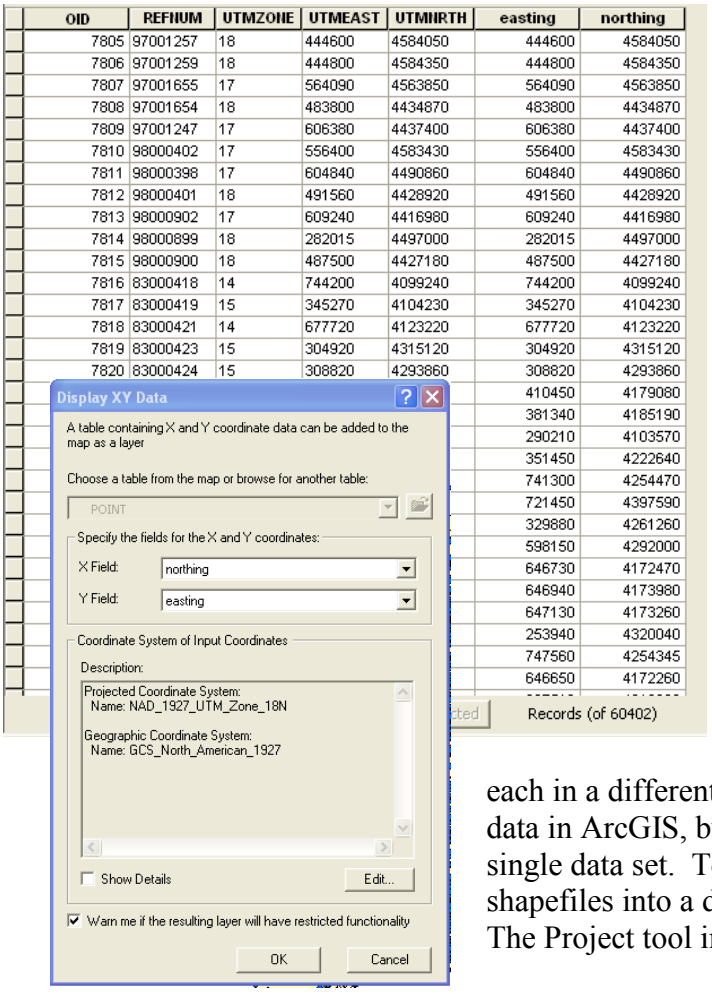
- Creating New Data from Coordinate Pairs

Many cultural resource specialists capture new locational data in the form of coordinate pairs, whether they are generated from a quadrangle map, through GPS, via an internet-based search engine or some other means. The coordinate pairs themselves, frequently stored in NPS databases (see the "Migrating Legacy Data into the Standards and Implementation Model" section), are not GIS data. Users must convert the coordinate pairs, which most often take the

form of UTM or latitude/longitude coordinates, into a shapefile or feature class which the GIS can interpret.

The process to convert coordinate pairs into GIS data takes several steps. Because the majority of cultural resource specialists use UTM, the following example shows how to create new shapefiles from UTM coordinates:

- Users should create a table with separate fields for the X coordinate and the Y coordinate. This can be accomplished through Excel, a table in a GIS project, a text file or other means. Some GPS receivers will output waypoints or features as such a table. In the case of UTM coordinates, an Easting is the X coordinate and a Northing is the Y coordinate. Once created, the table can be converted into point spatial data.
- First, because the UTM coordinate system uses zones to divide up the globe, users must first separate the individual records in the table out by UTM zone to create smaller subsets if the park, region or project crosses a zone. Resources from different UTM zones cannot be plotted together. Each coordinate pair must be plotted within its own distinct zone. See reference: http://egsc.usgs.gov/isb/pubs/factsheets/fs07701.html.

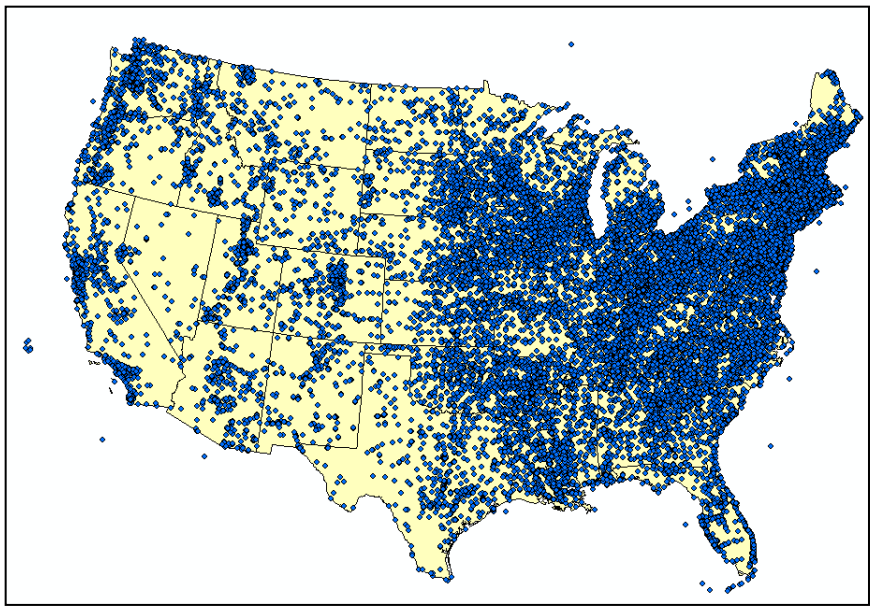


OID	REFNUM	UTMZONE	UTMEAST	UTMNRTH	easting	northing
7805	97001257	18	444600	4584050	444600	4584050
7806	97001259	18	444800	4584350	444800	4584350
7807	97001655	17	564090	4563850	564090	4563850
7808	97001654	18	483800	4434870	483800	4434870
7809	97001247	17	606380	4437400	606380	4437400
7810	98000402	17	556400	4583430	556400	4583430
7811	98000398	17	604840	4490860	604840	4490860
7812	98000401	18	491560	4428920	491560	4428920
7813	98000902	17	609240	4416980	609240	4416980
7814	98000899	18	282015	4497000	282015	4497000
7815	98000900	18	487500	4427180	487500	4427180
7816	83000418	14	744200	4099240	744200	4099240
7817	83000419	15	345270	4104230	345270	4104230
7818	83000421	14	677720	4123220	677720	4123220
7819	83000423	15	304920	4315120	304920	4315120
7820	83000424	15	308820	4293860	308820	4293860
					410450	4179080
					381340	4185190
					290210	4103570
					351450	4222640
					741300	4254470
					721450	4397590
					329880	4261260
					598150	4292000
					646730	4172470
					646940	4173980
					647130	4173260
					253940	4320040
					747560	4254345
					646650	4172260

