Development of a Geodatabase and GPS Data Collection Procedures for Cultural Resources Management of the Flagstaff Area National Monuments

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

Cultural Resources (CR) is a division within the National Park Service (NPS) responsible for monitoring and preserving the cultural and historical resources of the National Parks. In an effort to increase governmental efficiency and handle increasingly complex data collection standards, databases have been developed to track and monitor all cultural resource data at the national level. The resulting volume of data required by CR has required the staff at the Flagstaff Area National Monuments (FLAG), which consists of Sunset Crater Volcano, Walnut Canyon and Wupatki National Monuments, to work with a government contractor to create a SQL Server database so that they can view, enter and query the data that they collect.

Currently, CR uses sub-meter GPS to collect spatial data on the locations of cultural resources contained in the monuments. The datasets are contained in shapefiles which hold spatial information of all known cultural resources within Walnut Canyon (WACA) and Wupatki (WUPA) National Monuments. These shapefiles are inaccurate and inconsistent due to their inherent structure regarding the type of attribute, information, and data they will accept.

CR has requested the completion of three tasks: 1) that the database containing non-spatial data and the current spatial data be joined so that information contained within the geodatabase can be queried and displayed spatially, 2) that the current spatial data be converted from shapefile format to geodatabase format, and 3) that the data collection method for updating old GPS data and collecting new data be streamlined.

To accomplish these three tasks, all shapefiles need to be converted into geodatabase format, with spatial topologies and domains. Tools need to be created to join and unjoin non-spatial data so that GPS data can be collected in the field and easily updated in the office. Streamlined field data collection procedures will provide for consistent spatial accuracy with differential correction for the GPS data.

Cultural Resources, Geodatabase, GPS, Workflow, NPS

INTRODUCTION

A Geographic Information System (GIS) is composed of hardware and software for the purpose of storage, visualization, retrieval, and analysis of geographic and associated data. GIS is composed of features (locations) which work together with associated data in order for that data to be viewed spatially (ESRI 2012 v). The spatial features are stored in a coordinate system which references a particular area on Earth. GIS is not the same as Computer Aided Design (CAD) and other graphical computer applications. The main difference between GIS and other applications is that GIS is spatial data geographically referenced to earth-based coordinates. In GIS, it is possible to re-project spatial data from one coordinate system into another; this implies that data from various sources can be brought to a common relational database management system (RDBMS) and then integrated using GIS software (ESRI 2012 v) (ESRI 2011 g) (ESRI 2012 l). A RDBMS is a set of tables with rows and columns that relate to one another with a common field called a key (Codd 1970). The GIS for this project is made by ESRI and is actually a suite of programs called ArcGIS. For this practicum, ArcGIS programs ArcMap and ArcCatalog are used. ArcMap is the main application of ArcGIS which allows for exploring, displaying, and creating map layouts for publication of GIS data (ESRI 2012 u). ArcCatalog is used to organize GIS data; it is similar to Windows Explorer on a desktop computer. In ArcCatalog a tree system is used to allow for easy viewing, organizing, and searching of GIS Data (ESRI 2012 s) (ESRI 2012 e).

Managing cultural resource sites and the data associated with them is one of the most critical responsibilities of the archeologists in the NPS and specifically FLAG (National Park Service 2012 b). Cultural resource data is used to justify funding for monitoring, preservation, and documenting/recording. The entire organization depends on access to quality information from CR, as it is critical to compliance for all divisions. With computers being integrated into every aspect of work, it is now important that spatial data be accessible through a digital format. Additionally, the digital format allows for multiple users to have access to the most current data simultaneously.

BACKGROUND

Prior to 2000, all FLAG divisions used paper maps as a way to store and communicate spatial data. Beginning in 2003, hard copy data was digitized and placed in shapefiles. A shapefile is a vector, or location, data storage format for storing the location, shape, and attributes of geographic features. (ESRI 1998 i) At this same time all data collectors began to use high-accuracy (sub-meter) GPS units and data was placed in shapefiles with the digitized data. GPS (Global Positioning System) is comprised of a constilation of 24 satellites that triangulate a location on the earth's surface (U.S. Goverment 2012).

With various types of augmentation; the accuracy of GPS can be within a few decimeters (Trimble Navigation Limited 2007 a).

Since 2003, there has been a concentrated effort to collect both relevant data of the FLAG Cultural Resource Program and data that supplies the Archeological Sites Management Information System (ASMIS) (National Park Service 2012 a). ASMIS is a Cultural Resource Database that assists with the management of park or monument historic and prehistoric CR (National Park Service 2012 a). Data collection methods for FLAG from 2003 on were inconsistent, with different attributes added and taken from the GPS collection process. In the past, the information collected by CR was for management of FLAG and ASMIS. This data has historically been contained in several different MS Access Databases. MS Access is a tool for concentrating, analyzing, and understanding information in a small scale RDBMS (Mircosoft n.d.). In 2011, a SQL Server database, an RDBMS, was created that merged the Cultural Resource MS Access databases and provided a master dataset that fully integrated all the Cultural Resource MS Access Databases.

Historicaly, resource field collection procedures involved paper forms for data collection of database information and a high accuracy GPS unit for spatial data collection. The spatial data collection involves software made by Trimble; Terrasync which is GPS data collection software on the GPS unit; and Pathfinder Office on the PC for differential correction and conversion into a shapefile (Trimble Navigation Limited 2012 g) (Trimble Navigation Limited 2012 e). Differential correction can be used after the data has been collected using the Continually Operating Reference Station, CORS, network (National Oceanic and Atmospheric Administration 2012). CORS provides Global Navigation Satellite System, GNSS, data comprising of code range and carrier phase range dimensions (National Oceanic and Atmospheric Administration 2012). Differential Correction improves accuracy of GPS locations by comparing the time it takes to receive a signal at a given location in the field and the time it takes for the same signal to get to CORS (National Oceanic and Atmospheric Administration 2012). By noting the difference in the time it takes for a signal to get to the GPS in the field and to the CORS, the accuracy of the field GPS can be significantly improved (National Oceanic and Atmospheric Administration 2012). After differential correction is complete, a shapefile with the GPS information is exported (Trimble Navigation Limited 2012 e).

The shapefile is then compared with the existing CR legacy dataset. If the new record, which is comprised of both vector and attribute data, is replacing a digitized --a point created in GIS through visual interpolation (not accurate) --or a less accurate record, the record in the legacy dataset is deleted and the record from the GPS is merged into the current shapefile. If the GPS collected record does not replace an existing record, then it is merged into the legacy shapefile (Figure 1).

This process is difficult and time consuming, as there is no dynamic aspect to the procedure. Changing spatial data management techniques and integration with non-spatial data is a difficult process, both from a financial viewpoint and when considering the resistance that established organizations tend to have towards change. Fortunately, support from the CR management team at FLAG is strong, thus decreasing any expected issues regarding training or implementation.

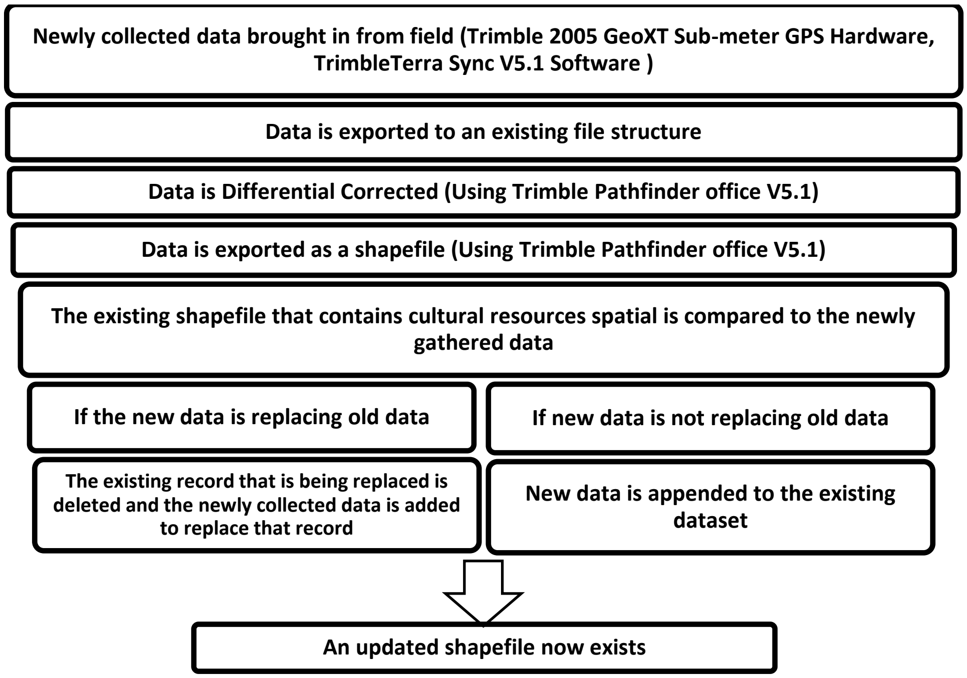

Figure 1. This figure represents the original update procedure for FLAG CR spatial data collection. It is confusing and required a significant amount of time from the GIS Department to keep CR GIS data accurate.

