WILDERNESS SPATIAL DATA TRANSFER STANDARDS – GUIDELINES FOR USE AND IMPLEMENTATION

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1 Wilderness Spatial Data Standard Guidelines Executive Summary

Protecting, managing and preserving our wilderness areas is a National Park mandate and remains fundamental to our understanding of the nationally significant landscapes we steward. The ability to use geographic information systems (GIS) to help manage all aspects of park operations, including wilderness areas, provides the National Park Service with a powerful tool. In order to take advantage of this tool to adequately plan and maintain wilderness data among other daily activities, we must maintain accurate spatial information for wilderness areas.

The National Park Service Wilderness Spatial Data Standards are intended to provide a framework for organizing our wilderness spatial data, documenting its lineage and facilitating data integration as well as data sharing. The standards will help insure spatial data consistency, quality and accuracy and will assist in program

direction, reporting and information requests.

As a spatial data standard, the standards address two wilderness data types: Legislated Wilderness and Other Categories of Wilderness. 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 standards document is an adopted NPS GIS data standard. This standard is sponsored by the NPS Wilderness Stewardship Division.

- For information on the history of the wilderness spatial data, see the *Background* section.
- For information on what a spatial data standard is, as opposed to a data content standard or other forms of standards see the *Definition of a Spatial Data Standard* section.
- For information on what the wilderness spatial data standards contain and define, see the *Contents of the Wilderness 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 Wilderness Standards Apply To* section.
- For a detailed summary of the feature level fields and their potential values, see the *Feature Level Field Definitions, Potential Values and Examples* section.
- For commonly asked questions regarding the specifics of migrating data into the standards, see the *Frequently Asked Questions* section.
- For an explanation of the GeoDatabase data model and how it works in conjunction with the wilderness spatial data standards, see the *Introduction to the Implementation Model* section.
- For an explanation of how the use of the implementation model can improve wilderness 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 wilderness 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 attributes required as part of the wilderness spatial data standard, see the *Completing Feature Attribution* section.
- For an overview of the plans to implement the wilderness spatial data standards at park, regional and program levels, see the *Wilderness Spatial Data Standards Implementation Plan* section.
- For a detailed explanation of the plans to migrate legacy wilderness data into the standards, see the *Migrating Legacy Data into the Standards and Implementation Model* section.
- For a detailed explanation of how to access and use the wilderness data once it has been migrated into the national dataset, see the *Accessing and Using the Data* section.
- For a detailed explanation of how to update the national dataset, see *Updating the National Dataset* section.
- To find help, guidance and technical support in creating data, migrating data or complying with the wilderness spatial data standards, see the *Assistance and Guidance Available to Assist in Complying with the Standards* section.
- For definitions of terms used throughout the Guidelines and with the wilderness areas management, as well as GIS disciplines, see the *Glossary of Terms* section located under *Appendices and Other Implementation Documents*.

The wilderness spatial data standards are intended to be flexible enough to meet the daily needs of resource managers. Using the wilderness 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.

2 Wilderness Spatial Data Standards Introduction

Few of the NPS programs provide guidelines regarding what kind of spatial 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 (polygons), and a standardized method of documenting where that data originated, how it originated and how it can be used, allows all resource specialists throughout the NPS programs to share data more effectively and use that data for planning, compliance as well as protection of these important resources.

2.1 Background

The wilderness spatial data standard was originally developed by the NPS Wilderness Working Group in January 2010. The group approved the legislated wilderness standard, but, tabled the "future" (changed to other categories of wilderness). At that time the other categories of wilderness standard was not put forward for approval by the NPS GIS Council. A Standards Development Team (SDT) was brought together in December of 2013 to update the other categories of wilderness standard and to receive approval from the NPS GIS Council. The wilderness data standards was developed to provide resource specialists with guidelines for maintaining a current, accurate representation of legislated wilderness areas and other categories or wilderness for national reporting and a variety of mapping and analytical requirements at all levels of the National Park Service. In addition to maintaining accurate spatial data for legislated wilderness areas, it is also important to maintain and track lands with other categories or wilderness which have potential of becoming a legislated wilderness area in the future, under the Wilderness Act of 1964.

The Wilderness Act of 1964, was created to establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes. If certain lands meet a specific criterion, the National Park Service may submit those lands to the United States Congress to become recognized as federally designated wilderness areas.

An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvement or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

2.2 Definition of a Spatial Data Standard

The NPS wilderness standards represent a spatial data standard, as defined by the Standards Development Team. Spatial data standards focus on reporting what the data contains. The format of a data 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 standards do provide the necessary structure to exchange data relating to the same subject.

2.3 Purpose and Benefit of Using the Standard

The purpose of creating and utilizing such wilderness spatial data standards is to consolidate our wilderness spatial data and integrate the existing feature attribute information into a national database for reporting and planning purposes.

The primary benefit of using the wilderness spatial data standards remains the organization and documentation of wilderness 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 wilderness data in any application they may need. Visualizing trends in wilderness data geographically through a GIS and accessing all available descriptive information at the same time, without needing to physically combine databases creates a powerful management tool. In this way, planners, resource managers, and superintendents can bring all of the various perspectives which may relate to a single wilderness area together via 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 wilderness standards will lead to more comprehensive access to all of our available wilderness data and provide a more integrated approach to wilderness data management across the NPS and at all levels: park, region and program.

As 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 Wilderness Stewardship Division to report effectively and accurately to the United States, Congress on the status of wilderness lands, as well as, submit any new areas for future designations.

2.4 Contents of the Wilderness Spatial Data Standards

In order to accommodate the needs of resource managers and gain the most benefit from integrating wilderness data, the wilderness spatial data standards address two aspects of wilderness data: descriptive information of the data (attributes) and the physical parameters of the spatial data. The attributes of the data can be found integrated as part of the database structure for both Legislated Wilderness and Other Categories of Wilderness. Each layer has information about the type of wilderness area, the status of the wilderness area, the common name associated with the wilderness area, etc.

In addition to the attributes, each layer will also have metadata, which is often referred to as, “data about your data”. Metadata 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 and level of accuracy to insure that data can be shared, integrated and combined into a single spatial data layer if necessary.

Other content issues relate to the relative accuracy of the spatial data created and incorporated into the wilderness spatial data layers themselves. In order to capture the best possible data to spatially represent wilderness areas, new data should be derived from surveys if available, or data sources accurate to within 10 meters. The minimum accuracy of the wilderness data should be reported in ground distances at the 95% confidence level, following the FGDC National Standard for Spatial Data Accuracy.

2.5 Who the Data Standards Apply To

If the goal of creating the wilderness spatial data standards is to promote the sharing of more accurate, reliable and authoritative wilderness spatial data for the purposes of resource stewardship within the NPS, then the standards apply to anyone creating or collecting wilderness 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 wilderness areas, spatial data should be created for that resource that meets the standards. Similarly, legacy data stored in an existing database, should be converted into spatial data (polygons) that meet the standards, bearing in mind the accuracy exceptions for this older data.

As a result, 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 can assist resource specialists in achieving this goal.

The wilderness spatial data standards are intended to serve as a starting point, or a minimum requirement for NPS wilderness spatial data. If resource specialists require additional descriptive information for a specific project, the standards remain flexible enough to accommodate specific applications.

3 Organization of the Wilderness Spatial Data Standards

The NPS wilderness spatial data standards do not specify a particular format for spatial data. To accommodate the various methods that parks, regions and programs may already be using to create and store wilderness spatial data, the standards have been organized around individual data layers, rather than a particular file type. The template geodatabase that is provided could be used in other formats as long as the field types and domains are consistent.

The wilderness types and spatial data types include:

- Legislated Wilderness Polygon

A single layer representing the current extent of Congressionally-designated wilderness and Congressionally-designated potential wilderness on NPS managed lands, as well as inholdings within the designated wilderness boundary that may be transferred to designated wilderness status without further Congressional action upon acquisition by NPS.

- Other Categories of Wilderness Polygon

These are lands the National Park Service manages that are not legislated wilderness, but which contain wilderness character. Many of these areas are candidates to become wilderness in the future, and it's often necessary to track where these areas are in that process. These categories are from NPS Reference Manual #41 – NPS Wilderness Land Status Definitions – March 2013: http://wilderness.nps.gov/RM41/5_IDandDesignationofWildernessResource/NPSWildernessLandStatusDefinitions.pdf

In order to further standardize the wilderness spatial data to accommodate data sharing and to make completing the attributes 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 SDT, these attributes, and their associated menu or *domain values* have been reviewed by NPS Wilderness Working Group to determine the minimum necessary information required to document and identify the appropriate uses of the data.

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, there is an "alias" for each field name. As a result, when viewing the attribute tables in the GIS, users will not see, "Feat_Type," but will see, Feature Type."

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 wilderness spatial data, however to comply with the standards users must input data only in the required fields.

3.1 Feature Level Field Definitions, Potential Values and Examples

The SDT designed each of the attribute fields to contain specific information to assist those who might use the spatial data in understanding what the spatial data represents, when it was created, whether it has been edited, whether the spatial data is restricted, etc. Detailed definitions describing what the group 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 wilderness data into any of the various data layers.