Records (of 60402)

- Querying the table by UTM zone and creating subsets in a table form will provide the user with the basic first step. Once divided by UTM zone, users can add the tables of coordinates by zone into an ArcGIS project and automatically create spatial data. By specifying that the X coordinate is contained within the Easting field and the Y coordinate is contained within the Northing field, users can quickly create a series of points.
- In creating point spatial data however, users must also specify a coordinate system. This requires the user to specify the UTM coordinate system and to define the particular zone the points will lie within. In addition, users must specify a datum (NAD27 or NAD83). The datum and coordinate system information should be recorded in the feature level metadata.
- Creating multiple shapefiles of points, each in a different UTM zone will allow the user to display the data in ArcGIS, but not merge the shapefiles together into a single data set. To do so will require re-projecting the UTM shapefiles into a decimal degree (latitude/longitude) projection. The Project tool in ArcGIS will accomplish this.

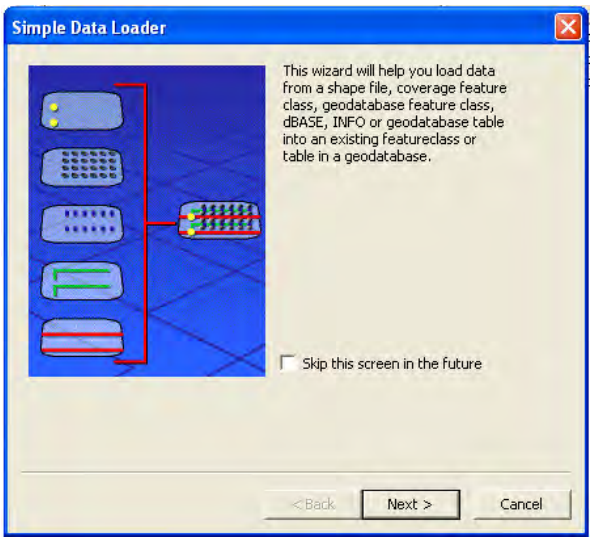
- Once re-projected, the various shapefiles, which now represent a decimal degree version of the UTM zones, can be merged together using the Merge tool in ArcGIS.
- The result of this processing should be a single shapefile containing points which represent all of the coordinate pairs, regardless of UTM zone. This shapefile can then be loaded into the implementation model (see the Procedures to Migrate New Data into the Implementation Model" section).



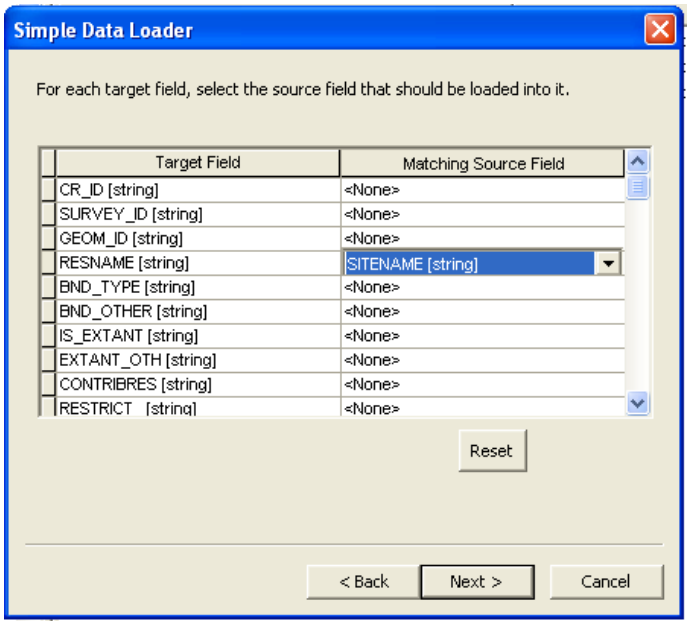
Procedures to Migrate New Data into the Implementation Model

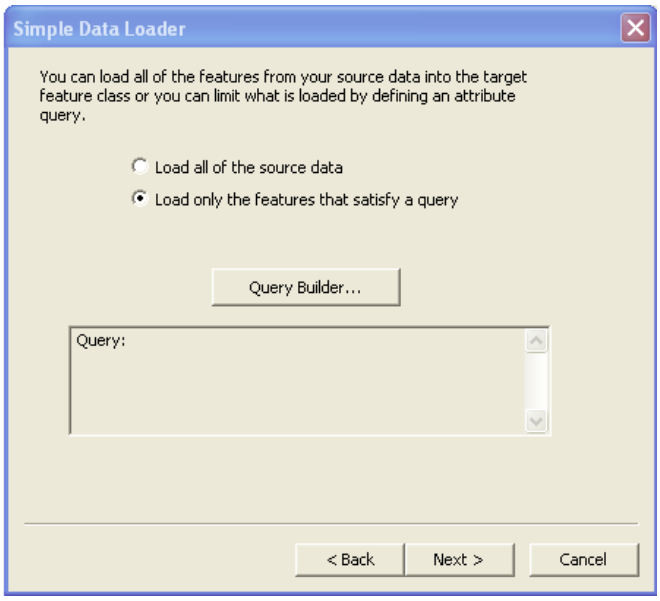
Shapefiles or feature classes generated from digitizing locations, GPS, or from creating points out of coordinate pairs may represent archaeological sites, historic buildings, historic structures, historic objects, cultural landscape features or historic districts among other resource types. Loading these shapefiles containing the coordinate pairs into the GeoDatabase implementation model is a simple process:

- Create a shapefile through editing in ArcGIS, exporting from GPS or generating from coordinate pairs
- Determine which resources in the shapefile belong in the various feature classes based on the cultural resource feature type. Adding your own field to a shapefile to describe which resource type a specific resource should be associated with, as digitizing takes place or when a table of coordinate pairs is created will make the loading process more efficient.
- In ArcCatalog, navigate to the template GeoDatabase model and find the feature class you would like to load resources into
- Right click on the feature class you want to load data into, select Load and Load Data from the context menu to launch the simple data loader
- Select the shapefile you would like to load data from



- Continue to select the defaults until you reach the window in the loading wizard where you can map the fields from your shapefile to the fields in the feature class. Note that the fields in your shapefile do not have to have the same name, and many of the feature level metadata fields will not be in the exported data from existing databases, so many of the fields will be blank. Use what data you can in the shapefile to make potential matches to the feature level metadata fields.
- When given the option, you may load all of the data in a shapefile, or only data from the shapefile that meets a particular query. If





you have a field in your shapefile for instance that indicates which resources are sites versus buildings, objects, structures, etc., you can simply choose to have the wizard address only those records as opposed to the entire shapefile.