PRACTICUM PURPOSE

The purpose of this practicum is to provide a streamlined, user-friendly method of updating spatial data for CR and to provide a geodatabase that will allow for the querying of non-spatial data through ArcMap. By allowing access to all related information requested by Lisa Leap, Chief of Resource Management, Lisa Baldwin, CR Program Manager, and Kelly Stehman, Lead Archeologist, ArcMap becomes a powerful tool for the organization in the following ways:

1. By creating a geodatabase with the appropriate data constraints, we will ensure the integrity of the data.
2. By adding non-spatial data, from the existing SQL Server database with the FlagArchGisExport_V1.1 MS Access tool, provided by Stan Mish an Engineer from 7K Information Technologies (Mish 2012), we increase the ability of the database to query traditionally non-spatial data in a spatial environment

3. By creating an easy check-in/check-out process for field data collection, this process will streamline data collection and update procedures ensuring access to consistent and up-to-date information.

OBJECTIVES

Below are the objectives of this practicum which are designed to, if followed, allow for successful design, development, and integration of a geodatabase in to the CR Program of the FLAG.

I. Meet with CR staff and find out if their data collection procedures are appropriate. If so, why? If not, why not?
   a. Which types of information do they need the GPS unit to hold when they are in the field?
   b. Which features does the GPS unit need to allow them to collect in the field?
   c. Which attribute fields do they need for each feature type?
   d. Are these in conjunction with NPS data standards?
   e. Specifically, what information will they enter into each field? Can dropdowns be used?
   f. What types of spatial constraints are appropriate?

II. Developing a Geodatabase
   a. Determine what information would be most useful to have imported from the SQL Server Database and integrate it into the geodatabase
      i. Interview Lisa Leap, Lisa Baldwin, and Kelly Stehman
      ii. Work with Stan Mish to get an export process for this from SQL Server to MS Access.
      iii. Design a process for integration for this data into the geodatabase.
   b. Examine the current shapefiles and determine what fields need to be created
   c. Create an Archeology Geodatabase
      i. Create all feature dataset
      ii. Create feature classes
   d. Clean up all existing datasets so that they meet NPS standards
   e. Import all data from old shapefiles into the Archeology Geodatabase
   f. Determine topologies
      i. How features relate to one and other
   g. Create Domains
      i. Meet with Kelly Stehman to determine domains and feature classes

III. Using the Geodatabase
   a. Add exported MS Access data to it to create all necessary joins to MS Access data

IV. Develop procedures for ArcPad Check-out/Data Collection/Check-in process

a. Write "Instructional Guide for these processes

V. Create presentation for this project to be presented to park staff

a. How to check-out data

b. How to collect data/update old data

c. How to check-in data

SCOPE

This practicum is intended to create a fast and easy workflow for GPS field data collection. It is also designed to create a geodatabase that can be queried and that joins non-spatial data from the CR SQL Server Database to the geodatabase. ArcMap will be used to view and query the geodatabase. All CR staff will be trained on Check-in/Check-out process and field data collection procedures. With increased efficiency of field collection procedures, the accuracy of GIS data will improve based on constant updates to the geodatabase. The scope of this practicum is shown in Figure 2 as a part of the overall workflow of the FLAG CR Division.

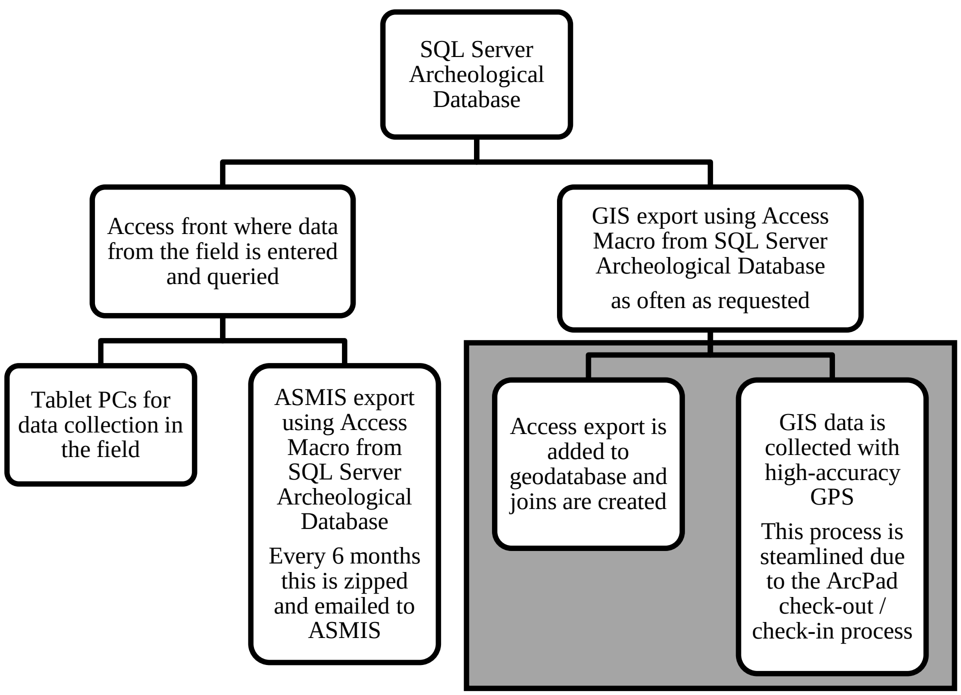

Figure 2. This figure represents the overall FLAG CR workflow. The portion in the grey box represents the part of the work flow that this practicum will address.

JUSTIFICATION

The purpose of this practicum is to show how a geodatabase and streamlined data collection procedures can improve efficiency and overall data accuracy for the Cultural Resource Program at FLAG. Information that was never intended to be used spatially can be related, queried and interpreted. This can become very useful to the organization when it needs to make a management decision that affects those resources. The development of a geodatabase will allow CR staff to:

- Identify areas that need to be surveyed
- Identify locations that are at risk for degradation
- Define areas that are particularly sensitive
- Justify funding for management efforts
- Analyze site distribution and potential site location
- Analyze movements of historic and prehistoric peoples

LITERATURE REVIEW

A number of companies provide GIS-based software. This practicum makes use of ArcMap and ArcCatalog. ArcMap may be used on the desktop computer to represent geographic information, it can display a variety of different data types, including shapefiles, layer files, feature classes, base maps, and even Bing aerial imagery (ESRI 2012 u). GIS is used to make maps for everything from infrastructure to natural resource management. But GIS, when leveraged properly, can do much more than that. GIS can perform complex analysis on vector data, data that is represented as a point, line, or polygon; and raster data, data that is represented as a continuous dataset, such as an aerial photograph (ESRI 2012 v) (ESRI 2012 h).

A feature is a representation of a real world object on a map. There are three types of features within GIS: a point, a line, and a polygon. These three features make up the fundamental components of the spatial data in the system (ESRI 2012 h). They can exist within GIS as a shapefile, coverage, or a feature class (ESRI 2012 q) (ESRI 2012 r) (ESRI 2012 j). A feature class is a collection of common features such as archeological site datums, archeological site boundaries, and archeological site lines at WACA. While these features may be represented as different geographical objects; points, lines, and polygons, they all share a common thread, and in this case are all related to CR of WACA.

A shapefile is a vector data storage format for storing the location, shape, and attributes of geographic features (ESRI 2012 r). A shapefile is simple and easy to use, but because of this simplicity is also limited. Features contain more than just a location and attributes. Features have topological relationships, spatial relationships, attribute relationships, related information, annotation, text or graphics. They provide necessary information to the reader of a map, and attribute domains, a range of valid values for a particular attribute field (ESRI 2012 j) (ESRI 2012 q). Shapefiles are useful when you need to share geographic data quickly and easily, but not for much else (ESRI 2012 r).

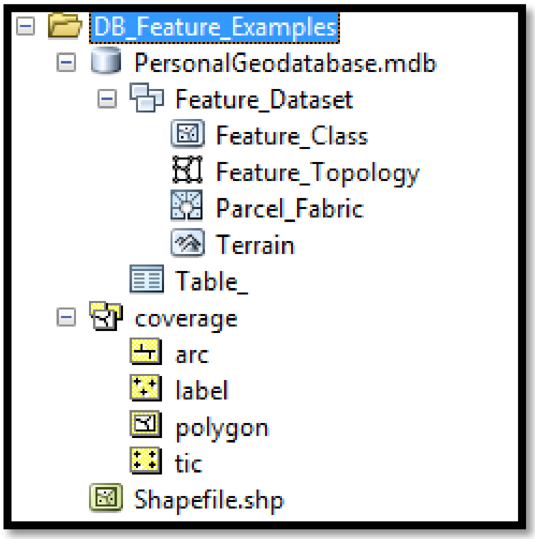

Figure 3. This figure displays shapefiles, coverages, and geodatabases as they are visualy represented in ArcMap. The shapefiles are the simplest of the 3. Coverages are more complex than shapefiles but simpler than a geodatabase. A geodatabase is the preferred method of storing GIS data because it allows for constraints of the attribute data. (ESRI 2012 c).