Standard fields and definitions for the wilderness data layers (shared between both layers):

Field Name	**GeometryID** (Mandatory)
Alias	Geometry ID
Type/Width	String, 50
Description	The GeometryID represents a unique identifier for the wilderness data layers 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. The length and variation in the identifier virtually guarantees its uniqueness helping to insure that each one of the data elements 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 features or external NPS database. In order to accomplish this, a single unique identifier must be assigned for each point, line or polygon used in the implementation model. This guidance document contains information regarding methods of generating these GUIDs automatically (see the implementation model discussion below).
Values	Example of a GUID: {53D8A74E-AD5A-460A-BA71-D79CE2641AAA}

Field Name	**Restriction** (Mandatory)
Alias	Restriction
Type/Width	String, 3
Description	The Restriction field is intended to allow users to indicate if the spatial data related to a specific feature should be restricted from release to other parties or general distribution. The Restriction field provides a finer level of detail for restricting spatial data that the entire dataset.
Values	Domains: Unrestricted Restricted - No Third Party Release Restricted - Originating Agency Concurrence Restricted - Affected Cultural Group Concurrence Restricted - No Release Unknown

Field Name	**UnitCode** (Mandatory)
Alias	Unit Code
Type/Width	String,10
Description	The UnitCode field is intended to allow users to identify the National Park that a

	particular resource may lie within. Some data collected and maintained by National Park Service may inventory resources outside NPS property or responsibility. As a result, data entry into the UnitCode is mandatory only if applicable, or if the specific resource lies within a National Park. To make data entry easier, the UnitCode 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.
Values	Domains: ACAD - Acadia National Park ADAM - Adams National Historic Site AFAM - African American Civil War Memorial AFBG - African American Burial Ground Memorial Etc.

Field Name	**GroupCode** (Mandatory)
Alias	Group Code
Type/Width	String, 10
Description	The GroupCode field is intended to allow users to indicate the NPS unit code of the NPS unit responsible for administering the unit identified in the UnitCode 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 data collected and maintained in NPS databases fall within a National Park unit, data entry into the field remains optional. The GroupCode field uses the same set of domain values used for the UnitCode field, including all possible park units.
Values	Domains: ACAD - Acadia National Park ADAM - Adams National Historic Site AFAM - African American Civil War Memorial AFBG - African American Burial Ground Memorial Etc.

Field Name	**RegionCode** (Mandatory)
Alias	Region Code
Type/Width	String, 4
Description	The RegionCode field is intended to allow users to identify the region of the country that a particular National Park may lie within. Some data collected and maintained by National Park Service may be managed by region as opposed to the individual park. As a result, data entry into the RegionCode is mandatory. To make data entry easier, the RegionCode field may select region unit names from a domain that contains all of the region codes in the country.
Values	Domains: IMR – Intermountain Region

	PWR – Pacific West Region MWR – Midwest Region NER – Northeast Region Etc.

Field Name	**Acres_Calc** (Optional)
Alias	Calculated Acreage
Type/Width	Double, 13 (Decimal, 1)
Description	The GIS_Acres field contains the acre value for the polygon feature that is calculated by the GIS software. This may be different than the legal acreage for an area due to projection issues.
Values	Example: 5010.5

Field Name	**CreateName** (Mandatory)
Alias	Create Name
Type/Width	String, 50
Description	The CreateName field is intended to allow users to document the name of the individual who created the point, line or polygon, associated with the CreateDate. Because resource and GIS 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 its original creation, this field may be left blank. The CreateName field is a free text field to accommodate any text entry for the name of the editor.
Values	Create Person

Field Name	**CreateDate** (Mandatory if Applicable)
Alias	Create Date
Type/Width	Date
Description	The CreateDate field is intended to allow users to enter the date the point, line or polygon was initially created. Because NPS 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 field is configured as a date field, as opposed to a text or number field. Date field storage format depends on the underlying database.
Values	Example: 7/24/2005

Field Name	**EditName** (Mandatory)
Alias	Edit Name
Type/Width	String, 50
Description	The EditName field is intended to allow users to document the name of the individual who created the point, line or polygon, associated with the EditDate.

	Because resource and GIS 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 its original creation, this field may be left blank. The EditName field is a free text field to accommodate any text entry for the name of the editor.
Values	Edit Person

Field Name	**EditDate** (Mandatory)
Alias	Edit Date
Type/Width	Date
Description	The EditDate field is intended to allow users to enter the date the polygon was initially created. Because NPS 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 field is configured as a date field, as opposed to a text or number field. Date field storage format depends on the underlying database.
Values	Example: 7/24/2005

Field Name	**Name** (Mandatory)
Alias	Name
Type/Width	String, 50
Description	The Name field is intended to allow users to identify the name of the wilderness area or the common name of the area. Enter name as a text string.
Values	Wilderness Area Name

Field Name	**Description** (Mandatory if Applicable)
Alias	Description
Type/Width	String, 255
Description	The Description field is intended to allow users to add suggested values and free text for use by park staff. May also be used to describe particular characteristic of the wilderness area, such as whether it is frequently subject to change.
Values	Description

Field Name	**Metadata ID** (Optional)
Alias	Metadata ID
Type/Width	String, 38
Description	The Metadata ID field is the foreign key to link with the primary key and metadata record in associated metadata. It uses a Globally Unique Identifier (GUID) for linking with associated metadata file(s).
Values	Example of a GUID: {53D8A74E-AD5A-460A-BA71-D79CE2641AAA}

Field Name	**Notes** (Optional)
Alias	Notes
Type/Width	String, 255
Description	The Notes field is intended to allow users to create notes or remarks that are needed to understand unusual or important aspects of the spatial data. Enter free text.
Values	Notes

Fields and definitions added to the standard group, specific for the Legislated Wilderness layer (see list of fields for each feature class above).

Field Name	**Feat_Type** (Mandatory)
Alias	FeatureType
Type/Width	String, 50
Description	The Feature Type field is intended to allow users to identify the type of congressionally designated wilderness area. To make data entry easier, the Feature Type field may select values from a domain that contains all of the congressionally designated codes for each wilderness area.
Values	Domains: Designated Potential Transferable Wilderness Inholding

Field Name	**Year** (Mandatory)
Alias	Year
Type/Width	String, 4
Description	The Year field is intended to allow users to identify the year of the most recent congressional designation. Enter the four-digit year.
Values	Example: 2005

Field Name	**Acres_Legis** (Mandatory, if applicable)
Alias	Acres_Legis
Type/Width	Double, 13 (Decimal, 1)
Description	The Acres_Legis field is intended to allow users to identify the size of the legislated wilderness area in acres. This may be updated with a calculated acreage if such calculation has been reported to Congress as the official wilderness acres.
Values	Example: 5010.5

Field Name	**Public_Law** (Mandatory)
Alias	Public_Law

Type/Width	String, 255
Description	The Public Law field is intended to allow users to identify the public law numbers referring to the legislation creating the wilderness area, and subsequent revisions, including the years enacted. The unique reference number of the public laws followed by the relevant calendar year for each public law. Additional public law number and years are separated with semi-colons.
Values	

Field Name	**Unit** (Optional)
Alias	Unit Name
Type/Width	String, 255
Description	The Unit Name field is intended to allow users to identify the full name of the NPS organization unit. Enter in the organizational place name in free text. This is an optional field.
Values	

Fields and definitions added to the standard group, specific for the Other Categories of Wilderness layer (see list of fields for each feature class above).

Field Name	**Feat_Type** (Mandatory)
Alias	Feature Type
Type/Width	String, 50
Description	The Feature Type field is intended to allow users to identify the other categories of wilderness areas. To make data entry easier, the Feature Type field may select values from a domain that contains all of the other categories for each wilderness area.
Values	Unassessed Eligible Proposed Proposed Potential Recommended Recommended Potential Other Wilderness Type

Field Name	**Year** (Mandatory)
Alias	Year
Type/Width	String, 4
Description	The Year field is intended to allow users to identify the year of the most recent land status change or boundary/area modification. Enter year as a text string.
Values	Example: 2005

Field Name	**NameOfAssociatedWilderness** (Optional)
Alias	Name of Associated Wilderness

Type/Width	String, 255
Description	The NameOfAssociatedWilderness field is intended to allow users to enter the name of the wilderness area that is associated with the feature. It could be an inholding or a proposed addition to an existing wilderness area.
Values	Example: Free text

4 Complying with the Standards

Storing the wilderness data in the adopted GeoDatabase format with the spatial parameters outlined, as well as creating new wilderness spatial data based on the accuracy defined in the standards constitutes the majority of the task for complying with the standards.

The Standards Development Team (SDT) together with several parks and regional offices, has conducted several tests and embarked on projects to convert legacy wilderness 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 wilderness data and move it into the standard format.

4.1 Frequently Asked Questions

4.1.1 Why are there different data layers referenced in the wilderness spatial data standard?

It is important to make the distinction between Legislated Wilderness and Other Categories of Wilderness. Legislated Wilderness represents congressionally-designated wilderness, congressionally-designated potential wilderness, and inholdings within the designated wilderness boundary that may be transferred to designated wilderness status without further Congressional action.

Whereas, Other Categories of Wilderness are areas that are not legislated wilderness, but contain wilderness character. Many of these areas are candidates to become wilderness in the future.

4.1.2 Is the horizontal accuracy the same for both, legislated wilderness layer and other categories of wilderness layer?

Legislated wilderness should be as accurate as possible, derived from surveys if available, or data sources accurate within 10 meters. The minimum accuracy of the layer should be reported in ground distances at the 95% confidence level, following the FGDC National Standard for Spatial Data Accuracy.

Because data depicting other categories of wilderness areas may be derived from many sources, some of which may be poor quality, no minimum standard for positional accuracy is prescribed here. However, it is desirable that data should be as accurate as possible, and that the accuracy should be reported in ground distances at the 95% confidence level, following the FGDC National Standard for Spatial Data Accuracy.