- Finish the wizard. With only those resources loaded into the feature class, all of the feature level metadata can be quickly filled out or calculated automatically.

Note: Using the simple data loader appends or adds records into the existing feature class. Unlike an import which creates a new feature class, loading data simply adds records to the existing feature class without altering any of the fields. Users can continue to load data into the existing feature class without over writing any existing data.

Note: In most park and region applications, users want to have a single National Register data set to work with, as opposed to multiple data layers based on resource type. The Cultural Resource Subcommittee recognizes that parks/regions may find it more practical to create a single point or polygon data layer for any cultural resource data in daily use. When transferring or sharing data however, those single data layers (feature classes or shapefiles) can easily be placed in the appropriate feature class or shapefile to meet the cultural resource spatial data transfer standards.

Completing Feature Level Metadata

Once data has been loaded into the appropriate feature class, users can begin to fill in the feature level metadata critical for compliance with the spatial data standards, and to document the quality of legacy data, as well as to differentiate legacy data from newly created spatial data. Although the standards contain many fields of feature level metadata, most can be filled out in batch processes, taking only a few seconds to complete.

- Batch GUID generation

Creating the unique CR_ID and GEOM_ID globally unique IDs remains a key element to the standards, allowing users to identify those individual cultural resources which may appear in multiple cultural resource databases through the CR_Link table. Quickly generating these IDs in an automated fashion makes the task much easier to accomplish, and insure that no duplicate GUIDs will exist. Using the Field Calculate function and only 2 or 3 simple lines of Visual Basic or Python code allows the user to completely automate this process and control exactly which resources are assigned GUIDs each time new data is loaded into the feature class.

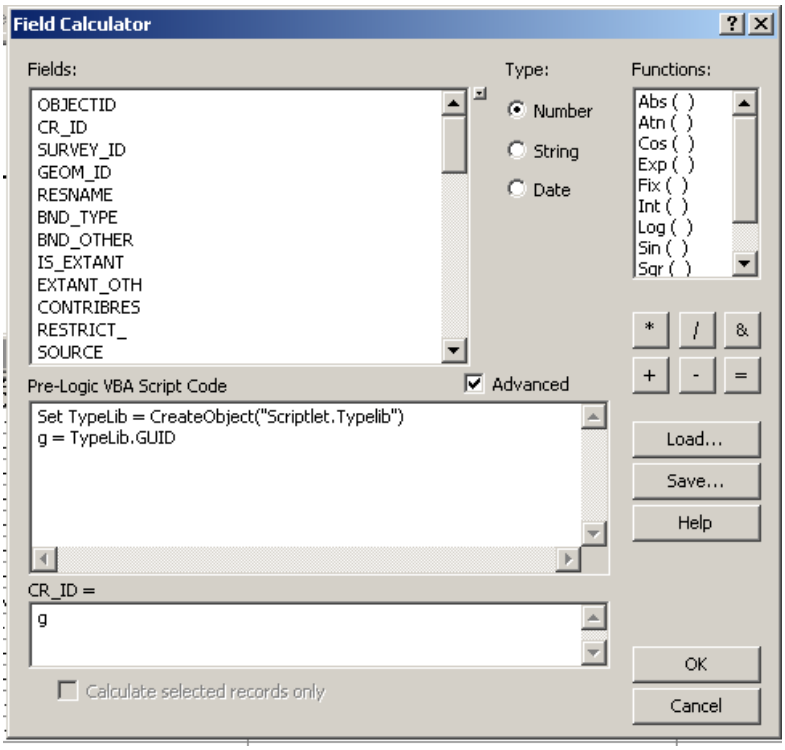
NOTE: Like any field calculate operation, if the user selects any records, the calculate function will only apply to those records. If the user has NO records selected, the calculate function will apply to all of the records in the attribute table. ***Be sure that after adding new records to a feature class, only those new records are selected when calculating GUIDs, or the original GUIDs can be over written.***

In version 10.x of the ArcGIS software, changes in the programming language mean that the multiple GUID generation process requires specific code input into the field calculator. The code used in version 10.x of the software will also work with version 9.x of the software. With version 10.x the process includes:

- Navigate to the Field Calculator for the appropriate field in the feature class
- Click in the check box to get the "Advanced" option
- Copy the following code into the first text box:

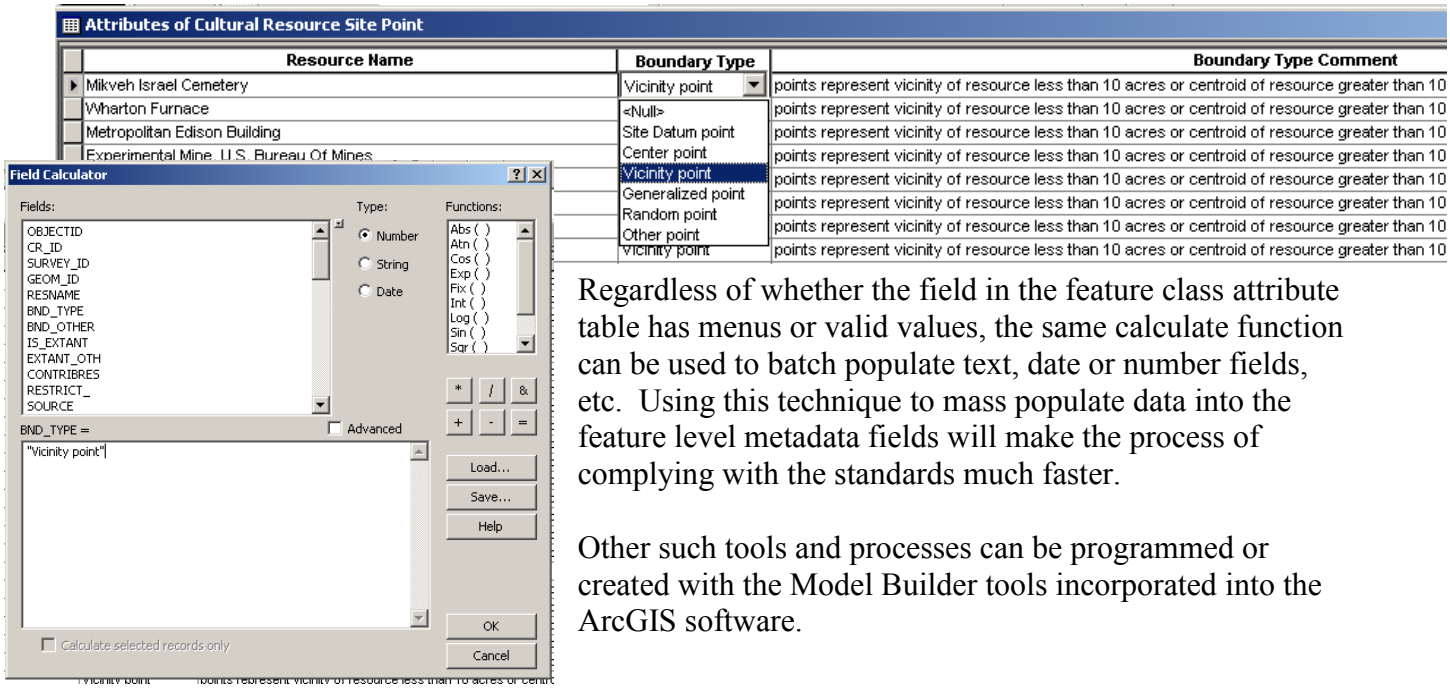
  Set TypeLib = CreateObject("Scriptlet.Typelib")
  g = TypeLib.GUID
- Type the following into the second text box:

  g



- Using the Field Calculator to Mass Populate Data

Just like using the Field Calculator to generate multiple GUIDs, the Field Calculator can be used to mass populate data in any of the feature level metadata fields. Unlike with the GUID generation, no special code is required to take advantage of this operation. Users may select a value from the drop down menus in the feature class attribute table and simply copy and paste that value into the field calculator to fill that value in for any of the selected records.



Regardless of whether the field in the feature class attribute table has menus or valid values, the same calculate function can be used to batch populate text, date or number fields, etc. Using this technique to mass populate data into the feature level metadata fields will make the process of complying with the standards much faster.

Other such tools and processes can be programmed or created with the Model Builder tools incorporated into the ArcGIS software.

Completing the CR_Link Table

With data loaded into the appropriate feature classes and feature level metadata completed, populating values in the CR_Link table constitutes the last step in bringing cultural resource data into the implementation model/GeoDatabase. The most time consuming task involved in using the implementation model, if completed, will allow users to integrate all of the cultural resource databases without compromising the integrity of any of those databases.

NOTE: It is important to note that the use of the implementation model/GeoDatabase and the completion of the CR_Link table are NOT part of the cultural resource spatial data transfer standard themselves. Loading legacy data and creating new data in the GeoDatabase and completing the CR_Link table is an important way for cultural resource specialists and managers to better understand our cultural resource data, view trends and examine the interconnectedness of our various programs. In order to comply with the cultural resource spatial data standards, users must complete the required elements of the feature level metadata. Spending the extra time to complete the CR_Link table however will add significantly to the value of the GIS data created and any GIS application created using the data.

Completing the CR_Link table is often a manual process of matching resources from one database to another, requiring users to look at resource names, locations and descriptions to insure that two resources in two different databases actually refer the same location. In many of

the NPS cultural resource databases fields exist to identify if a specific resource relates to some other feature in another database. Most often, National Register reference numbers are included in NPS databases. These fields in the NPS databases, which could provide the data required to quickly complete the CR_Link table, are typically not required and are not frequently filled in. Where an NPS database does have a reference to another NPS database, this information can be easily incorporated into the various feature classes and thus into the CR_Link table. Where an NPS database lacks these cross-reference IDs, the completion of the CR_Link table becomes a manual process.

In general, the process to fill in the CR_Link table is similar to loading data into the existing feature classes in the implementation model:

- Load all records from all of the feature classes into the CR_Link table

Because the CR_Link table is an a-spatial table, it will not matter what type of geometry (point/line/polygon) the feature classes represent. The feature level metadata which constitutes the bulk of the attribute information for the feature classes will NOT be loaded into the CR_Link table, only the GUIDs and other resource ID information will be included. The CR_Link table exists to function as a "switchboard" connecting the user from the geometry to the various databases which reference that resource.

- You may want to add a field to the CR_Link table to identify what feature class the record originated with and a add a field to identify the resource name

Because the CR_Link table should contain a record that relates to every point, line or polygon feature, the CR_Link table will reference information in all 18 of the various feature classes. To assist the user in taking advantage of the relationships referenced by the relationship classes in the implementation model, it may be helpful to know which feature class each record in the CR_Link table is associated with. This can easily be calculated when each feature classes is loaded into the CR_Link table. Similarly, having some kind of feature name to help identify the resource in the CR_Link table will help distinguish it from others.

- Use the same simple data loader and match the GUID fields to the appropriate fields

Just as with loading the spatial data into each established feature class, the simple data loader can be used to load the records into the CR_Link table from any of the spatial feature classes. This operation will append the attribute contents of each feature class to the CR_Link table, without over writing what may already be in the table. It will also provide the user with the opportunity to map the appropriate GUID or resource ID fields to the matching fields in the CR_Link table.

- You may want to add fields to the feature classes themselves to store alternate IDs for a location, depending on what database is serving as the source for the location and/or descriptive information

Adding additional fields to the feature classes in the implementation model to accommodate alternate IDs for a single resource will help automate the process of creating the links across databases. In doing so, when a user loads the geography into a feature class, the ID information (if present) can also be incorporated.

- If alternate IDs are present in fields in the feature class attributes, these can be loaded into the CR_Link table at the same time as the cultural resource GUID fields which serve as the index to other databases

For instance, a resource listed in the LCS may also be listed in the National Register, may have been documented by HABS/HAER/HALS and may also have received an historic preservation grant. In the LCS database, frequently National Register reference numbers are entered. The HABS/HAER/HALS database may also include a National Register reference number. Properties receiving grants must be on or eligible for the National Register, but the database does not necessarily contain National Register reference numbers. The goal of the CR_Link table is to associate the unique CR_ID with the location of the resource, as well as the appropriate LCS ID, National Register reference number and grant ID. Having these associations indicated in the feature class makes the process of matching one resource to another much faster.

- Without any alternate IDs in the individual feature classes, users will have to manually go through each record to find possible associations in alternate databases

Users can complete this process through the standard editing tools in ArcGIS, ArcMap.

Completing the CR_Catalog Table

With data loaded into the appropriate feature classes, feature level metadata completed and the CR_Link table completed, populating values in the CR_Catalog table constitutes the last step in bringing cultural resource data into the alternative implementation model/GeoDatabase. Unlike the CR_Link table however, the CR_Catalog table can be completely automated and generated by the GIS, without any manual entry. This automated proces, if completed, will allow users to create an index to further facilitate searching and using the cultural resource geographic data in conjunction with the CR_Link table, depending on how the user implements the CR_Link table.