A coverage has more functionality than a shapefile but less than a geodatabase feature class. A coverage is a georelational model that can store vector data. Typically, a coverage requires more than one feature class. Consider a line and polygon feature class that both exist in a coverage; they are both used to represent polygon features (ESRI 2012 q). The polygon represents itself and the line feature class as a representation of different parts of the polygon. Polygons also have label points which are a separate feature class. Every coverage has tic points in a separate feature class; the tic points work to define the coverage of the extent. A coverage also contains feature numbers; these are geographic features that are identified by unique numbers (ESRI 2012 q). The spatial and attribute data of a given feature is linked by the feature numbers to one another; this is one way that a coverage helps to maintain its integrity and accuracy. Attributes of features in coverage are stored in tables or the .ADF files; these feature attributes are then joined with other layers or relationship classes, adding to the overall integrity of a coverage (ESRI 2012 q). While a coverage is more useful than a shapefile, it does not have the same functionality that is available in a geodatabase. This makes a coverage less desirable to use when designing a study or workflow that requires a good deal of accuracy both spatially and within the attributes of any data set (ESRI 2012 q).

A geodatabase is the natural data structure for GIS. It represents the primary data format used for editing and for managing large and small amounts of data. A geodatabase is used when the quality of the data is a priority, such as a scientific study or a roads system (ESRI 2002 w). A geodatabase is capable of topologies which assist in quality assessment and quality control (QA/QC) to determine spatial errors in GPS data. Annotation, or dynamic labels, can be stored in a geodatabase, and domains can be used to ensure attribute integrity, allowing the data to be consistent and thus more useful. In addition, a geodatabase can store related tables, so that attribute relationships can be created with non-spatial data (ESRI 2012 l).

A geodatabase can contain non-spatial data in tables that can be related or joined to spatial data. Joining data is accomplished by linking one unique attribute field, called a key, within either a table and a table, or a table and a feature, or a feature and a feature (ESRI 2012 b). Joins can only be accomplished in a one-to-one or a many-to-one relationship. A one-to-one relationship is when one piece of data in a table or feature is linked only to one other piece of data in a table or feature (ESRI 2012 b). A many-to-one relationship exists when many fields in one table or feature is linked to only one field in another table. Joins can also be accomplished by spatial location. For instance, a polygon can be joined to a point based on the point RDBMS location inside of the polygon. Relates are another way that information in different feature classes and tables can be associated with one another (ESRI 2012 b). For the purposes of this practicum, however, they will not be discussed here as they are not relevant.

The ability of the geodatabase to store MS Access data is based on relational database concepts. A geodatabase uses the same multitier application structure that is found in more complicatedRDBMSs (Nguyen 2009). This type of structure is often referred to as an object relational model (ESRI 2012 m). An object relational model refers to objects that exist as rows in RDBMS that have unique identities, while the behavior is controlled through the geodatabase application logic. This partition of application logic from the storage of the actual data is what allows a geodatabase to interact with several different types of RDBMS (ESRI 2012 m). A geodatabase in its simplest terms is nothing more than a standard RDBMS that is a set of table types, indexes, and other database objects (ESRI 2012 l) (ESRI 2012 l). The integrity of a geodatabase is defined by the constraints placed on it. All of the datasets within a geodatabase are stored in one or multiple tables; the dataset tables then work with the system tables to help manage the data. System tables help to keep track of the contents of the geodatabase (ESRI 2012 l). System tables essentially define the schema that specifies all the dataset definitions, rules, and relationships. The schema of a geodatabase can include definitions, integrity rules, a definition of the coordinate system, coordinate resolution, feature classes, topologies, networks, information, raster catalogs, relationship, and domain (ESRI 2002 w).

A geodatabase can also work with a variety of RDBMS, including: MS Access, Oracle, Microsoft SQL Server, Informix, and Postgre SQL. The interaction of ArcMap and ArcCatalog and other RDBMS is made possible by ESRI's ArcGIS Server and ArcSDE (ESRI 2012 t). ArcGIS Server is an RDBMS that allows for GIS resources to be shared within an organization and over the web. ArcGIS Server is different than other RDBMS in that it provides resources only available through GIS, such as spatial analysis (ESRI 2012 t). Instead of data simply being represented as rows and columns, it can be shown geographically and thus take on particular significance. ArcSDE with the latest version 10 of ArcMap is no longer a stand-alone product; it has been integrated both with ArcGIS Desktop and ArcGIS Server. However, it was at one time a software component that allowed for communication with and integration of various types of RDBMS, adding spatial functionality to them (ESRI 2012 h).

Geodatabases can hold a wide variety of data types and can be represented by the following objects (ESRI 2012 h):

- Annotation: A feature class that stores text of graphic data and can be dynamically linked to other feature classes
- Dimension: A type of annotation that shows specific lengths/distances on maps
- Feature Class: A group of graphic features that have the same attributes and the same coordinate system
- Feature Dataset: A group of feature classes all stored together that share the same spatial reference
- Mosaic Dataset: Collections of images and rasters
- Relationship Class: These manage the relationships between features, tables, and other feature classes
- Tables: Hold non-spatial data
- Toolboxes: Hold dataflow and workflow tools and processes, specific to that geodatabase
- Topologies: These determine how different feature classes interact; when the rules are broken the user is notified. Topologies make the QA\QC process significantly easier

A geodatabase is an important part of a workflow because it is a physical location for geographic data inside a relational database management framework. Also, it defines the behavior of the features, how they can be edited or displayed, the relationships between features and tables and one another, and even the domains and subtypes, the types of data that individual fields can hold (ESRI 2002 w). All of these factors allow for a more intuitive interaction with GIS which determines the success or failure of its implementation (ESRI 2002 w).

Relationships in a RDBMS are defined from table to table by a unique key that each table shares (Codd 1970). To better understand a geodatabase, one needs to look at the relational database model, to understand what a database is, and how it can leverage data. The word relation, as it pertains to a relational database, in this instance is used in the mathematical sense. Given sets of data $S1,\ S2,\ S3, \ldots\ Sn$, R is a relation, unique identifiable field, within each of these datasets that relates them all

(Codd 1970). Edgar Codd is considered one of the founders of the relational database model. A relational database is something that has become common place today (e.g., MS Access). But Edgar Codd first conceived of a relational database as a math equation. This equation defined the concept of a relational database whereby all data could be linked together with a unique key common to all. Today, relational databases are in common use. A relational database contains tables of information that are related to each other. Those related tables also contain fields that match (ITS Training Services for Pennsylvania State University 2010). A table contains data about a certain subject area or concept and holds records, e.g. archeological information at WACA. A record contains data about one specific entry within a table and holds fields, e.g., a single archeological item. A field contains data about a specific object or thing described in a record and then holds a data value, e.g., site type, the date it was collected and the Recorder ID, the person who collected it. Lastly, a data value holds a single occurrence of data in a field, e.g., ASMISID = WACA10000, Site Type = Artifact Scatter, Date = 5\23\2012, Recorder ID = Michael Jones.

The purpose of a relational database is to efficiently consolidate data so that it can be viewed, queried, managed and easily updated. The benefit of a relational database is the majority of the data only needs to be stored as a single record. Designing a relational database is complicated but can be done using the following steps (ITS Training Services for Pennsylvania State University 2010) (Figure 4):

1) Identify a problem that could be improved with a relational database, e.g., tracking archeological site monitoring and archeological site type.

2) Get information and determine the real needs, e.g., interview people who will need this data and make sure their needs are met.

3) Determine that you have all the fields that you will need, e.g., make sure that you have the Site Type and Recorder ID Fields. Do your best to eliminate redundancy, e.g., don't have multiple fields with the same information.

4) Group fields into appropriate tables, e.g., Date collected and ASMIS ID in one table and Site Type and Recorder ID in another. Remember to include a primary key to link all tables to one another.

5) Define relationships among tables. There are three types of relationships in a relational database. There is a one-to-one relationship which links one record in one table to one record in a different table. There is a one-to-many relationship which links one record in one table to many records in a different table. Lastly, there is a many-to-many relationship which links several records in one table with several records in a different table.

6) Test and revise your relational database. If you do not fix the issue at hand, it is possible that no one will use the relational database.

7) Lastly, develop queries so that your data will be accessible and useful, e.g., How many sites that had a Site Type of Artifact Scatter were visited this May. This last step is perhaps the most important as it makes the relational database indispensable.

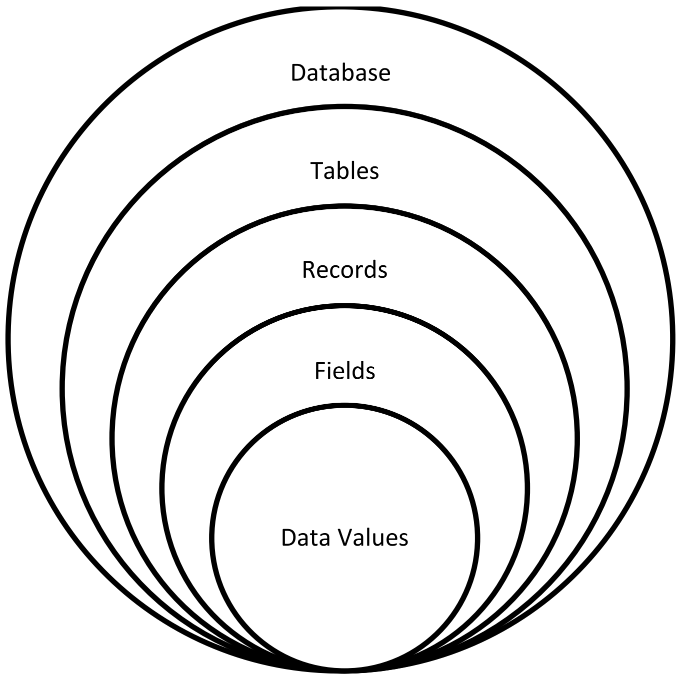

Figure 4. The structure of a relational database is represented above. The database hold tables, tables hold records, records hold fields, and fields hold the individual data values. A database allows for consistent data structure and provides reliable data which is one of most important aspects of a database (ITS Training Services for Pennsylvania State University 2010).