4.1.3 Is the projected coordinate the same for both, legislated wilderness layer and other categories of

wilderness layer?

Both layers are stored nationally in the geographic coordinate system, GCS_WGS_1984. However, locally maintained data can use a different geographic coordinate system, such as UTM.

4.1.4 What is the difference between the Acre_Legis field and the Acre_Calc field in the legislated wilderness layer?

The Acre_Legis field is the legislated acreage. It is the actual size of legislated wilderness area in acres. This may be updated with a calculated acreage if such calculations have been reported to Congress as the official wilderness acreage.

The Acre_Calc field is calculated acreage based on spatial data representation of features. This field will not be published for use outside NPS.

4.2 Adding Additional Fields

Not included in the "Frequently Asked Questions," but an issue that is often raised by those testing or using the wilderness spatial data standards is whether additional descriptive fields of information can be added. The fields described in this guidance document represent the wilderness data standards minimal requirements and additional fields can be added to meet the park and regional needs.

5 Supporting Implementation Data Model for the Standard

5.1 Introduction to the Implementation Model

The wilderness spatial data standards are intended to apply to any spatial data or spatial data type, including shapefiles, feature classes, GeoDatabases and others.

In order to assist resource specialists comply with the standards, a GeoDatabase template or implementation model has been created. Within the model all of the fields have been created, defined and assigned domain values where appropriate. In addition, each of the 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. The data model is intended to be a tool for users to assist them in moving their existing spatial data into compliance with the standards and to allow for the easiest possible data entry. Users my use other storage options for the data as long as exchange occurs using the same data structure.

5.2 General Structure of the Implementation Model

The wilderness spatial data standard implementation model contains two feature classes. The two primary layers are Legislated Wilderness and Other Categories of Wilderness. The Legislated Wilderness layer includes only areas that have been congressionally designated, whereas Other Categories of Wilderness include areas that have potential to have wilderness character.

The structure of the GeoDatabase template includes all of the fields 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 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 resource specialist may create. Resource specialists may continue to use their own shapefiles and data layers as they see fit however, or they may find that the GeoDatabase template 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 spatial data standards. A GeoDatabase diagram of both layers including the domain values can be found under section 13.2.

5.3 How the Implementation Model Works with Wilderness 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 two feature classes remain the same regardless of the data set or project. The overall goal of the implementation model is to allow

users to quickly move their legacy or new wilderness data into a structure which meets data transfer standards. As a result of fully utilizing the implementation model, users should be able to integrate their wilderness databases for individual projects, or on a larger scale for a park, region or national level. For instance, an individual park can use the implementation model to analyze new areas within the park boundary that may contain wilderness character.

5.4 How the Implementation Model can Improve Analysis Capabilities

Integrating all of the separate NPS wilderness databases through GIS and using the standards provides a great deal of value added to the analysis capabilities of these programs.

5.4.1 General GIS Project Data

Integrating the wilderness databases is needed for national reporting efforts (i.e. new areas that have wilderness characteristics) and a variety of mapping requirements, at the park, regional and national levels. Also, maintaining a current, accurate representation of lands in various stages of the wilderness assessment and designation process is needed for planning purposes.

5.4.2 Using Wilderness GIS Data in an Emergency

Access to spatial data remains a critical need during responses to any type of disaster (hurricane, flood, tornado, earthquake, or wildfire). The ability to provide digital wilderness data quickly and efficiently in response to a disaster is one of the most important and positive outcomes of generating spatial data 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 wilderness data and standardizing the structure of it make it an invaluable part of any disaster response effort. For instance, during a wildfire, accurate data on wilderness locations are critical in planning response types (chainsaw or crosscut saw).

6 Creating New Spatial Data Using the Implementation Model

The GeoDatabase template can be helpful to park, regional and program level resource specialists in a number of ways. Users may simply load their data into the established feature classes to take advantage of the simplified data entry made possible by the domains in the GeoDatabase. In other cases users may want to make use of the enhanced analysis capabilities provided by the use of the GeoDatabase structure. 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 polygons to represent wilderness areas and to incorporate them into the model.

6.1 Data Creation Methods

6.1.1 Digitizing New Polygons

The structure of the implementation model/GeoDatabase template creates Legislated Wilderness Areas and Other Categories of Wilderness. Data is stored nationally in the geographic coordinate system, GCS_WGS_1984. However, users can store data locally in any format.

Users can simply add one of the feature classes into an ArcGIS map document and begin to draw new polygons using the standard editing tools. Keep in mind background data sets, such as aerial photographs, quadrangle maps or other data should be incorporated into the same map document to facilitate the digitizing. After drawing the geographic features, users can complete the attributes for individual features or groups of features.

See the "What is Editing" section in the ArcGIS online help for more information about creating features.

6.1.2 Incorporating Data Collected with GPS

Frequently resource specialists use GPS to collect locations of the resources that they monitor, steward or discover in their work. The following sections detail some options for dealing with the various types of GPS receivers.

- Higher end GPS receivers, such as Trimble units can export data as a feature class. Users can load these feature classes directly into the appropriate GeoDatabase feature classes.
- Consumer grade GPS units like Garmin are also commonly used to collect spatial information. These GPS units can communicate with third party software like DNRGPS to export the waypoints, tracks and routes to GPX, shapefile, .csv, etc. Once the data is in these formats it can be imported directly into ArcGIS. More information about working with this type of data can be found HERE.

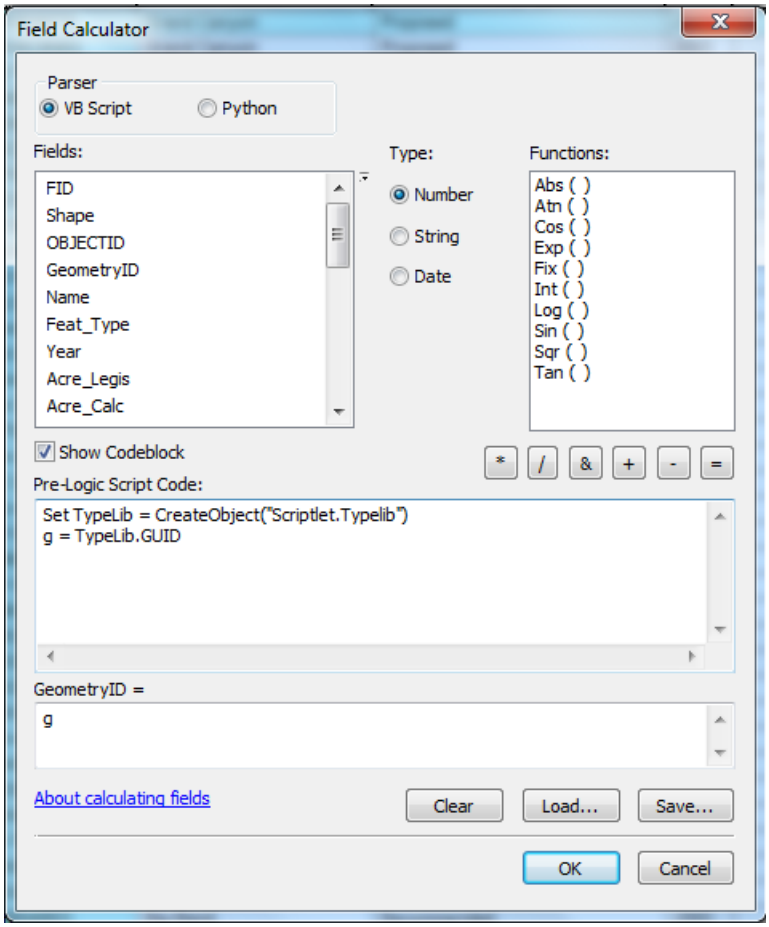
6.2 Completing Feature Attribution

Once data has been created/loaded into the appropriate feature class, users can begin to fill in the attribute information critical for compliance with the spatial data standards, and to document the quality of the data. Although the standards contain many attribute fields, many can be filled out in batch processes, taking only a few seconds to complete.

6.2.1 GUID Generation

Creating globally unique IDs remains a key element to the standards, allowing users to identify those individual wilderness areas which may appear in multiple wilderness databases through the 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.