NOTE: It is important to note that the use of the implementation model/GeoDatabase and the completion of the CR_Catalog table or the CR_Link table are NOT part of the cultural resource spatial data transfer standard themselves. Loading legacy data and creating new data in the GeoDatabase and completing the CR_Link and CR_Catalog tables is an important way for cultural resource specialists and managers to better understand our cultural resource data, view trends and examine the interconnectedness of our various programs. In order to comply with the cultural resource spatial data standards, users must complete the required elements of the feature level metadata. Spending the extra time to complete the CR_Link or CR_Catalog table however will add significantly to the value and utility of the GIS data created and any GIS application created using the data.

Completing the CR_Catalog table is an automated process of summarizing the information in the other feature classes and does not require the manual data entry that the CR_Link table does. With the CR_Catalog table basic information such as the CR_ID, the Geometry_ID, the feature class name, the resource type, boundary type and resource name form the bulk of the information in the table. In this way, the CR_Catalog serves as an index to all of the resources in all of the feature classes. All CR_IDs are represented here (see the discussion of the CR_Catalog above), along with information that will lead the user to the appropriate feature class or delineation of the resource required for their application.

Should the user choose to take advantage of the alternative data model and the CR_Catalog, tools will be provided to carry out the automated process. The user must determine the fields they would like to include in the table however.

- Like the CR_Link table all of the main resource ID fields will be included

Like the CR_Link table, the main resource ID fields included in all of the feature classes will be included in the CR_Catalog table including the CR_ID, the Geometry_ID and the Survey_ID. In this way, the CR_Catalog table can serve as an index leading the user to the appropriate resource. The Geometry_ID will serve as the primary key (unique identifier) in the CR_Catalog table.

- A Feature Class Name field will be included

One of the main purposes of the CR_Catalog table is to provide the user with information regarding which feature class a resource may be located in, particularly if multiple delineations of the same resource exist in different feature classes. The index should lead the user to the location of the geography for the resource they are searching for.

- A Resource Type field will be included

The standards must be independent of file type (shapefile or GeoDatabase), so many of the field or feature class names must be shortened or abbreviated to 10 characters or less. With the GeoDatabase data model (primary or alternative) aliases may be applied so that the user sees the full feature class name for instance. The feature class name field will contain the official, abbreviated version of the feature class name, but the Resource Type field can contain the more detailed and user friendly version of name to again facilitate finding the appropriate delineation of the resource in the data model.

- A Boundary Type field will be included

Because multiple delineations of a single resource may appear in the GeoDatabase, and boundary type is captured in the feature level metadata, it is included in the CR_Catalog to allow the user to confirm that they are looking for the correct resource, and the correct delineation of that resource in the geographic data.

- Other fields, such as Unit Code and Resource Name will be included

To clarify the exact resource located in the CR_Catalog, other fields such as unit code or resource name will help the user to confirm they are looking at the appropriate resource in the right park or with a familiar resource name. The user may choose to add other fields similar to these to facilitate finding the right resource.

CRGIS and the Cultural Resource Subcommittee recognize that implementing the cultural resource data standards in a comprehensive and service-wide approach seems daunting to park, regional and program level cultural resource specialists. In an effort to simplify the process as much as possible CRGIS developed an implementation plan where the major NPS program level cultural resource databases, which contain the majority of our cultural resource legacy data, will be migrated into the standards by CRGIS. Additionally, the Cultural Resource Subcommittee

developed a general workflow for implementing the standards related to new data, taking into account regional variations and needs.

With CRGIS completing the migration of the legacy data into the standards, the assignment of the CR_ID, Geometry_ID and Survey_ID GUIDs can be centralized and controlled in a more organized way. If one of the main goals of the standards is to integrate our cultural resource databases, a single CR_ID must reference multiple databases. CRGIS will assign these critical GUIDs and begin to match resources across the databases for this legacy data. By migrating this legacy data at the National level, CRGIS also hopes to remove the burden of completing complicated and sometimes unknown feature level metadata from the park and regional level cultural resource specialists and GIS professionals. This implementation plan would require park and regional level cultural resource specialists to create spatial data to represent NEW resources surveyed, identified or included in the existing databases. Because these specialists know their resources best, the appropriate spatial representation and most complete feature level metadata documentation of that spatial data would result. Parks and regional offices would then assign the appropriate GUID for new data and incorporate it into any data rolled up to the National level, ready for inclusion in an authoritative collection of cultural resource data sets as part of the NPS enterprise GIS efforts.

A major challenge in the NPS cultural resource programs remains the sharing of data among the many databases which describe and document the variety of NPS and NPS-related resources. Integrating these databases allows cultural resource managers to obtain a complete picture of the amount of documentation compiled related to a single property, its current condition, any potential threats to the resource and any interrelationship to other cultural or natural resources

The existing NPS cultural resource databases serve important purposes and maintain specific data used on a daily basis by individual programs. Collapsing all of this information into a single cultural resource database would result in the loss of information and the creation of a database unsuitable for the daily needs of any one specific program. Using geography, through the cultural resource spatial data standards and the GeoDatabase implementation model created, allows cultural resource specialists to integrate the various databases when needed, yet maintain the autonomy and perspectives reflected in their own databases.

Working with the NPS National GIS program, the NPS GIS Council, the Cultural Resource Subcommittee, regional and park GIS/cultural resource specialists CRGIS developed a plan to implement the standards with the least possible burden to the park and regional staff, while reaping the most potential benefit through the integration of databases.

- Individual park cultural resource specialists would be responsible for creating spatial data and completing feature level metadata for new features added to any one of the cultural resource databases only, depending on regional strategies, individual skill levels and individual park circumstances. In some cases, regional GIS specialists, regional archaeological centers or others may be creating this data. At this level, data creators would assign the appropriate GUIDs, migrate new data into the data model, complete the CR_Link table where possible and finally transfer data to the region. Upon completion, the data is now considered an authoritative park dataset. The Cultural Resource Subcommittee recognizes that not all data created or collected at this level may need to

roll up to the region or national level, however, having the data in the standards allows parks to be prepared to share this data if necessary to respond to an immediate need.