A RDBMS is ignorant of one factor, "Everything is related to everything else, but near things are more related than distant things" (Tobler 1970). That is why it is so logical that the relational database model be used in conjunction with a GIS. There are many different definitions of GIS. The USGS defines GIS as "a computer system capable of capturing, storing, analyzing, and displaying geographically referenced information; that is, data identified according to location" (USGS 2007). A simpler definition would be linking a geographic location with information about that location so that relationships can be displayed and analyzed. The power of GIS lies in its ability to relate unique types of information spatially and to draw conclusions based on those relationships. Consider rainfall information and how relevant it is to know where that information is collected (USGS 2007). We do this by using a reference system, such as latitude and longitude or Universal Transverse Mercator (UTM), and perhaps the elevation of that location as well. Rainfall location can then be compared with the location of known flooding on a landscape and conclusions can then be drawn (USGS 2007).

GIS has shown great promise in addressing this need for the scientific community. Geographic patterns and spatial relationships that were previously unknown or overlooked can be discovered with simple mapping tools within GIS (ESRI 2012 n). Analysis of more complex relationships and even forecasting behavior or presence/absence of conditions can be conducted with the modeling tools in GIS. GIS provides many valuable tools in working with this field data (ESRI 2012 n).

Since 1995, GIS within the NPS has been focused on data acquisition and GIS training, as well as technical support for GIS and GPS within the parks (National Park Service: GIS Program n.d.). National management of GIS within the NPS is accomplished through the National Information Systems Center (NISC) and is supervised by the NPS Chief Information Officer (CIO) the goal of this to ensure that library and internet programs include support for the needs of GIS. Since 1995, eight Regional Support Centers have been created to assist NPS programs with everything from planning, development, and implementation of GIS technology, to developing GIS Applications (National Park Service: GIS Program n.d.). The NPS is fully committed to GIS and GPS integration into all divisions and aspects of park operations.

A geodatabase can contain non-spatial data in tables that can be related or joined to GIS data. A geodatabase, or relational geodatabase, is the way that spatial data is commonly stored for use in GIS. This allows the storage of data gathered in a logical format and ensures easy data maintenance, data retrieval, and visualization; this is the key factor that differentiates a relational geodatabase from a relational database (ESRI 2012 l). The ability to view data spatially provides a powerful method of data analysis that can reveal data relationships not easily seen in tabular format (ESRI 2012 l).

A geodatabase enhances the abilities of a traditional RDBMS, enabling it to carry out multiple roles such as data manipulation, visualization and management of attribute data, and offering the spatial analysis capabilities associated with spatial data (ESRI 2012 l) (ESRI 2002 w). A geodatabase, unlike a coverage or a shapefile, has the capability of showing and managing geographically-related information. This comprehensive data model is integrated as tables holding attributes, raster datasets, and feature classes. Additionally, a geodatabase can implement rules for management of spatial information as well as attribute information; this allows for more reliable and useful information (ESRI 2002 w). The ability to join non-spatial data with spatial data is incredibly useful in a variety of disciplines. Currently FLAG CR uses a SQL Server-based database to track and manage archaeologically-related data. While shapefiles and coverages can be joined with non-spatial data, they cannot store the related tables within themselves. A geodatabase, however, can store and manage this non-spatial data in a controlled manner, making geodatabases ideal for joining non-spatial data with geographically related information (ESRI 2002 w).

For more than ten years the U.S. Bureau of Reclamation has been in the process of capturing cultural resource site data in GIS. This data, which has been collected over time, addresses issues for particular reclamation projects and also for analysis purposes. GIS is a significant portion of cultural resource site information for the regional office. Cultural resource site location information is considered sensitive and valuable information, thus falling into the classification of "Sensitive Data." The Mid-Pacific region collected a variety of cultural resource information over the years to address issues related to the protection and conservation of CR. Staff archaeologists attempt to have this data in a readily accessible format for analysis in addressing impacts of agency actions to the resource (Ebert 2004). This data comes from a variety of sources including State Historic Preservation Offices, other agencies, and internal site investigations. Organized by reclamation project, the data has been collected and verified over time with formats and content of the data varying based on sources and project needs. This information includes the spatial representation of cultural resource site locations, along with site records or field descriptions, images and photos. There is a need to bring this data together into a common structure that can meet the general requirements for archeologists across a variety of agencies and entities, and fit it into other enterprise efforts for various organizations (Clark n.d.). The spatial representation of the sites includes points, linear transects or features, and polygons or area features. The geodatabase is designed to handle the variety of naming conventions and site attributes in use by the different organizations (Clark n.d.). This design will allow links to stored site records or images of sites. Site information stored in the geodatabase is available for use with statistical and geostatistical tools.

The focus of GIS in the NPS has been on cartographic data acquisition for parks, GIS training, and technical and administrative support for the growing number of GIS and GPS operations in parks (Kelvin 2008). Today, more than 250 National Park Service units use GIS. Many types of resources are tracked using GIS. For instance, GIS is used throughout the NPS to query data and ask specific questions of that data. It can be used to show the specific relationships of different types of data on a map. GIS is a powerful tool for increasing our ability to make good decisions about resources and the way they can be affected by other geographically-related items (Temız and Tecım, 2009).

It is not only natural resources that can benefit from GIS. "Archaeology seems like a perfect match of technology and application," according to Ebert and it has found its way into all aspects of Cultural Resource Management, CRM (Ebert, 2004). Just like an endangered species or a forest meadow, cultural resource sites can be threatened by the natural environment, by people, or by both. GIS can be an effective tool for managing CR. With constant updates it can be known if a site is getting too much visitation and is degrading. GIS can determine if a site has not been monitored in many years and needs to be inspected; the information can be displayed graphically to increase understanding of the size of the situation and the different inspections that need to be done. By using the GIS database model we can determine the threat to many site locations at once by examining their relationships to the surrounding environment (Constantinidis 2009).

The ability of linking data to spatial location is what gives GIS its unique perspective on CR. While making a map may be one of the most useful things that you can do with GIS, it is considered common place. One of the best uses of GIS for CR is management (Ebert, 2004), because GIS provides a more realistic view of our data rather than just numbers on a sheet or numbers in a table. GIS allows individuals to experience the information in a more visceral way. GIS spatial analysis is perhaps the best demonstration of this fact. Consider, for example, a predictive model that is based on current data that attempts to predict the occurrence of a particular event, such as a prehistoric dwelling (Ebert, 2004).

Research on the integration of GIS and GPS into a CR workflow was time comsuming as there is very little information on their integration with Archeology field data collection procedures. Using mobile data collection procedures has substantialy simplified the CR spatial data collection procedures as they fit the data management requirements on the scale of many CR projects (Tripcevich Ph.D. 2004). GPS replaces the need for estimating the location of archeological sites locations with topographic maps, with exact locations derived from satellite determined locations. Mobile GIS for handheld GPS offers consistent data attributes and collection methods and the ability to query attribute data and correlate with spatial location (Tripcevich Ph.D. 2004). ArcPad can be leveraged to check-out and check-in data from the GIS to collect new data and ensure that the same attribute constraints are applied to the data being collected as currently exist within the GIS. ArcPad can be used to collect not only archeological site locations but also specific features within those sites, such as artifact concentrations, walls, and hearths (Tripcevich Ph.D. 2004).

The advantages to workflows are increased accuracy and speed of data collection. These are due to the constraints placed on attributes and the ease of integrating new or updated data into a dataset (Wagtendonk and De Jeu 2007). However, there are drawbacks to workflows, such as increased resources to develop workflows, increasing the initial cost of a project. Additionally, there is at the some minimal training that needs to be done to educate field staff on the procedures regarding workflows, and there is always the potential for losing datasets of a digital nature (Wagtendonk and De Jeu 2007). While losing digital data is rare, it can occur, and when it does it can be quite significant. Advantages associated with not using workflows are that there is little development needed before a project begins, and the costs associated with this development are minimal. Additionaly, training of staff is minimized, and overall costs associated with the project will likely be reduced. The disadvantages are inconsistent data due to a lack of constraints placed upon the data, and simple things like poor handwriting, and miscommunications about proper field form entries (Wagtendonk and De Jeu 2007). The question becomes one of whether you want to spend less money and risk getting inconsistent data from a less trained staff but do more projects, or whether you want to spend more money to get higher quality science from more highly trained field staff.

GIS is critical to making decisions in a resources setting because it can not only represent data, but make predictions based on that data. GIS can take many factors and combine them to gain a better overall understanding of what is really happening. GIS allows for the integration of differing datasets and the creation of a complete picture of a situation. Ultimately, the decision makers can make "better, more informed decisions based on all relevant factors" (Temız and Tecım, 2009). Geodatabases are intended to make using GIS more intuitive. The geodatabase data model centralizes data management and opens up the use of GIS or applications that were not feasible before (ESRI, 2002).