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")

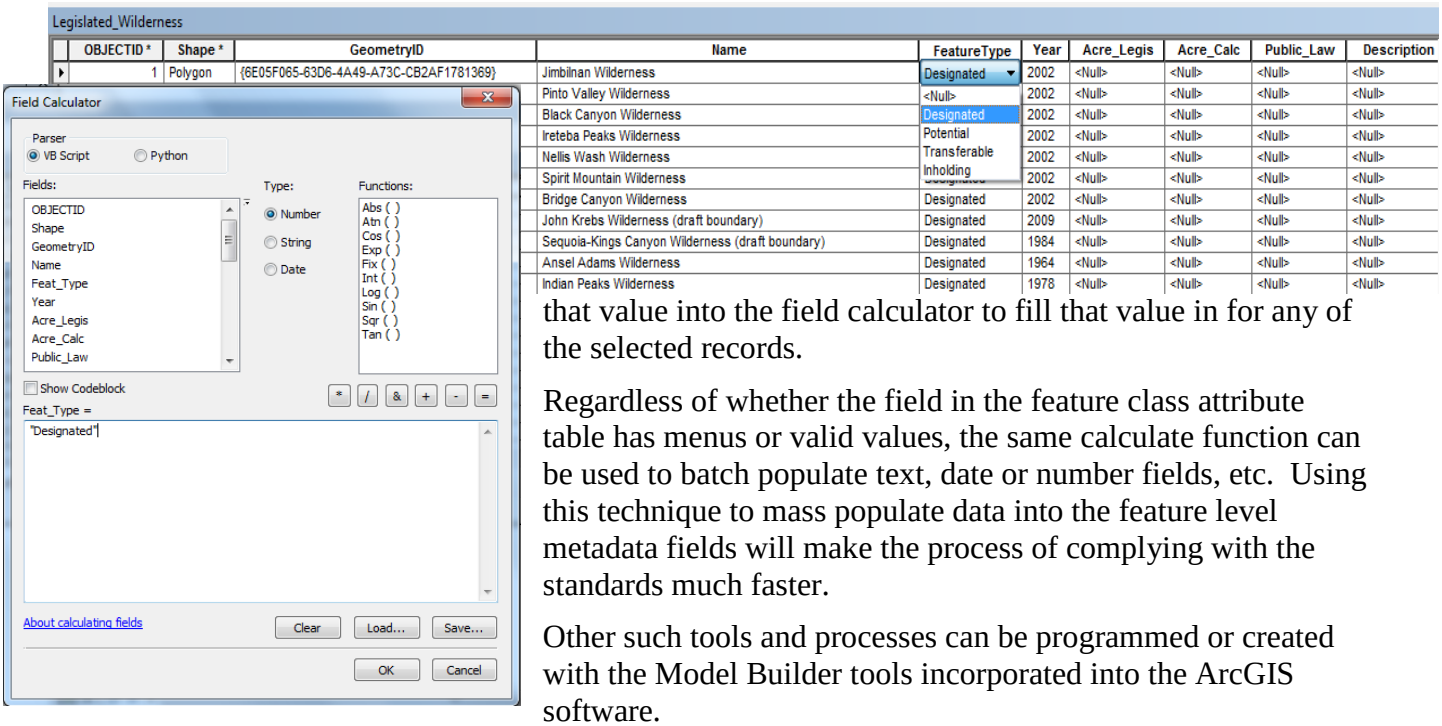
  g = TypeLib.GUID

- Type the following into the second text box: g

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 selected row 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.

6.2.2 Batch Processing

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.

Note: The domain value/code must be the same as the domain description in order for this method to work correctly.

6.3 Completing Additional Database Elements

6.3.1 Hyperlink in the feature class

The legislated wilderness layer has a hyperlink field that can be populated with a URL for a website or map service for linking to additional information regarding the specific wilderness area.

6.3.2 Populating records in related tables

Information regarding the metadata of each layer will be stored in a separate metadata table that can be linked to Legislated Wilderness layer or the Other Categories of Wilderness layer via the Metadata ID. The Metadata table will be included in the GeoDatabase template listed under section 5.1.

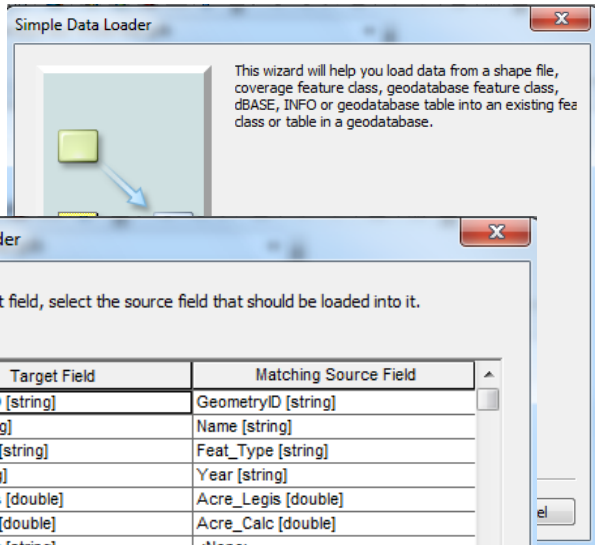
7 Migrating Legacy Data into the Implementation Model

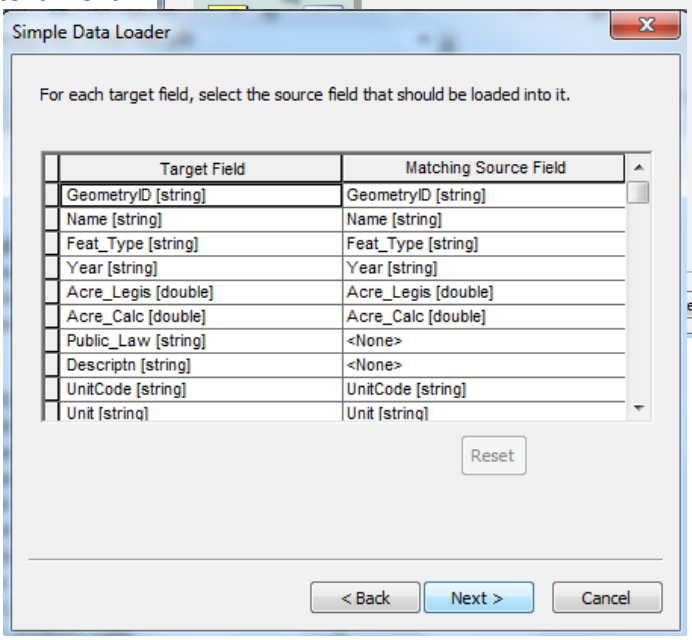
The following examples provide a general overview of how resource specialists or GIS specialist will migrate the legacy data into the standards, and how an individual park or region could do the same with their own specific databases, similar to the National repositories.

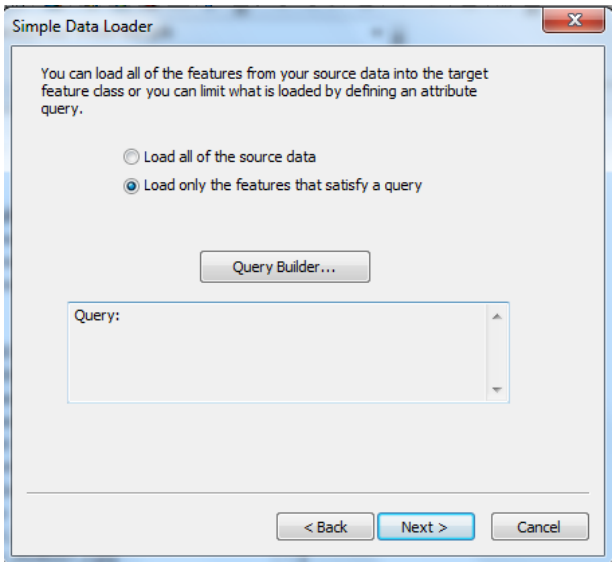
7.1 Simple Data Loader

Loading shapefiles containing the wilderness features into the GeoDatabase implementation model is a simple process:

- Create a shapefile through editing in ArcGIS, exporting from GPS or from an existing layer.
- Determine which resources in the shapefile belong in the various feature classes based on the wilderness feature type. Adding your own field to a shapefile to describe which resource type a specific resource should be associated with, 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. 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.

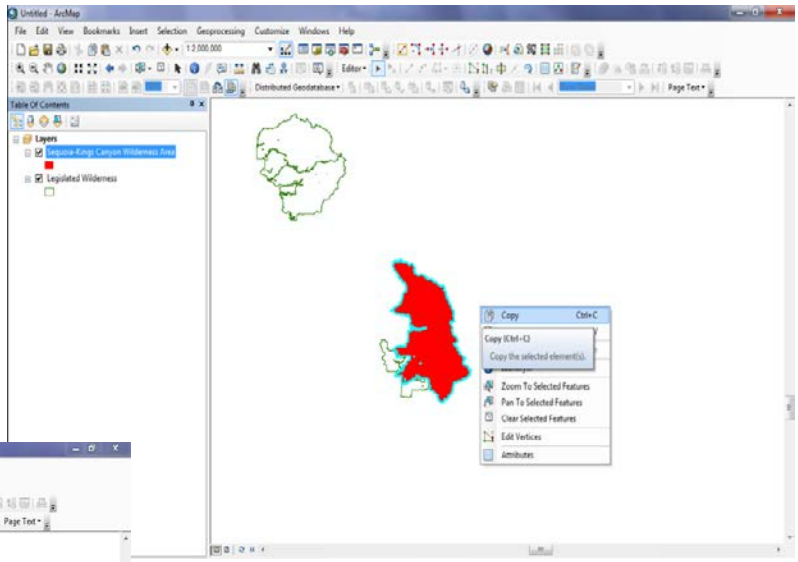
***Note**: Using the simple data loader appends or adds records into the existing feature class. Unlike an import which creates a new feature class, loading data simply adds records to the existing feature class without altering any of the fields. Users can continue to load data into the existing feature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

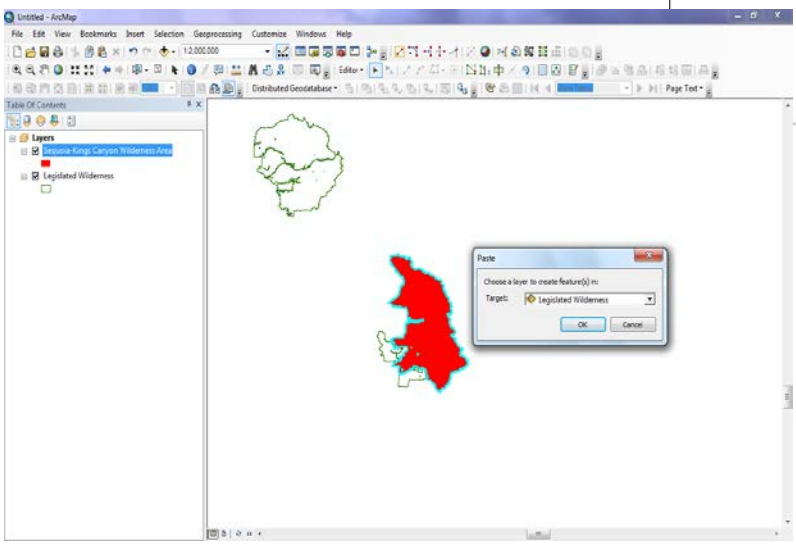
***Note**: The Standards Development Team (SDT) recognizes that parks/regions may find it more practical to create a single polygon data layer for any wilderness data in daily use. When transferring or sharing data however, those single data layers (feature classes or shapefiles) can easily be placed in the appropriate feature class or shapefile to meet the wilderness spatial data standards.*

7.2 Copy and Paste into Feature Class

Another way to migrate data into the implementation model is to use the copy/paste function in an ArcMap session.