- Park and regional GIS coordinators, or regional archaeological centers would be responsible for providing a first level of support to the cultural resource specialist in creating spatial data and assisting in completing the feature level metadata, again depending on regional strategies. At this level, GIS specialists and subject matter specialists would review new data input at the park level to insure correct feature level metadata, insure that the data meets regional requirements, update the CR_Link table with additional information if necessary, perform some general quality control and finally transfer the data to WASO. Upon completions, the data is not considered an authoritative regional dataset. The Cultural Resource Subcommittee recognizes that not all data collected at this level may need to roll up to the national level, however having the data in the standards again allows regions to be prepared to share data if necessary to respond to an immediate need.
- At the WASO level, CRGIS would be responsible for performing final quality control/quality assurance tests to make sure the standards have been met, that the data meets national data requirements, and confirm that no mis-assigned or duplicate GUIDs (except intentional duplicate CR_IDs) remain in the dataset. CRGIS will also update the CR_Link table with additional IDs if necessary and consolidate the data into the National cultural resource GeoDatabase as part of the enterprise GIS effort. Upon completion of these actions, the data is now considered an authoritative national or NPS-wide dataset. CRGIS will manage the security of the data, distribution of the data and availability of the data through direct connections, GIS services and other means currently in development.
- The Cultural Resource Subcommittee of the NPS GIS Council will provide support and guidance to the park and regional staff as they implement the standards with new data, assisting and answering questions where needed. The Subcommittee will also review the implementation process, receive comments on the process and alter the implementation plan, as well as the standards, based on the comments and input from the park, regional and National level.
- CRGIS, through the NPS GIS program, will ultimately provide a home for any national cultural resource dataset developed through the integration of the cultural resource databases and the creation of the spatial data. Through the process of rolling data up from parks to regional to National levels, the CRGIS could provide an enterprise GIS dataset, housed with the NPS GIS program, that would be an authoritative cultural resource dataset that all parks, regions and programs could take advantage of.

CRGIS and the Cultural Resource Subcommittee will implement the standards through a phased plan. The first phase will focus on the NPS partnership programs including grant and tax programs, as well as National Register and HABS/HAER/HALS data. The second phase will widen the scope to include the NPS National central cultural resource databases such as LCS, ASMIS and CLI, concentrating on documenting the legacy data and improving the quality of the locational data. Parallel to the first phase, CRGIS has already begun work on the legacy data contained within the CLI and expects to finish this in 2013 before moving on to the LCS. The final phase will focus on park and regional data and the development of tools to incorporate that new data where necessary, as well as develop tools to access and use the National dataset.

CRGIS and the Cultural Resource Subcommittee understand that all phases are subject to funding constraints but believe that it could be complete by 2015with procedures for maintaining or improving the data also in place.

Assistance and Guidance Available to Assist in Complying with the Standards

The Cultural Resource Subcommittee recognizes that fully implementing the cultural resource standards, not just for assisting in data transfer, but also to integrate all of the cultural resource databases will require assistance to and from park, regional and National levels. The Cultural Resource Subcommittee intends for the this guidance document to serve as a reference manual to help cultural resource specialists at park and regional levels understand the feature level metadata, the purpose of the standards and how they could provide new ways to use our cultural resource data. Similarly, CRGIS intends for the GeoDatabase implementation model to serve as an important tool for park and regional cultural resource and GIS staff, allowing for improved data entry, quality control and database integration. Finally, CRGIS will provide training to park, regional and program staff to explain the standards, how to create spatial data using the implementation model, how to properly complete the feature level metadata and how to manipulate the GeoDatabase to full effect.

As discussed in other sections of the guidance document (see the, "General Structure of the Implementation Model" section), individual parks, regions and programs may wish to focus their GIS analysis on their specific data, rather than using the GeoDatabase in its entirety. The cultural resource spatial data standards are intended to facilitate data sharing through the feature level metadata documentation of each point, line or polygon. Because the primary purpose of the standards remains data sharing, the use of the GeoDatabase model is not required to comply with the standards. Users may exchange data when necessary via the GeoDatabase, feature classes, shapefiles, tables or other forms of data exported from the standard format.

At a park level users may further keep their spatial data in a coordinate system specific to their state or UTM zone. The data exchange standard requires data to be in a decimal degree/NAD83 coordinate system to facilitate combining datasets from across the country. Park, regions and programs may convert their specific data to this coordinate system at the time data is exchanged, as opposed to migrating all of their park level data into this coordinate system permanently. The Subcommittee does not intend for the cultural resource standards or the implementation model to necessarily take the place of the already established methods of doing business at a park or regional level, although it can be used in this way. The intention remains to improve the quality of our cultural resource spatial data, integrate the cultural resource databases for analysis purposes and establish a procedure to develop an authoritative cultural resource spatial data set service-wide.

When users do exchange data, either in a shapefile, feature class or GeoDatabase form, FGDC dataset level metadata must be completed. This already established and familiar and well used standard is required for Federal agencies when exchanging data. This FGDC metadata would describe the data set as a whole, as opposed to the individual features where the cultural resource spatial data standard focuses. Users currently must complete FGDC dataset level metadata, regardless of the cultural resource spatial data standards when exchanging data.

Data Exchange Types and Using Data in the Cultural Resource Standard

CRGIS and the Cultural Resource Subcommittee understand the security constraints and legal issues surrounding the exchange of sensitive cultural resource spatial data. Not all parks will want or need to share their cultural resource data with other entities. However many instances exist when cultural resource spatial data must be shared between parks, between parks and regional offices, between parks/regions and National programs, between the NPS and State or Tribal Historic Preservation Offices for instance.

In many cases parks, regions and programs must be capable of quickly providing important cultural resource spatial data, particularly in the case of disaster response. The Cultural Resource Subcommittee suggests that parks, regions and programs keep their cultural resource spatial data in a format that complies with the cultural resource standards to allow for these circumstances. Carrying out Section 106 of the National Historic Preservation Act compliance, GPRA, general management planning and other typical park cultural resource activities would be greatly enhanced by the integration of the NPS cultural resource databases via the implementation model provided with the cultural resource standard and certainly aid in the ability of the NPS or a single park to respond to data requests with quality spatial data in a timely manner.

Migrating Legacy Data into the Standards and Implementation Model

As outlined previously (see the "Cultural Resource Spatial Data Standard Implementation Plan" section), CRGIS would take the responsibility of migrating legacy data stored in the existing cultural resource databases, held at the National level. If parks or regions maintain their own databases of cultural resource information similar to these National repositories, but not included in the official database, they would be responsible for migrating that legacy data into the cultural resource standards, in the event of any data sharing.

The following examples provide a general overview of how CRGIS will migrate this legacy data into the standards, and how an individual park or region could do the same with their own specific databases, similar to the National repositories.

- External NPS Databases

Databases related to NPS programs that work inside and outside the park units such as the National Register of Historic Places, the Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscape Survey, Historic Preservation Tax Incentives, and various grant programs keep varying degrees of locational data. Some, such as the National Register maintain UTM coordinates while others such as Tax Incentives store addresses. These databases which document and record the footprint of the National Park Service in communities outside park boundaries represent an important national inventory of cultural resources that does not exist anywhere else.