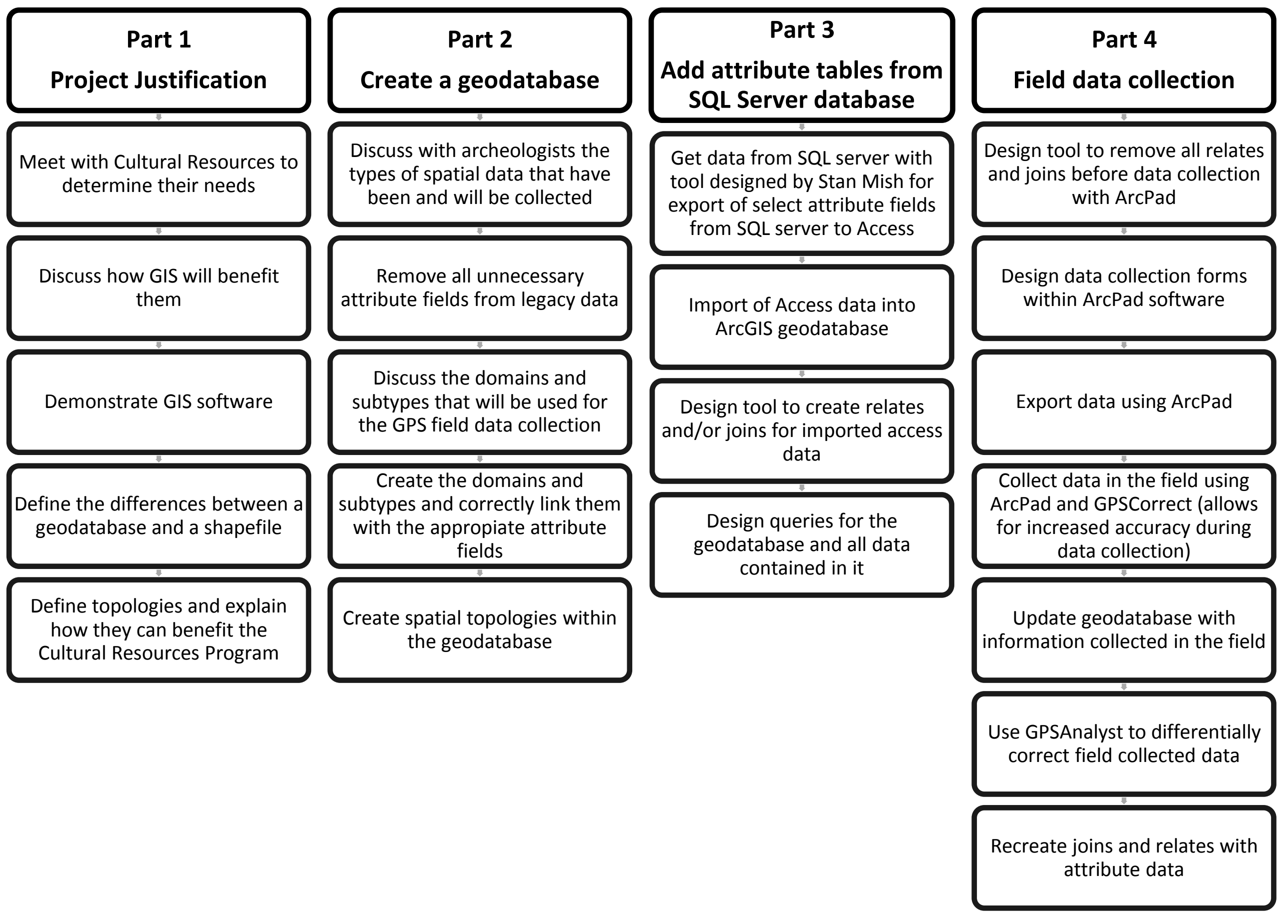

Figure 5. This figure holds the workflow used for designing the Archeological Geodatabase for this practicum. The four parts of this workflow are as follows. 1) Project Justification: why are you doing this practicum, how will you do it, why will you do it that way. 2) Create a geodatabase: what types of spatial data should it hold, can the old data set be streamlined, how can you ensure accuracy and consistency. 3) Add attribute table from the SQL Server database. 4) Design a streamlined field data collection procedure and implement the workflows.

METHODOLOGY

Designing a Geodatabase

A geodatabase combines the abilities of a shapefile to represent spatial data and the ability of a RDBMS to maintain relationships and integrity of attribute data. To begin designing the geodatabase it is first necessary to develop a conceptual model and gather as much associated input as possible.

Geodatabase Conceptual Analysis

1. Identify all the information you will need to develop and maintain the GIS
    a. Legacy shapefiles used for data collection for the CR Program were obtained from the GIS Server located at FLAG Headquarters
    b. Meetings
        i. 10\15\2011 Kelly Stehman at Piñon House
            1. We discussed different types of feature classes that would be needed and how to breakout archeology sites, archeology features, and archeology isolated occurrences. At this time we were unclear as to what we want exactly.
        ii. 10\20\2011 Talked with Lisa Leap Head of Resources at Headquarters and Lisa Baldwin CR Program Manager.
            1. Both deferred to Kelly for the most part. Wanted to include more of the SQL Server archeological data into the geodatabase. I am hoping to include a dynamic link between the 2 databases.
2. Identify how each dataset will be used, what types of information may need to be collected, how that information will be stored, and how that information will be accessed.
    a. Meeting
        i. 12\20\2011 Kelly at Piñon House
            1. We talk more about the feature classes. Kelly tends to want things that are not advisable to do in a geodatabase. I need to better explain what is possible to do and not to do. Even better would be to explain what will work best for FLAG CR but, I don't know yet.
3. Be sure to identify the specific ranges in the types of spatial representations that each dataset will be used for. This information pertains more to rasters as their spatial resolution can vary greatly; however, it is equally important to remember how your vector data is likely to be viewed. If it will never be viewed closely, perhaps accuracies do not need to be as great. For the purposes of this practicum, however, NPS data standards require that sub meter capable GPS units and differential correction.
    a. No meeting developed spatial ranges and accuracies based on NPS standards.

4. Break geographic datasets into their appropriate groupings. Make use of feature classes to separate similar feature datasets into logical groups. This makes the database more accessible and easy to understand. It also prevents confusion about what type of information a given feature dataset holds.
    a. Meetings
        i. 11\15\2012 Met with Kelly. View of staff interaction with database is unclear. I am beginning to really see the Archeological Geodatabase conceptually. I recommend that we break data out by Monuments WACA and WUPA seems the most logical grouping rather than having a field with Monument Names this would make the dataset difficult for users unfamiliar with GIS to query.
        ii. 1\11\2012 Recieved email from Kelly containing a great deal of information about the feature classes that will be created.
5. Define the tabular data and feature dataset attributes. Identify what attributes fields you wish to have and the types of columns you wish to create. Define domains, ranges, and valid values for each field.
    a. Meetings
        i. 3\20\2012 with Kelly Stehman
            1. We had been talking about what types of data to collect and had gone back and forth a lot. We have decided that we only need to collect GPS Location, Recorder_I (who recorded it), and Site_Type (the type of site it is.)
        ii. 4\10\2012 Kelly has also provided me with her site monitoring forms that will be the basis for the dropdowns.
6. Define spatial rules for your feature dataset. Make use of topologies when at all possible. Topologies ensure spatial consistency and domains/subtypes ensure attribute consistency.
    a. Meetings
        i. 4\5\2012 at Piñon house Kelly Stehman
            1. After speaking with Kelly I developed the following table. I also realized that topologies would be useful to maintain the spatial integrity of the data.

Feature Class	Relationship	Feature Class
Archeological Site Datums	Should Be Inside	Archeological Site Boundaries

Archeological Site Boundaries	Should Not Overlap\Touch	Archeological Site Boundaries
Archeological Isolated Occurrences	Should Not Be Inside	Archeological Site Boundaries
Archeological Site Features	Should Be Inside	Archeological Site Boundaries
Archeological Site Features	Should Not Overlap\Touch	Archeological Site

Table 1. This figure represents the first iteration of spatial relationships of the feature classes within the Archeological Geodatabase. It was developed from input from Kelly Stehman.

7. Propose a geodatabase design.
    a. No one was interested in the design aspect as long as they had access to the information.
8. Design editing workflows.
    a. Designed for minimal knowledge and training of seasonal CR Staff
    b. Discover that ArcSDE will not work for this project because of the type of license that NPS has with ESRI. I will need a way to get the data from SQL Server.
9. Build a working prototype. Now finally, you can start to see all the things you have done and steps you have forgotten. When you see the working prototype, it will likely not be what you want and require significant reworking. Work with those that will use the geodatabase most often and tailor it to their needs.
    a. Meetings
        i. 4\2012 – 5\2012 Met with Lisa Leap, Lisa Baldwin, and Kelly Stehman. Met multiple times with each staff member in order to cater to their individual needs. Paid particular attention to related tables so that the database could be queried for specific routine operations; such as justifying funding.
        ii. 5/5/2012 created a sheet with the types of data they wanted from Stan Mish (Mish 2012). Stan created and sent the working tool to me.
        iii. 6/10/2012 Developed tools to help with database tasks.
        iv. 7/10/2012 Presented Archeology Geodatabase training to CR staff, it was well received; support will be necessary until staff is comfortable working in the geodatabase.
10. Document the design: how the geodatabase was created, what methods were used to develop feature classes, feature datasets, topologies, and coordinate systems. The goal was that

another group or organization could look at your documentation and successfully re-create the geodatabase that was designed.

a. This process was necessary for the practicum and will hopefully be implemented in other departments within our own monuments and parks throughout the United States.