- Create a new ArcMap session, and add the legislated wilderness area layer to map as well as the layer that will be migrated.
- Start an edit session, selecting the legislated wilderness layer as editable.
- Next, select the feature(s) from the layer that will be migrated into the legislated wilderness layer.
- Right click, select copy





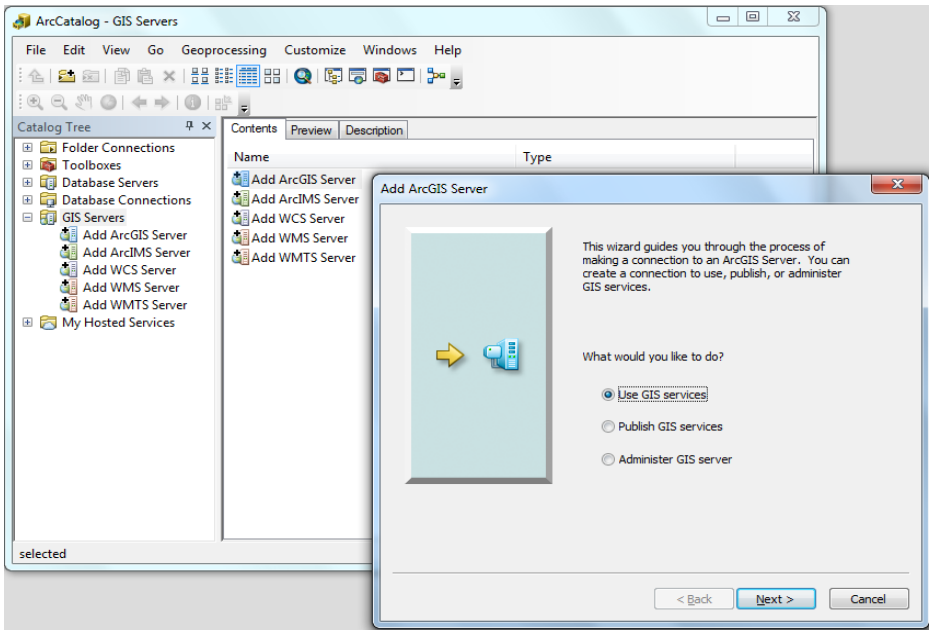
- Right click anywhere in the data frame and select paste. A paste box will appear, select legislated wilderness.
- Click, OK

Note: Copy/paste function will copy all features selected in the data frame. To ensure the correct features are copied. Unselect all features first, then manually select the features from the attribute table.

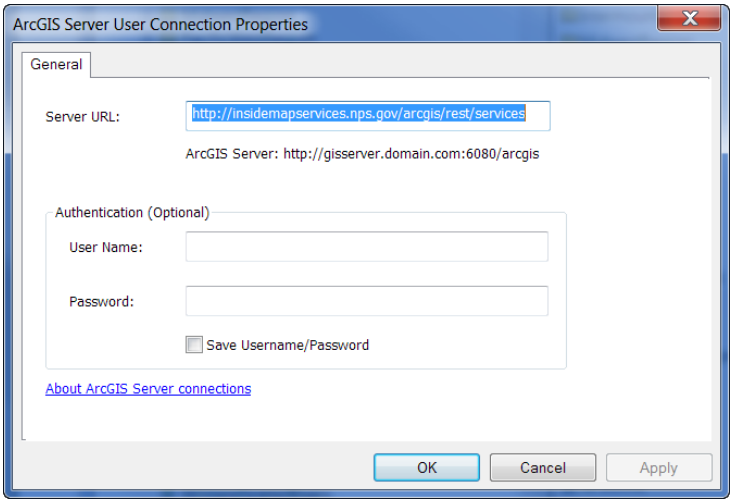
8 Accessing and Using the Data

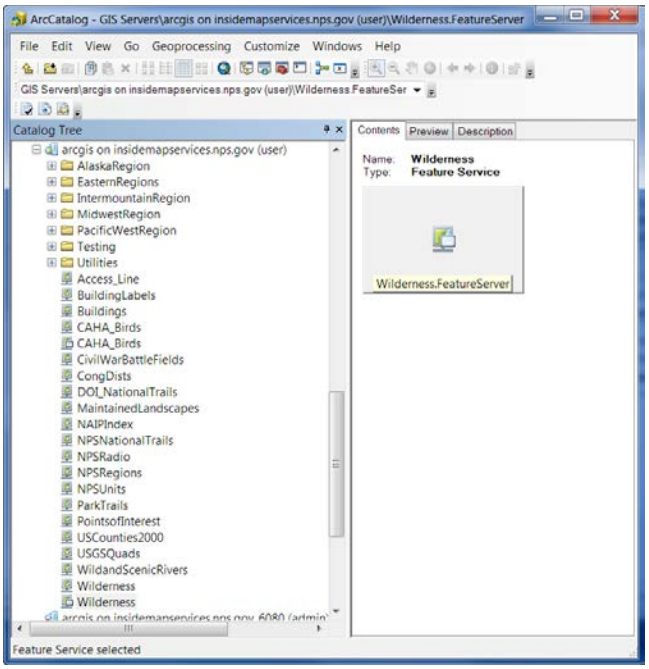
8.1 Accessing the Data

8.1.1 Access via Map and Feature Services



- Open ArcCatalog, in the Catalog Tree scroll down to GIS Servers.
- Double click on Add ArcGIS Server to open the connection wizard.
- Select Use GIS Services and click Next.
- In the Internet Server URL box chose the correct link based on ArcGIS version:
- ArcGIS 10.2: http://insidemapservices.nps.gov/arcgis/rest/services
- Make sure to leave the Authentication (optional) section blank.
- Click Finish
- "ArcGIS on inpniscvfemp7_6080 (user)" now appears in the Catalog Tree. This name can be changed to be more relevant as desired.
- Click the plus sign next to the new layer in the Catalog Tree to expand and view the data (services) available.





- The Wilderness feature services are located under the main server list. The feature service provides more options for changing symbology and using queries to limit displayed data.
- More information about editing feature services can be found on the WSD Google Site.

8.1.2 Access via SDE

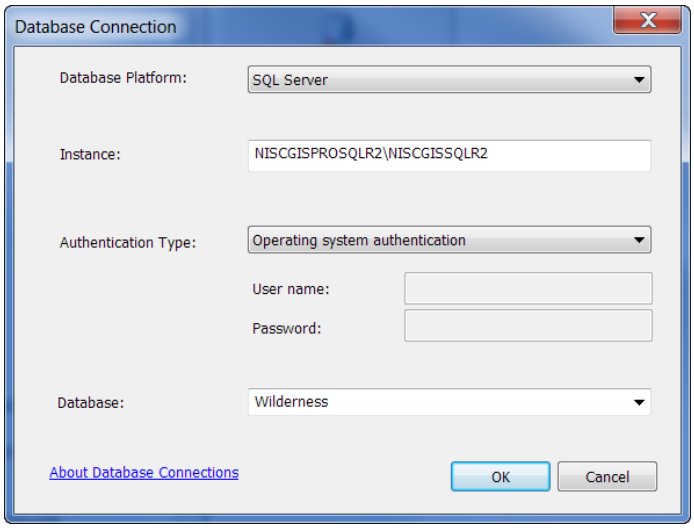
The database can also be accessed directly for certain tasks. Please use the GIS contact listed in Section 12 to inquire about access to the SDE database. Once you have secured access the SDE database information is below.

Database Platform: SQL Server

Instance: NISCGISPROSQLR2\NISCGISSQLR2

Authentication Type: OS Authentication

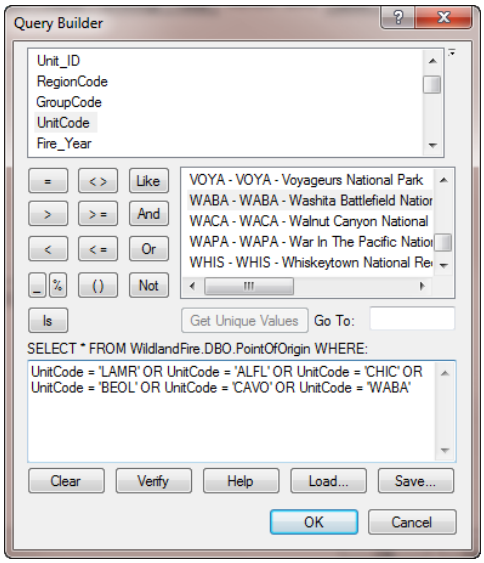
Database: Wilderness



8.2 Using the Data

8.2.1 Using Definition Queries

Definition Queries are a useful method to focus on a particular area of interest and limit data displayed on the map or in a table.