The National Register of Historic Places is one of the primary national cultural resource data sets maintained by the NPS. Although not frequently used in its entirety by an individual park or region, locations of National Register properties remain one of the most frequently requested data sets produced by the NPS. Because of the implications of National Register eligibility with

regard to Section 106 of the National Historic Preservation Act and any potential Federal undertakings which might affect these resources it remains important to be able to quickly produce and share National Register spatial data.

The National Register stores locational information in the form of UTM coordinates in the National Register Information System (NRIS). This data, with the exception of location restricted sites, is publicly available through the National Register website: http://nrhp.focus.nps.gov/natreg/docs/Data.html. This does not constitute spatial data which can be used in a GIS application or shared with others for analysis purposes. CRGIS entered into an agreement with the National Register program in April 2012, creating a more permanent coordination between the two programs. Under this agreement, CRGIS used the UTM coordinates in the NRIS to create points and polygons for the National Register data, put it into the GeoDatabase data model and get the data into compliance with the standards. This GIS data will be made available for download from the National Register website, but will also be incorporated into the larger National cultural resource data set.
Additionally, users can download the NRIS database in an Access format. National Register properties which encompassing less than 10 acres are delineated as points while properties which expand beyond 10 acres are represented by a series of bounding coordinates, used to create polygons. The coordinate pair information stored in the NRIS does contain mistakes and incorrect information. CRGIS has cleaned up the most obvious errors in the data, but has not "corrected" the data.

Similarly, the HABS/HAER/HALS programs keep a database containing information related to all of the resources they document. The documentation consists of measured drawings, large format photography and detailed history statements. Transmitted and stored at the Library of Congress for public access, HABS/HAER/HALS documentation can be viewed through the American Memory website: http://memory.loc.gov/ammem/collections/habs_haer/. The HABS/HAER/HALS programs document resources inside and outside NPS units but represent a wealth of information useful to parks and regions. It is often important to know what resources have been documented, what documentation exists and where the documented resources are in relationship to an individual park or region.

These documentation programs represent some of the oldest historic preservation efforts within the NPS, with HABS originating in the 1930s as part of New Deal legislation. Collecting locational information has not always been a priority, and unfortunately many of the resources first documented by HABS no longer exist to generate a location indicating where they once stood. Some early records track latitude/longitude coordinates, some later records track UTM coordinates but the majority do not track any specific location, other than a nearby town, making the creation of GIS data difficult.

The same procedures used to create point data for the National Register data can be followed for HABS/HAER/HALS resources where coordinate pairs exist, whether as UTM or latitude/longitude. Unlike the National Register however, a single point represents each HABS/HAER/HALS resource. HABS/HAER/HALS now requires all documentation to contain latitude/longitude locations in the form of decimal degrees, documented with the correct datum.

This should allow users to incorporate new data easily into the cultural resource standards, without the same processing.

Many records only identify a vicinity or nearby town. Public data or locations gathered using internet-based geographic search engines could provide more detailed point locations. The feature level metadata fields in the standards will allow users to identify that these points represent vicinities as opposed to more detailed locations, and will allow users to specify to source of the location data.

Note: Similar to the National Register, most park and region applications will use a single HABS/HAER/HALS data set, as opposed to multiple data layers based on resource type. The Cultural Resource Subcommittee recognizes that parks/regions may find it more practical to create a single point or polygon data layer for any cultural resource data in daily use. When transferring or sharing data however, those single data layers (feature classes or shapefiles) can easily be placed in the appropriate feature class or shapefile to meet the cultural resource spatial data transfer standards.

- Internal NPS Databases

Internal NPS databases, such as ASMIS, the List of Classified Structures (LCS) or the Cultural Landscapes Inventory (CLI), are not available to the public. Data contained within these databases may be available to an individual park or region, with the national dataset managed at the Washington office. Use and availability of these data are frequently restricted to the resource specialists or particular users. Although internal to the NPS, they work in the same way, storing coordinate pairs in the database as their locational data.

Some parks or regions may keep additional GIS points, lines and polygons that relate to records in these databases, but that varies from park to park and among the regional offices. Some regions have Archaeological Centers (Midwest and Southeast) which may have much more detailed GIS data for their ASMIS records. Most parks only have access to the data within these databases that relate to their park. Regional offices should have access to the larger database.

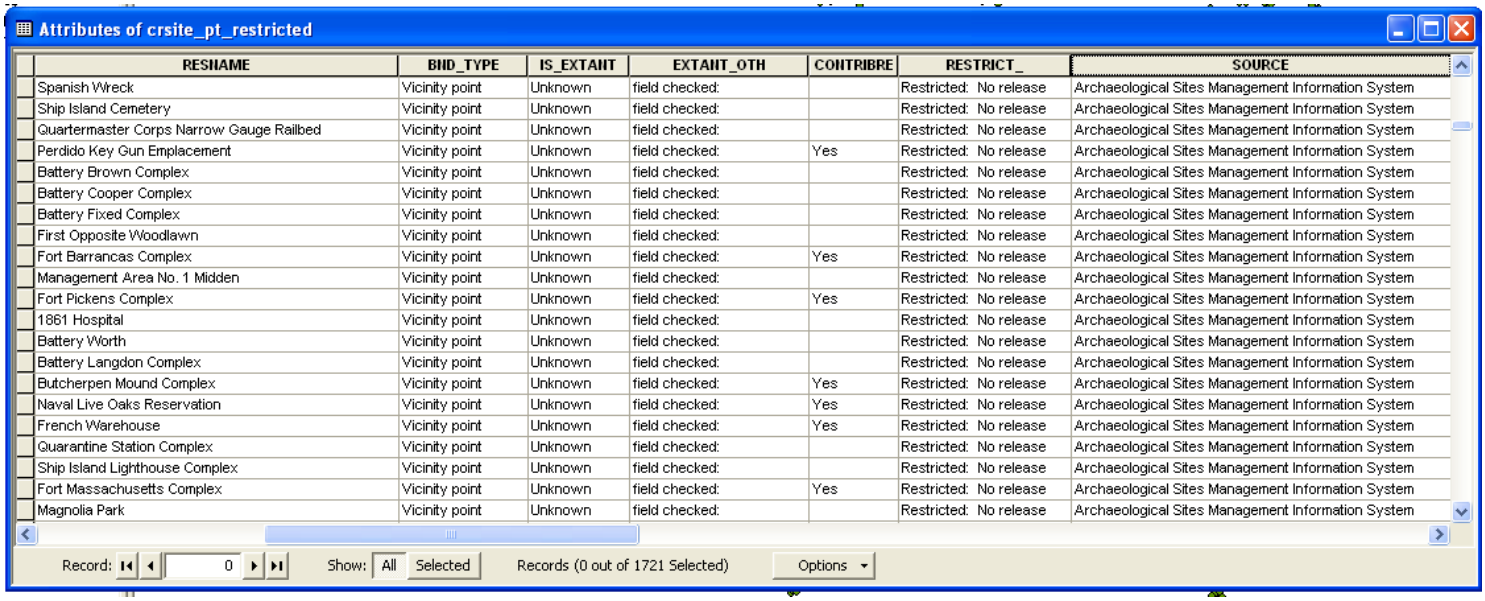
Legacy data migrated into the standards by CRGIS will include the internal NPS databases, however many parks maintain inventories of resources not included in these central databases. If this data is referenced by the internal NPS databases, it will be migrated by CRGIS. Migrating any other legacy data would be the responsibility of an individual park or cultural resource specialist who maintains that data. Many of these types of resources remain in park databases because of their sensitive nature and their locations may be restricted and should not be released to the public or even to unauthorized users in the park or region. The Restrict field should help identify those sites which are the most sensitive and how to appropriately share that data when necessary.