Logical Design

FLAG CR wants to collect accurate and updated information on Archeological Site Type, Feature Type, IO Type, Recorder ID, and GPS locations. To do so they need to use sub-meter GPS units in the field and then return to the office to either update or collect new GPS information. The types of information they will collect will be broken down into three categories.

Archeological Sites, which must contain remains from past human activity over 50 years old, must also contain at least 30 artifacts of one type, e.g., 30 railroad ties, and all artifacts must be in an area no larger than 15 meters unless all features originate from one source, e.g., a road. The site must containat least 20 artifacts of 2 different types, and with artifacts in an area no larger than 15 meters unless all features originate from one source. Archeological site will be defined as Arc_Site_Datums (center of site or unique feature of site), Arc_Site_Line (like a road), Arc_Site_Boundary (the boundary of an archeological site).

Archeological Features must be inside of an archeological site boundary and over 50 years old. They will be represented as Arc_Feature_Point (hearth or midden), Arc_Feature_Line (wall or check dam), or Arc_Feature_Polygon (pot drop).

Lastly are Archeological Isolated Occurances which must not be within 100 meters of another feature. These will be represented by Arc_IO_Point like a single mine shaft and Arc_IO_Polygon which may have multiple objects in it but does not meet the requirement of an Archeological Site as defined previously.

Implementation

All feature classe and tables of the Archeological Geodatabase are shown below in Table 2. See Appendix D for full specifications of the Archeological Geodatabase.

<table>
<tr><th>ObjectClass Name</th><th>Type</th><th>Geometry</th><th>Subtype</th><th>Total</th><th>Extent</th></tr>
<tr><th colspan="6">WACA</th></tr>
<tr><td rowspan="4">WACA_Arc_Feature_Line</td><td rowspan="4">Feature Class</td><td rowspan="4">Polyline</td><td rowspan="4">-</td><td rowspan="4">1</td><td>453733.6981</td></tr>
<tr><td>453744.1229</td></tr>
<tr><td>3892589.091</td></tr>
<tr><td>3892591.833</td></tr>
</table>

WACA_Arc_Feature_Point	Feature Class	Point	-	59	450743.9656 459279.793 3889630.521 3893081.927
WACA_Arc_Feature_Polygon	Feature Class	Polygon	-	4	453505.4827 453849.4951 3892576.951 3892693.271
WACA_Arc_IO_Point	Feature Class	Point	-	119	450445.2622 459456.9604 3890446.616 3895942.91
WACA_Arc_IO_Polygon	Feature Class	Polygon	-	0	No Extent
WACA_Arc_Site_Boundary	Feature Class	Polygon	-	335	450470.7434 459537.4578 3890045.868 3896182.408
WACA_Arc_Site_Datums	Feature Class	Point	-	491	450456.5696 459500.5568 3890071.306 3896134.731
WACA_Arc_Site_Line	Feature Class	Polyline	-	3	450854.4693 453193.3529 3890282.386 3892246.722
WUPA					
WUPA_Arc_Feature_Line	Feature Class	Polyline	-	44	468466.8053 473984.9807 3932201.559 3942840.166
WUPA_Arc_Feature_Point	Feature Class	Point	-	217	451380.7424 472785.4632 3928338.735 3943180.095
WUPA_Arc_Feature_Polygon	Feature Class	Polygon	-	1	468895.1922 468915.8478 3942815.202

					3942829.052
WUPA_Arc_IO_Point	Feature Class	Point	-	225	448241.7463 473201.9798 3913801.627 3940446.95
WUPA_Arc_IO_PointAnno	Feature Class	Annotation	-	224	448154.2786 473260.4972 3913753.951 3940511.191
WUPA_Arc_IO_Polygon	Feature Class	Polygon	-	0	No Extent
WUPA_Arc_Site_Boundary	Feature Class	Polygon	-	648	451360.6437 475483.2504 3928036.231 3943365.13
WUPA_Arc_Site_Datum	Feature Class	Point	-	2696	451316.9669 475370.1278 3928110.133 3943286.915
WUPA_Arc_Site_DatumAnno	Feature Class	Annotation	-	2696	451240.495 475461.8059 3928076.796 3943314.509
WUPA_Arc_Site_Line	Feature Class	Polyline	-	0	No Extent
Stand Alone ObjectClass(s)					
ArchSite	Table	-	-	3730	No Extent
CeramicsCount	Table	-	-	1187	No Extent
CeramicsLog	Table	-	-	97	No Extent
CulturalGroup	Table	-	-	13092	No Extent
DATING	Table	-	-	2041	No Extent
GeneralTimePeriod	Table	-	-	3347	No Extent
LithicsCount	Table	-	-	1260	No Extent
LithicsLog	Table	-	-	133	No Extent
Monitoring	Table	-	-	2925	No Extent
Project	Table	-	-	18	No Extent
ProjectSiteMap	Table	-	-	0	No Extent

SiteType	Table	-	-	6371	No Extent
ArcGIS Diagrammer is prototype application and is not supported by ESRI. The commands assoicated with this application and the output generated by those commands are not to be used in a production environment. ESRI is not reponsible for errors, ommission or any damages resulting from the use of application and associated output. Use of this application is conditional on the acceptance of this statement.					

Table 2. Represents feature class and table geometry, extents, and quantities. (ESRI 2008 d).

ARCHEOLOGICAL GEODATABASE

Feature Dataset

The Archeological Geodatabase consists of feature datasets WUPA and WACA. All feature class properties are based on NPS standards.

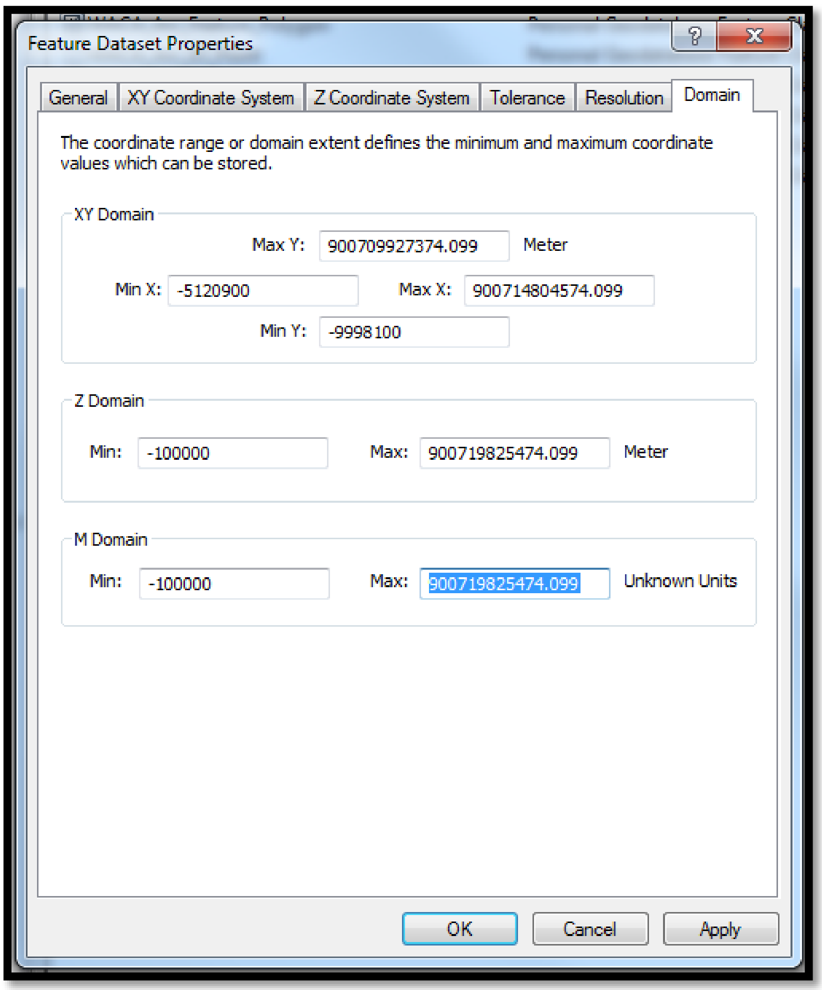

Figure 6. This figure represents the XY Domains and the Z Domains of the feature dataset. These domains were generated by the feature classes that were imported into the the feature datasets WACA and WUPA.

Feature Classes

The Archeological Geodatabase consists of feature datasets WUPA and WACA and within those feature datasets are feature classes. Table 3 displays the attributes of a legacy shapefile.

MAX_PDOP	4.9	**FID**	0	**Id**	0
MAX_HDOP	2.5			**PARK**	WACA
CORR_TYPE	Postprocessed Code			**SITENO**	-999
RCVR_TYPE	GeoExplorer 3			**ASMIS_ID**	
GPS_DATE	9\25\2003			**Site_Numbe**	
DATAFILE	combined waca sewer			**Site_Type**	IO
GPS_Time				**Comments**	
Data_Dicti				**Recorder_I**	
GPS_Week	0			**Condition**	
GPS_Second	0			**Project_Na**	
GPS_Area	0			**Sensitive**	
GPS_Perime	0			**Map_Method**	DGPS
GPS_3DPeri	0			**Map_Source**	
Avg_Vert_P	0			**Src_Date**	20030925
Avg_Horz_P	0			**Edit_Date**	
Worst_Vert	0			**Identifier**	
Worst_Horz	0			**Date**	
Unfilt_Pos	0			**GIS_Notes**	
Filt_Pos	0			**Update_Sta**	
Date_	12:00:00 AM			**Feat_Name**	
Date1				**Area_ID**	0
HPE	0			**TYPE**	Boundary
VPE	times			**COMMENT**	Unrecorded Site Boundary

Table 3. This table represents the attributes of the shapefiles that traditionally held the CR data. The first column represents data that is automatically generated by Pathfinder Office during the export process. The second column represents data that ArcMap automatically generates. The last column represents data that was filled in by CR staff in the field or by the GIS Specialist in the office. Many of the fields are no longer used and some are duplicates of information in other fields.