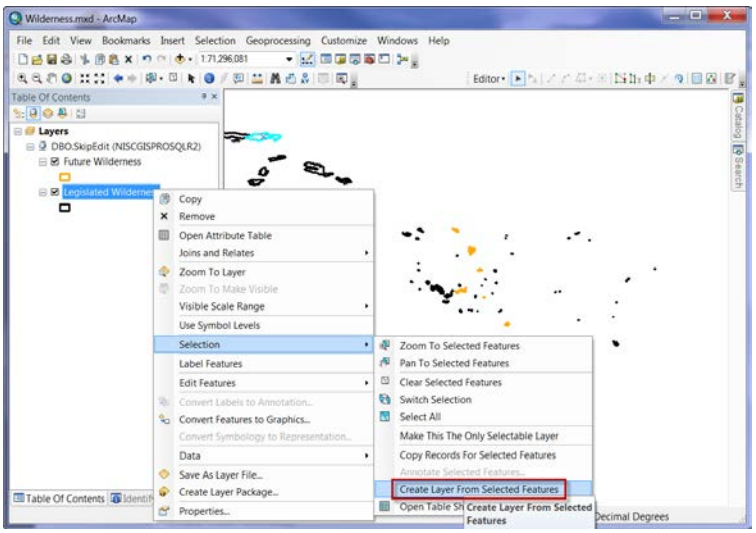


- Right click on the layer in the Table of Contents, select Properties, then select the Definition Query Tab.
- Click on the Query Builder button to open the dialog box.
- Use the UnitCode or other fields to limit data. Click on the "Get Unique Values" button to get a list of valid values for each field.
- Build an appropriate query and select OK.
- More information on Definition Queries can be found in the ArcGIS online Help.

8.2.2 Creating Layers from Selected Features

Often it will be easier to manually select features and create a new layer rather than using Definition Queries to subset the feature data. Layers based on selection sets can be stored in the map document or saved to a layer file.

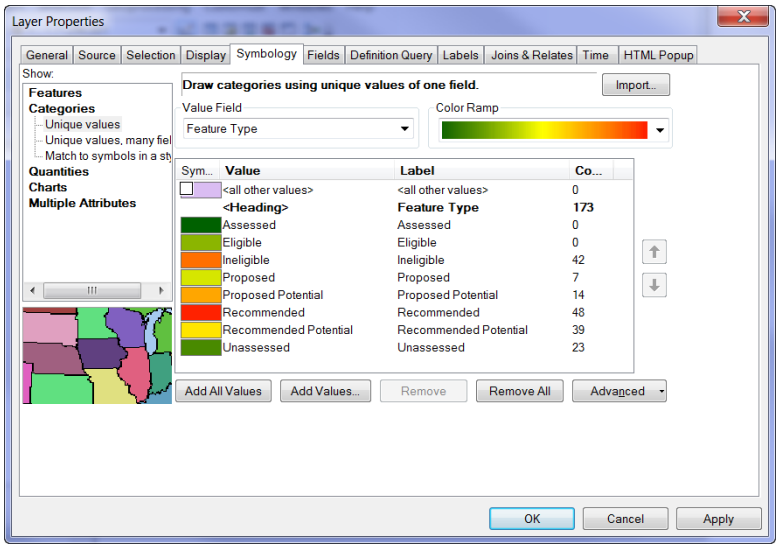
- Select features using the Select Features tool in ArcMap.
- Once the appropriate features are selected right click on the layer in the table of contents and go to Selection > Create Layer from Selected Features
- A layer will be created in the ArcGIS table of contents representing the selected features from the original layer. The original layer can now be unchecked to display the new layer. This layer persists in the map document only at this time. A layer file can be created for use in other ArcMap documents.
- For more information on working with selected features see ArcGIS online Help.



8.2.3 Symbolizing Data

The most common method of symbolizing the Wilderness feature classes is to use Feat_Type (Feature Type) to break out the classes of wilderness areas. This will provide the user with a way to see each wilderness polygon and its current status in wilderness designation.

- Right click on the layer in the Table of Contents, select Properties, then select the Symbology tab.
- On the left side of the Symbology tab in the Show: option box, select the Categories option.
- In the Value Field dropdown list select "Feature Type"
- Modify the symbology by clicking on the color patch in the Symbol column. Change the labels in the Label field.
- Click OK to apply your changes.
- For more information on Symbology see the [ArcGIS online Help](#).



9 Updating the National Dataset

Updating the wilderness data into the national dataset will be completed by the park and can be done anytime. However, the updated wilderness data will need to be submitted on a quarterly basis to the Regional Wilderness Coordinators for verification in preparation for annual Agency Financial Reports and the quarterly Heritage Asset Stewardship Land Reporting requirements. Methods of updating the wilderness data include checking out a version of the SDE database, creating a local copy from a Feature Service or direct editing of the SDE database.

9.1 Checking Out a Version of SDE

Contact the GIS administer listed in section 12 to checkout a version of the SDE database.

9.2 Creating a Local Copy from a Feature Service

9.2.1 Connect to Feature Service

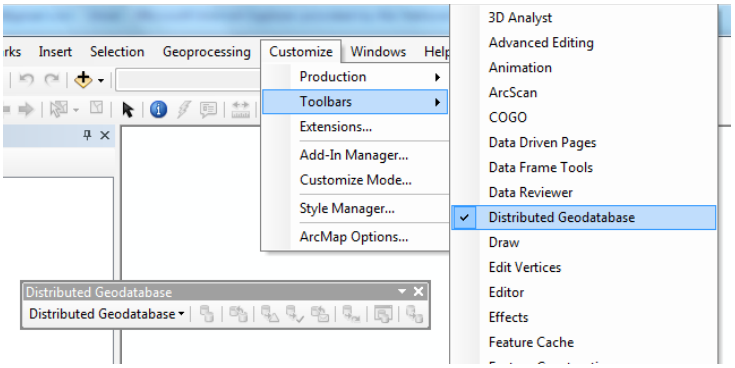
- Connect to the wilderness feature service using the direction listed in section 8.1.1.

9.2.2 Set up ArcMap Session

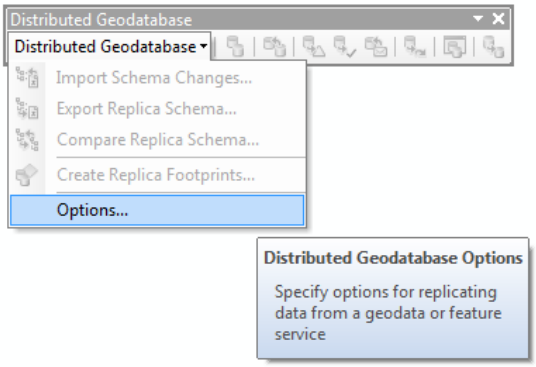
- Open ArcMap, click the add data button and add the desired feature service. Display the layers details to view which service in the folder is the feature service. This will create a group layer containing feature layers that reference the layers of your service. Layer properties, including the symbology and feature templates from the service layers, are preserved in the new layers.
- Add a data layer of the park, using either local data or a map service.
- Pan and zoom into an area of interest to be edited, such as the park boundary. The extent of the map defines the data that will be in the local copy. Keep in mind that once a local copy is created, you cannot later expand the area that it covers. If you find that you need to edit a different area or a larger area, pan and zoom to the area in the service and create another local copy. You can have multiple local copies on the same machine.
- **NOTE:** To keep performance high keep the AOI as small as possible for only the features you are editing.
- Save map document as <park name>_FireEditing_<yourname>.mxd This will be the one place to find and edit this data until you are finished.

9.2.3 Set up Local Copy

- Turn on the Distributed Geodatabase toolbar.

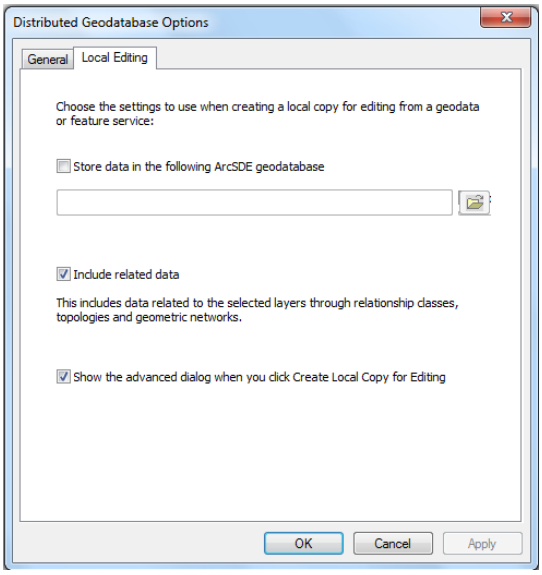


- Open the options window.