Because the internal NPS databases, where they do record locations, often keep UTM coordinate pairs like the National Register or other external databases, the same procedures used to create point data can be followed. Most of the internal NPS databases will store a single point, as opposed to bounding coordinates, but some do have bounding coordinates. Some parks or regions do have specific GIS data in the form of point, line or polygon shapefiles or

GeoDatabase feature classes for these NPS cultural resources which can be directly incorporated into the implementation model.

Some parks may keep different forms of resource information, dividing archaeological site data into sites, features, artifacts, or isolated finds for instance. These resources may not all be included in the national databases, but they remain important for park resource management. These can all fit into the cultural resource standards using a combination of the Historic Site Point, Line and Polygon feature classes with the Cultural Resource Other Point, Line and Polygon feature classes.

- An example from Carlsbad Caverns (Brigid Shaw, GIS Specialist):"Primarily the organization of data among feature classes [in the standard] was not relevant to the data we store at this park. CAVE uses general archaeological classifications for cultural resource data – sites, features and artifacts. After consultation with CAVE's cultural resources specialist, it was decided that preserving these classifications made sense for the cultural resources at this park, so we decided to keep this data structure instead of storing data in the data standards for in-park use. For any inter-park communication we use the data for, sites and features will be merged into Historic Site Point, Line and Polygons, and artifact files will be renamed Cultural Resource Other Point, Line and Polygon."


Attributes of crsite_pt_restricted

RESNAME	BND_TYPE	IS_EXTANT	EXTANT_OTH	CONTRIBRE	RESTRICT_	SOURCE
Spanish Wreck	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Ship Island Cemetery	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Quartermaster Corps Narrow Gauge Railbed	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Perdido Key Gun Emplacement	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
Battery Brown Complex	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Battery Cooper Complex	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Battery Fixed Complex	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
First Opposite Woodlawn	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Fort Barrancas Complex	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
Management Area No. 1 Midden	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Fort Pickens Complex	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
1861 Hospital	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Battery Worth	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Battery Langdon Complex	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Butcherpen Mound Complex	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
Naval Live Oaks Reservation	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
French Warehouse	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
Quarantine Station Complex	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Ship Island Lighthouse Complex	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System
Fort Massachusetts Complex	Vicinity point	Unknown	field checked:	Yes	Restricted: No release	Archaeological Sites Management Information System
Magnolia Park	Vicinity point	Unknown	field checked:		Restricted: No release	Archaeological Sites Management Information System

Record: 0 Show: All Selected Records (0 out of 1721 Selected) Options

Note: Users will need to talk with the cultural resource specialists in the park or region to determine how they track their ASMIS data and corresponding archaeological site location data to determine what the best approach is. If your park/region requires a different data structure other than what is contained within the implementation model, please continue to use what suits your daily needs the best. However, when you share park ASMIS data with the regional or national office, it will need to be in the structure laid out by the cultural resource spatial data standard. Tools can be created to help automate the process of moving between a park oriented data set and the cultural resource spatial data standards.

If an individual park enters isolated finds into ASMIS, these may be classified as, "Cultural Resource Other," as CAVE has demonstrated. If a park aggregates portions of sites or creates

sub-sites in ASMIS, the sub-sites will be classified as a site and the aggregate could be classified as a district or a site polygon. Users could indicate a sub-site by listing the record as a contributing element and using the CR_Link table to connect the sub-site to the larger site with GUIDs. Not all parks or regions collect information on isolated finds or divide sites up into sub-sites. The user will need to talk with the archaeologists in the park to determine how best to handle their own ASMIS records.

Conclusion

The cultural resource spatial data transfer standards, formally adopted by the NPS GIS Council in February 2010 represent the work of park, regional, and program level cultural resource as well as GIS specialists over an 8 year period. Extensive testing of the standards and the accompanying GeoDatabase implementation model, prior to implementation refined and improved the tools available to comply with the standards. Since the initial implementation effort began, additional changes have been made to the GeoDatabase implementation model and are reflected here in the guidance document. The guidance document associated with the standards is intended to serve as a reference for those who wish to understand the standards, how to comply with the standards, and the roles of the various offices within the NPS responsible for implementing the standards.

The cultural resource spatial data transfer standards outline a minimum amount of feature level metadata required to describe the quality of our cultural resource spatial data and the appropriate use of that data. Individual parks, regions and programs may add to these standards to suit their own needs. Additionally, individual parks, regions and programs may find it necessary to adjust the GeoDatabase template to fit a specific project or their own needs. The standards are intended to facilitate the exchange of good quality spatial data and remain flexible enough to accommodate these types of changes.

Although intended to help with the exchange of cultural resource spatial data, the GeoDatabase implementation model provides an important tool for the management of cultural resources and the data we keep about those resources. Integrating the various cultural resource databases which exist with the NPS has long been a goal of the cultural resource program. Until the advent of GeoDatabases and the ability for cultural resource specialists to take advantage of the power of GIS, a single monolithic database was the only perceived solution.

Today, cultural resource specialists have the flexibility, power and means to integrate all of the separate cultural resource databases through GIS and using the cultural resource spatial data standards without having to alter their daily activities or redesign their databases. These databases serve important purposes for cultural resource programs and document a perspective on each cultural resource. Integrating the databases using the standards, the GeoDatabase and GIS means little or no change to these databases, but a great deal of value added to the analysis of these programs, their effectiveness and their ability to communicate with various audiences. Additionally, NPS staff can better manage the resources themselves and the cultural resource programs.