Feature classes are created based on discussions with Kelly Stehman and Lisa Baldwin. A final version was based on an email sent by Kelly Stehman, Lead Archaeologist with FLAG. See Appendix A for the email. Each of the feature classes listed below exist in both the WACA and WUPA feature datasets. The following defines the features for WACA; however, the feature classes' specifications are identical for both WACA and WUPA.

1. To be considered an archeological site:
    a. The area must contain remains from past human activity over 50 years old.
    b. The area must contain at least 30 artifacts of one type, 30 rail road ties
        i. The artifacts must be in an area no larger than 15 meters unless all features originate from one source; like railroad ties.
    c. The area must contain at least 20 artifacts of 2 different types; like tin cans and pot sherds.
        i. The artifacts must be in an area no larger than 15 meters unless all features originate from one source.
    d. The area must contain at least one feature that is temporally associated with at least one artifact or feature.
2. The types of archeological sites include:
        i. WACA_Arc_Site_Datums: Represents a point layer that is typically designated by a metal stake and/or tag, but it can also be the middle of the site.
        ii. WACA_Arc_Site_Line: Represents a line layer that is a linear feature representing other items like an artifact scatter, or railroad ties.
        iii. WACA_Arc_Site_Boundary: Represents a polygon layer that contains all features of the site. An example of this would be a room, artifact scatter, and a corral would all be included in the Site Boundary.
3. To be considered an archeological feature:
    a. The feature must be inside an archeological site boundary.
    b. The feature must be over 50 years old.
4. Types of archeological features include:
        i. WACA_Arc_Feature_Point: Represents a point layer that is the center of a feature within an archeological sites boundary; like a hearth or a particular arrowhead that is contained within the WACA_Arc_Site_Boundary.
        ii. WACA_Arc_Feature_Line: Represents a line layer within an archeological sites boundary; like a check dam or wall that is contained within the WACA_Arc_Site_Boundary.
        iii. WACA_Arc_Feature_Polygon: Represents a polygon layer within an archeological sites boundary; like a corral or an artifact scatter that is contained within the WACA_Arc_Site_Boundary.
5. To be considered an archeological isolated occurrence:
    a. Can be a feature that does not have another feature within 100 meters of it.

6. Types of archeological isolated occurrences include:

   i. WACA_Arc_IO_Point: Represents a point layer of a single feature; like a mine shaft

   ii. WACA_Arc_IO_Polygon: Represents a polygon layer of multiple artifacts but does not meet the standards of a site and is not within an archeological site boundary.

The Legacy shapefile was reduced to the attributes in

OBJECTID	336	**Est_Accuracy**		**Max_PDOP**	4.199999809
ASMIS_ID	WACA10399	**Worst_Est_Accuracy**		**Max_HDOP**	3.299999952
Site_Type	Unknown			**Vert_Prec**	0
Recorder_I	UNK			**Horz_Prec**	0
COMMENT	WACA 399			**Unfilt_Pos**	0
SiteName				**Filt_Pos**	0
Datafile	S06121			**Corr_Type**	Postprocessed Code
GPS_Date	6\12\2002			**Rcvr_Type**	GeoExplorer 3
Northing	10000000				
Easting	999999				
GIS_Notes					

Table 4. Domains have also been added for Site_Type and Recorder_I so that those fields are maintained to the highest possible accuracy.

OBJECTID	336	**Est_Accuracy**		**Max_PDOP**	4.199999809
ASMIS_ID	WACA10399	**Worst_Est_Accuracy**		**Max_HDOP**	3.299999952
Site_Type	Unknown			**Vert_Prec**	0
Recorder_I	UNK			**Horz_Prec**	0
COMMENT	WACA 399			**Unfilt_Pos**	0
SiteName				**Filt_Pos**	0
Datafile	S06121			**Corr_Type**	Postprocessed Code
GPS_Date	6\12\2002			**Rcvr_Type**	GeoExplorer 3
Northing	10000000				
Easting	999999				
GIS_Notes					

Table 4. This table represents the pared down and cleaned up feature classes in the new Archeological Geodatabase. The first column represents relevant data enter by CR field staff or the GIS Specialists. The second column represents the data automatically filled in by GPS Analyst during differential correction. The third column represents the legacy data from the data collections with Pathfinder Office. There are no duplicate columns and the data now hold only relevant data.

Domains

Domains are the rules that govern the values of a field; this means that only certain values are allowed in certain fields. The Archaeological Geodatabase was created for increased accuracy of the database and for field data collection purposes. The domains of the geodatabase for specific fields are shown as drop downs on the GPS unit during data collection procedures to create the domains for the geodatabase; data is gathered from the CR Division. If there are not standardized data collection procedures, they most likely need to be developed. In this instance, however, the FLAG CR Program was in the process of revamping data collection methods. Therefore, new recently updated data collection forms were used in conjunction with meetings and e-mails, particularly with Kelly Stehman, but also Lisa Baldwin and Lisa Leap. See Appendix D for a complete list of the domains used.

Once it was determined what the four domains were to contain, Mircosoft Excel (Excel) spreadsheets were created, including Site_Type, Recorder_I, IO_Type, and Feature_Type. The domains' Site_Type, IO_Type, and Feature_Type all have matching code and description fields. That is to say, the code listed in the code field is the same as the description in the description field. This is done because the actual description of the given code is much longer than would be appropriate in the description field. The definitions of each code for all domains are determined by Kelly Stehman and have already been defined previously. Upon conducting interviews with Kelly, it was determined that there is a great deal of flexibility as to the exact definitions of each option within the domains. As such, this is constantly being reworked and adjusted as necessary.

The domain recorder ID is slightly different in that the code is two- or three-digit initials of the person who is collecting the GPS information and the description is a person's full name, e.g., the code value of MMJ has a description of Michael M. Jones. Also the description for unknown Recorder_ID is UNK. As with the type fields for the other domains, unknown data represent null data.

The list of each domain can be found in Appendix D. All the domains are given a cell value of A1 as code, and a cell value of B1 as description. The purpose of this is so that the table to domain tool in our catalog can be used to create the domains, quickly and easily. In addition, if changes are made, only the spreadsheets need to be updated so that the domains can be quickly and easily re-created in ArcMap and added to their appropriate fields and feature. The method used here is for text fields only. No other fields that required domains were created during the practicum, so methods to develop domains other than text domains are not discussed.

All domains are created with other, comment, and unknown options. Other may be used in rare instances where the particular data that is being gathered is not contained within the domain. Comment indicates that the data is outside of the domain, and is manually entered in the comment field. Unknown is for legacy datasets and replaces null. Unknown should never be used during data collection and should ultimately be phased out.

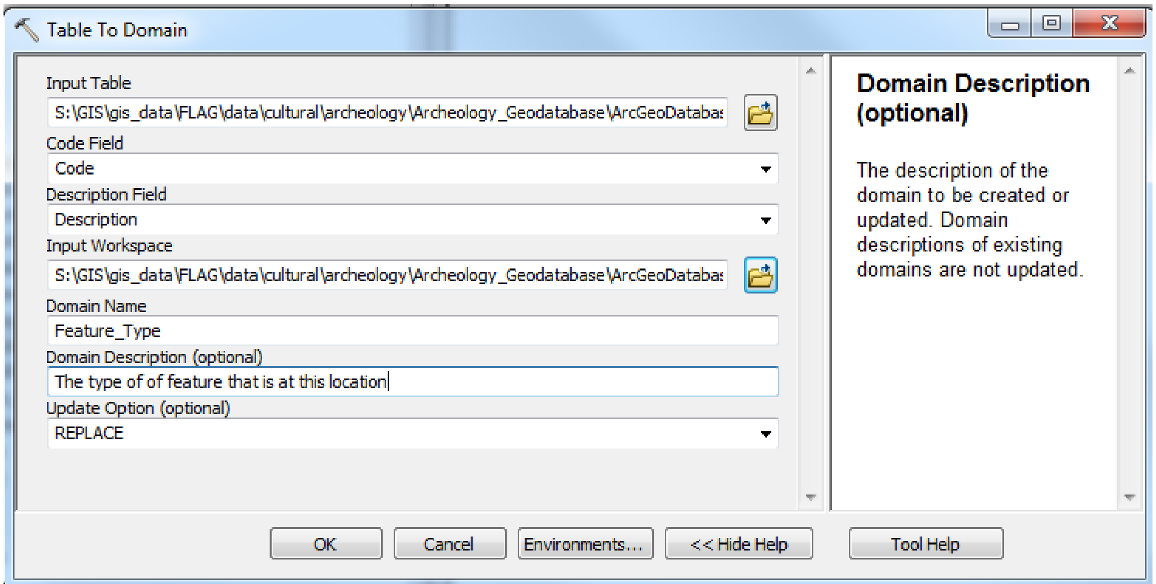

Figure 7. This figure represents the "Table to Domain" tool being used to create the Feature_Type domain. This tool allows for conversion of an Excel table into a Geodatabase domain quickly and easily, which means that the domains can be altered to keep the Archeological Geodatabase relevant even as standards change.