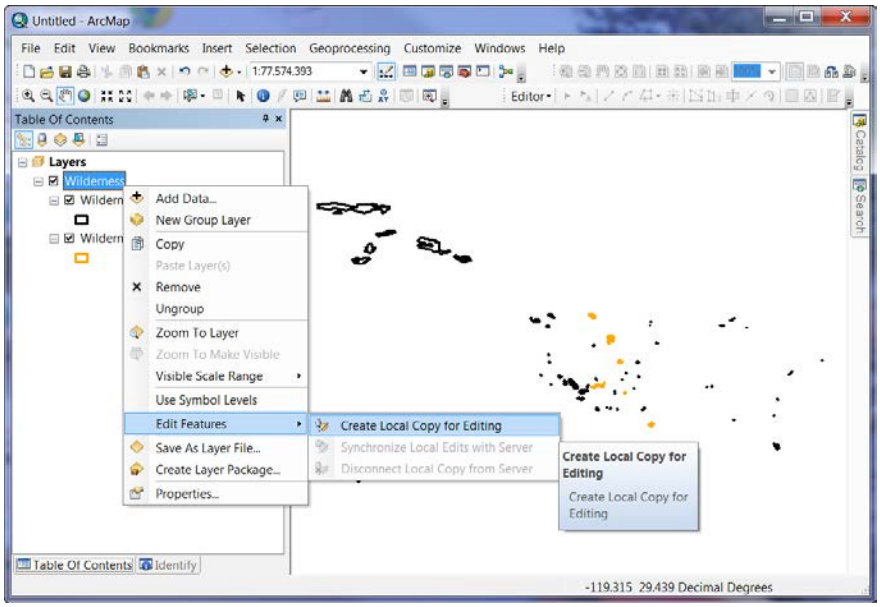
- On the Local Editing tab check the boxes for *Include related data* and *Show the advanced dialog.*

- Click OK.



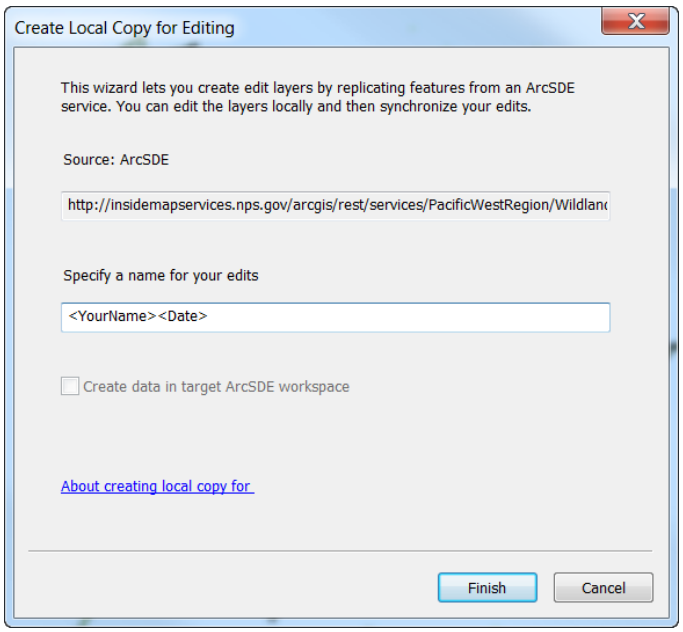
9.2.4 Create Local Copy

- Right click on the group sub name (**feature service name**), point to Edit Feature, then click Create Local Copy for Editing. If the service is not editable, the command will be disabled. (Depending on speed this might take a few minutes to download to your computer)



- When the Create Local Copy for Editing dialog box appears specify a name for your edits. The format is as follows: <YourName><Date>. *This is a critical step for SDE database maintenance.* Click Finish.

Note: Once the local copy is made, the data source of each layer in the group layer is changed to point to the local copy. Switch to the Source list to confirm the data is stored on the local machine. The location is default, but can be set to a specific folder location as desired. Edits can now be made to the data in the new layers.



9.2.5 Edit/Update Wilderness Data

- Right click on the local copy, select Edit Features, and then Start Editing.
- If the Create Features dialog box are not shown they can be opened from the Editor tool bar.
- In the Create Features window select the feature type to be edited. In the Construction Tools window select the appropriate feature.
- Digitize or edit features as needed, entering attributes that correspond to the features created or edited. Features can always be copied and pasted as well.
- After all the editing is complete and you are ready to roll your edits back to the online feature service, save and stop editing.

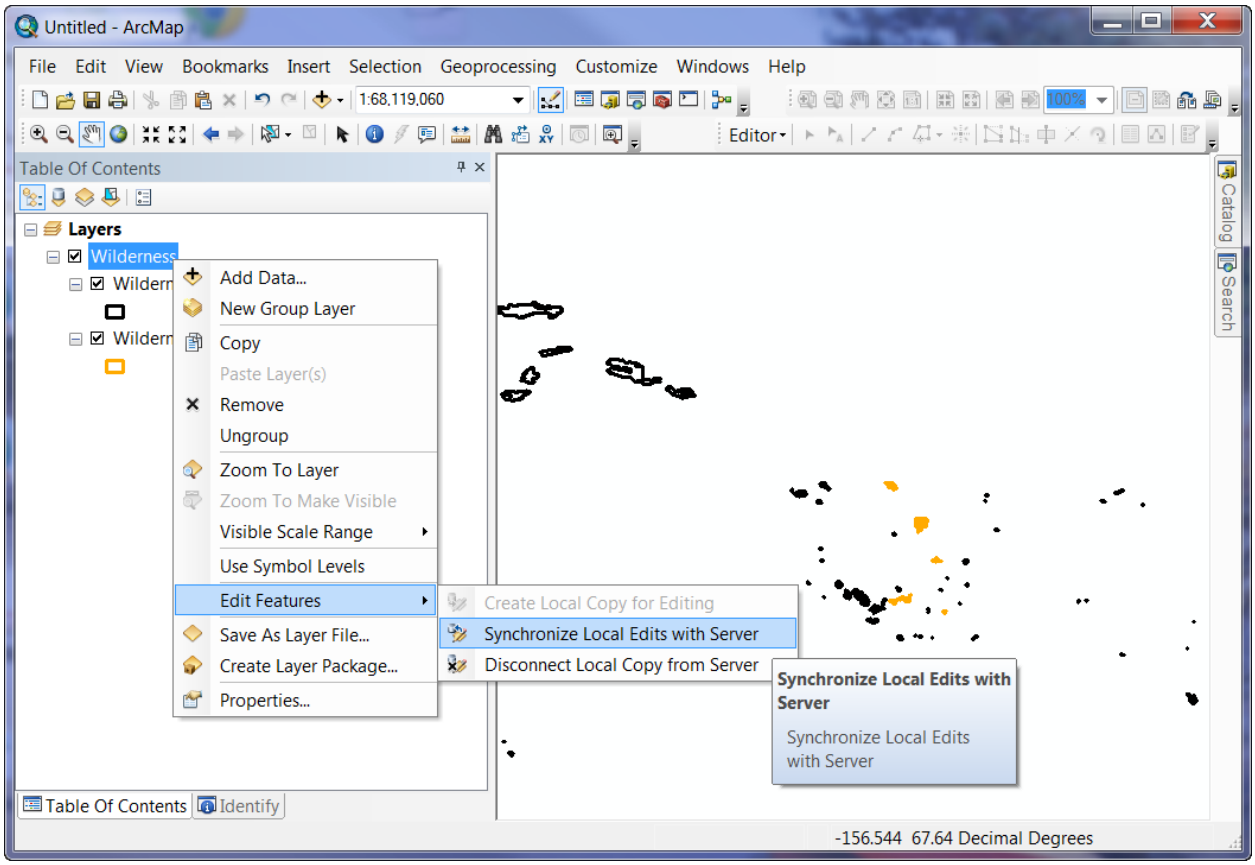
Note: There is currently a bug with ArcGIS where the local copy is not stored in the correct location in your user geodatabase, rather in a temporary file location. If ArcMap is closed the local copy will be deleted. So make sure edits are made and synchronized before closing ArcMap. (1/31/12 – ArcGIS 10.1 SP1 Fixed with ArcGIS 10.2 and above)

9.2.6 Synchronize Local Edits

- When you are finished editing the local layers, you can synchronize the edits with the server.
- In the Table of Contents right click on the name of your local copy, point to Edit Features, and click Synchronize Local Edits with Server.
- You can only synchronize edits one time if a file geodatabase is being used to store the local data. If you want to apply more edits in the future, you need to create a new local copy. Once edits from a file geodatabase are synchronized with the service, the data sources for the layers will be changed to reference the service.

- When you no longer need to synchronize edits, disconnect the local copy from the server to clean up metadata on the client and server. The metadata cleanup process is important in that it aids server maintenance. If a file geodatabase is used to store the data locally, synchronizing also cleans up the metadata.

- Switch to the source tab to confirm the data is now displayed directly from the feature service.
- Once the processing is complete, review the data in the Feature Service to verify all edits were successfully synchronized.



9.3 Directly Editing the SDE Database

Some users will be allowed to directly edit the SDE database. To receive approval, contact the GIS administer listed in section 12. If approval is granted, the GIS administrator will assign the correct permission for editing the SDE database directly.

10 Spatial Data Standards Implementation Plan

The Standards Development Team (SDT) recognize that implementing the wilderness data standards in a comprehensive and service-wide approach may seem daunting to park, regional and program level specialists. In an effort to simplify the process as much as possible an implementation plan was developed. The Team intends for the this guidance document to serve as a reference manual to help specialists at park, regional, and national levels understand the feature attributes, the purpose of the standards and how the wilderness data should be updated to the national database.

10.1 Scope of Implementation Plan

The SDT does not intend for the 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 integrate the spatial data for analysis purposes and establish a procedure to develop an authoritative spatial data set service-wide.

At a park level users may keep their spatial data in a coordinate system specific to their state or UTM zone. The data standard roll-up requires data to be in a GCS_WGS_1984, geographic coordinate system to facilitate combining datasets from across the country. All data for this type within NPS should be stored and used in this format.

10.2 Timelines

The Legislated Wilderness data will be integrated into the wilderness spatial data standard as it becomes available. Other Categories of Wilderness will be updated by GIS specialist as wilderness analyses are completed or the statuses of such lands have changed. Both layers will be submitted for data verification on a quarterly basis to the Regional Wilderness Coordinators in preparation for annual Agency Financial Reports and the quarterly Heritage Asset Stewardship Land Reporting requirements.

10.3 Update and Maintaining Data in the Standard Format

GIS Specialist will be required to update/maintain the data once it has been integrated into the wilderness data standard. When any changes are made, the data should be integrated into the national dataset via a checkout from the SDE database, local copy from the feature service, or directly editing the SDE database.

10.4 Assistance and Guidance for Data Standard Implementation

A Standards Development Team was brought together in December of 2013 to update the standard and get GISC approval. Members of the team include:

Data Steward/Sponsor: NPS Wilderness Stewardship Division – Ryan Scavo

Data Custodian: NPS Wildland Fire Program (temporary) – Skip Edel

Standard Development Team: Chris Dietrich (RISD), Adrienne Lindholm (AKR Wilderness Coordinator)

10.5 Training

SDT 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 attributes and how to manipulate the GeoDatabase to full effect.

10.6 Data Exchange

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 feature level. Users currently must complete FGDC dataset level metadata, regardless of the wilderness spatial data standards when exchanging data.

11 Conclusion

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 wilderness spatial data standards outline a minimum amount of information required to describe the quality of our wilderness spatial data and the appropriate use of that data. Individual parks, regions and programs may add to these standards to suit their own needs. The GeoDatabase implementation model provides an important tool for the management of wilderness areas and the data we keep about those resources. Integrating the various wilderness databases which exist with the NPS has long been a goal of the wilderness program.

12 Contacts and Additional Information

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13 Appendices and Other Implementation Documents

13.1 Glossary of Terms

To assist resource specialists and GIS specialists to comply with the wilderness spatial data transfer standards, both specialists need to understand the terminology involved in wilderness management as well as GIS data management. The glossary of terms included here is meant to assist resource specialists to 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 wilderness 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.
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 wilderness 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 wilderness standards, attribute values take the form of feature level metadata and many of the attributes or fields have domains established to ease data entry.
Conceptual model	A conceptual model is a typical element in database data modeling. For the purposes of the wilderness standards, the NPS Wilderness Working Group was required to create a conceptual model of the

	wilderness 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 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. In order to view all of the wilderness 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.
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 wilderness spatial data transfer standards the data model describes the various wilderness data layers.
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.
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.
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 (**until version 11**) 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.
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 wilderness standards the implementation model takes the form of a diagram showing the structure of a GeoDatabase.
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.
Legislated Wilderness	Wilderness areas representing congressionally-designated wilderness, congressionally-designated potential wilderness, and inholdings within the designated wilderness boundary that may be transferred to designated wilderness status without further Congressional action.
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.
Mandatory	In relationship to the wilderness 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 wilderness 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 polygon included in a data set, or the specific circumstances surrounding the creation of the 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 wilderness 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 polygon to explain their source, specific parameters, editing history, etc. These feature level metadata fields document the individual features, not the entire data set.
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, 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,
National Park Service Wilderness Stewardship Division	Within the National Park Service, wilderness data is managed by this division.
National Park Service Wilderness Working Group	The group that led the development of the wilderness data standard. This group included individuals from WASO, regions, and parks.
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.
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.
Optional	In relationship to the wilderness 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.
Other Categories of Wilderness	Areas that are not legislated wilderness, but contain wilderness character. Many of these areas are candidates to become wilderness in the future.
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, or landscape feature.
Polygon	Polygon features in a GIS are entities that represent closed boundaries such as an wilderness area. 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. Shapefiles can be used within ArcGIS by themselves or they can be imported or otherwise incorporated into a feature class in a GeoDatabase.
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.
Standards Development Team	A team brought together in December 2013 to update the wilderness standards and to receive approval from the NPS GIS Council.
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.

13.2 GeoDatabase Diagram

Displayed below is the GeoDatabase diagram for the Legislated Wilderness feature class and the Other Categories of Wilderness feature class.

Legislated Wilderness and Other Categories of Wilderness Geodatabase Schema

Date generated: June 3, 2014

Simple feature class
Legislated Wilderness

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

Congressionally Designated Wilderness Areas

Field name	Data type	Allow nulls	Domain	Prec-ision	Scale	Length	
OBJECTID	Object ID						
SHAPE	Geometry	Yes					
GeometryID	String	Yes				50	GUID for Legislated Wilderness Feature Class
Name	String	Yes				50	Name of Legislated Wilderness Area
Feat_Type	String	Yes	WildernessType			50	Type of Legislated Wilderness Area
Year	String	Yes				4	Year of Congressional Designation
Acre_Legis	Double	Yes		1		13	Acres of Legislated Wilderness Area
Acre_Calc	Double	Yes		1		13	Acres Calculated by GIS Software
Public_Law	String	Yes				255	Public Law Numbers
Descriptn	String	Yes				255	Description of Legislated Wilderness Area
UnitCode	String	Yes	UnitCode_NPS			10	Unit Code for the Legislated Wilderness Area
Unit	String	Yes				255	Unit Name for the Legislated Wilderness Area
Unit_Type	String	Yes				255	Unit Type for the Legislated Wilderness Area
GroupCode	String	Yes	UnitCode_NPS			10	Group Code for the Legislated Wilderness Area
RegionCode	String	Yes	RegionCode_NPS			10	Region Code for the Legislated Wilderness Area
CreateDate	Date	Yes		0	0	8	Date the original record was created
CreateName	String	Yes				50	Person that created the original record
EditDate	Date	Yes		0	0	8	Date of the last edit
EditName	String	Yes				50	Last person to edit the record
Notes	String	Yes				255	Notes for the Legislated Wilderness Area
Restriction	String	Yes	Restriction			3	Restrictions placed on the data
MetadataID	String	Yes				50	GUID linking to the unique metadata record
URL	String	Yes				150	URL address to Legislated Wilderness Area
GNIS_ID	String	Yes				50	GUID linking to the unique GNIS record
SHAPE_Length	Double	Yes		0	0		
SHAPE_Area	Double	Yes		0	0		

NOTE: UnitCode_NPS domain values are not shown.

Simple feature class
Other Categories of Wilderness

Geometry *Polygon*
Contains M values *No*
Contains Z values *No*

Lands with Wilderness Character that are NOT Congressionally Designated

Field name	Data type	Allow nulls	Domain	Prec-ision	Scale	Length	
OBJECTID	Object ID						
SHAPE	Geometry	Yes					
GeometryID	String	Yes				50	GUID for Other Categories of Wilderness Feature Class
Name	String	Yes				50	Name of Other Categories of Wilderness Area
Feat_Type	String	Yes	WildernessTypeOTHER			40	Type of Other Categories of Wilderness Area
Year	String	Yes				4	Year of most recent land status change/modification
Acre_Calc	Double	Yes		1		13	Acres calculated by GIS Software
Description	String	Yes				255	Description of Other Categories of Wilderness Area
UnitCode	String	Yes	UnitCode_NPS			10	Unit Code for the Other Categories of Wilderness Area
GroupCode	String	Yes	UnitCode_NPS			10	Group Code for the Other Categories of Wilderness Area
RegionCode	String	Yes	RegionCode_NPS			4	Region Code for the Other Categories of Wilderness Area
CreateDate	Date	Yes		0	0	8	Date the original record was created
CreateName	String	Yes				50	Person that created the original record
EditDate	Date	Yes		0	0	8	Date of the last edit
EditName	String	Yes				50	Last person to edit the record
Notes	String	Yes				255	Notes for the Other Categories of Wilderness Area
Restriction	String	Yes	Restriction			3	Restrictions placed on the data
MetadataID	String	Yes				50	GUID linking to the unique metadata record
GNIS_ID	String	Yes				50	GUID linking to the unique GNIS record
SHAPE_Length	Double	Yes		0	0		
SHAPE_Area	Double	Yes		0	0		

Coded value domain
RegionCode_NPS

Description *NPS Region IDs*
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
IMR	Intermountain Region
PWR	Pacific West Region
MWR	Midwest Region
NER	Northeast Region
AKR	Alaska Region
NCR	National Capital Region
SER	Southeast Region

Coded value domain
Restriction

Description *Use Restrictions*
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
UNR	Unrestricted
RND	Restricted – No Third Party Release
RAC	Restricted – Originating Agency Concurrence
RCC	Restricted – Affected Cultural Group Concurrence
REX	Restricted – No Release
UNK	Unknown

Coded value domain
WildernessType

Description *Wilderness Type*
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
Transferable Wilderness	Transferable Wilderness Inholding
Designated	Designated
Designated Potential	Designated Potential

Coded value domain
WildernessTypeOTHER

Description *For types other than designated wilderness*
Field type *String*
Split policy *Default value*
Merge policy *Default value*

Code	Description
Unassessed	Unassessed
Eligible	Eligible
Proposed	Proposed
Proposed Potential	Proposed Potential
Recommended	Recommended
Recommended Potential	Recommended Potential
Other Wilderness Type	Other Wilderness Type