In order to make the domains functional after they are created the domains need to be added to the appropriate field.

To accomplish this:

1. The property values of the feature class are opened and the "Fields" tab is selected.
2. From the "Fields" tab select the site type row under the Fields property in the center of the window.
3. Now select the domain row and all of our possible domains are opened in a dropdown menu. The feature class in **Error! Reference source not found.** is a feature line.
4. So for the domain of its Site_Type attribute field, we select Feature_Type. This populates the geodatabase feature class with all the possible options for that field.

As the needs of the CR Program change so can the geodatabase adapt to those needs. If new crew members join the team their names can be added to the Geodatabase to keep it updated.

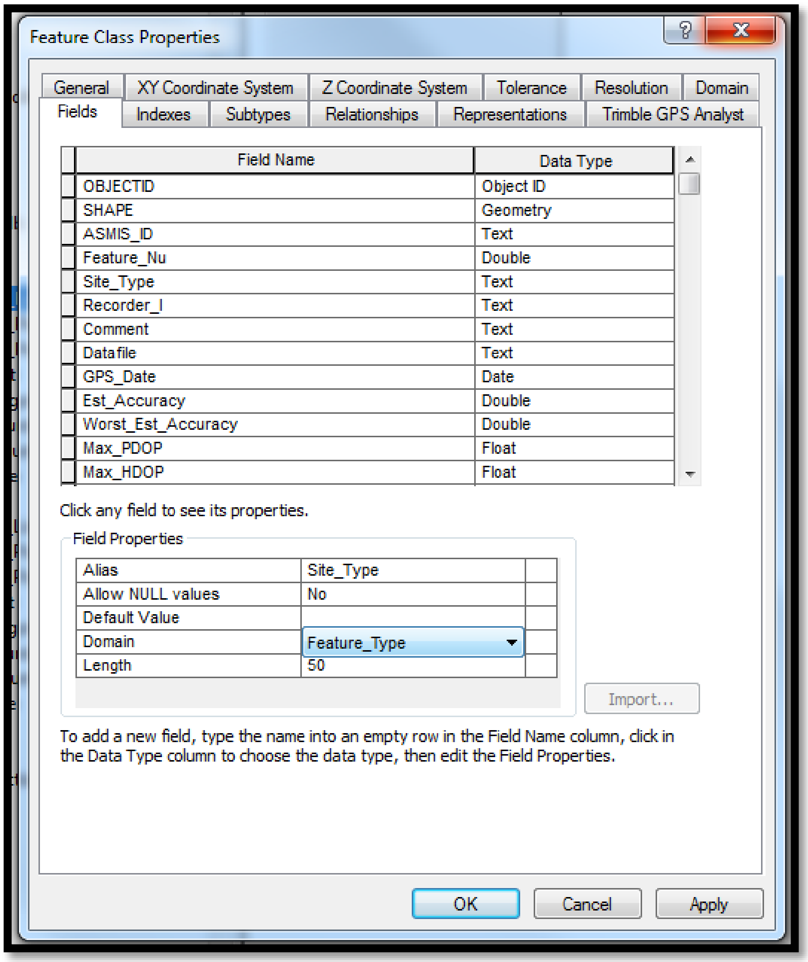

Figure 8. This figure shows how to add a domain to a feature class attribute field. This process ensures that the correct domain is in the correct field.

Ultimately, the process of adding domains to the geodatabase and to the fields themselves was automated using geoprocessing with two tools:

1. Create_ArcDB_Domains: This tool automatically creates domains based upon the information contained in Archeology_Domains.xlsx, Spreadsheet (Figure 9). This allows for easy and consistent updates to the geodatabase domains. See Appendix C for Python code of this tool.

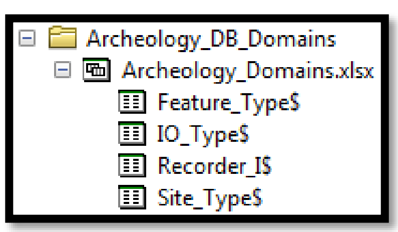

Figure 9. This figure displays what a spreadsheet looks like in ArcCatalog. The domains in the Archeological Geodatabase all reside in the same Excel file for consistency.

2. ArcDB_Domains_To_Fields: This tool adds the newly created domains to their appropriate associated attribute fields. See Appendix C for Python code of this tool.

ENABLING GPS IN A GEODATABASE

Now that the geodatabase has all necessary attribute fields and domains for those attribute fields it is time to prepare the geodatabase to accept GPS data. To accomplish this, we use an extension called GPS Analyst which is made by Trimble (Trimble Navigation Limited 2012 b) (Trimble Navigation Limited 2012 c). GPS Analyst allows for working with and storing GPS data directly within a given geodatabase. It allows for GIS and GPS data to be directly imported using the Trimble SSF file format. The SSF file format is used by Trimble data collection software products to store GPS data. GPS Analyst also allows for the import of GIS and GPS data gathered from the field with ArcPad software and GPS Correct, both made by Trimble (Trimble Navigation Limited 2012 b). Once the SSF files are transferred into the geodatabase, they can be used to differentially correct the GPS data that is gathered. This leads to increasing both the accuracy of the GPS data through differential correction and overall workflow (Trimble Navigation Limited 2012 b).

In order to prepare a geodatabase to accept GPS data the following needs to be done (Trimble Navigation Limited 2012 b):

1. GPS-enable the geodatabase and its associated feature classes so that they can contain the GPS features.
2. State the spatial reference intended for the geodatabase.
3. Specify the appropriate geographic transformation for the GPS data in order to GPS enable the geodatabase.
4. Right-click on the geodatabase and select properties from the dropdown which appears once the database properties window opens.
5. Select the Trimble GPS analyst tab.
6. Select the GNSS-enable geodatabase check box and then select the check boxes next all the feature classes in which GPS data will be gathered with.
7. Then select "Apply."
8. A window will appear that asks what type of geographic transformation you wish to use. Select the appropriate transformation. For the contiguous 48 states "NAD_1983_To_WGS_1984_5" will be used. This is based on recommendations from the ESRI ArcGIS Resource Center (Figure 10) (ESRI 2011 g).

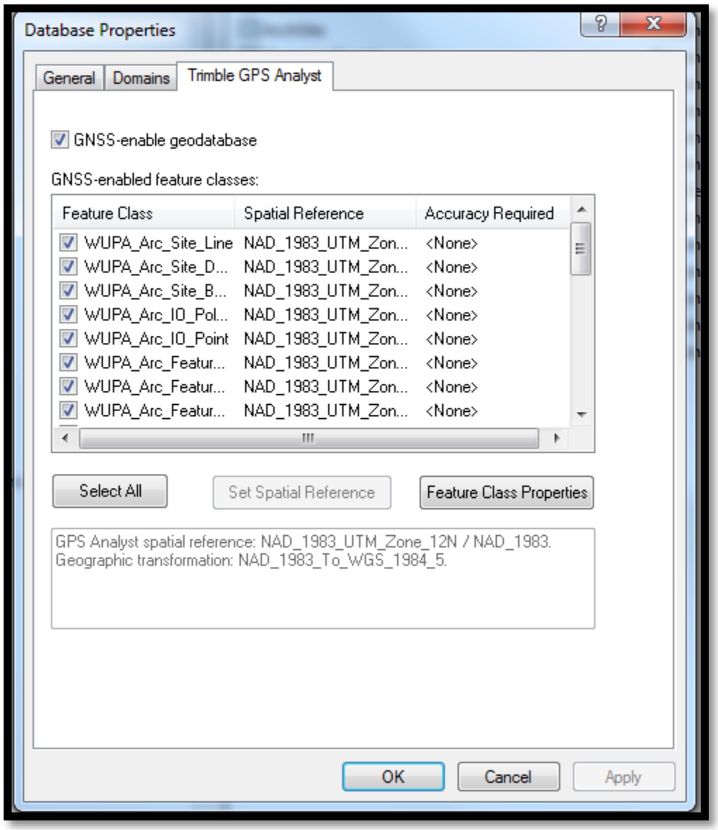

Figure 10. This figure represents how GPS Analyst is enabled within the Geodatabase. The spatial reference and the accuracy required for input into the Archeological Geodatabase are defined here.

After you have activated Trimble GPS Analyst for the geodatabase, you can then activate the settings for each feature class. To configure the Trimble GPS Analyst settings for each feature dataset of the geodatabase:

1. Right click on a feature dataset and select properties. The feature class properties window should open.
2. Then, make your selections as to what fields you would like to populate with the average estimated accuracy and the worst estimated accuracy. Also, if you need it, select the accuracy required for validation. For purposes of this practicum there is no required accuracy for validation.

TOPOLOGIES

Topologies are one of the main advantages of the geodatabase as they help to maintain spatial integrity, a key advantage to a geodatabase. Topologies are a collection of rules that allow the geodatabase to better model spatial relationships (ESRI 2012 o). Topologies define how geographic features interact with each other, and how they are related to one another geographically. There are many different types of topologies. Refer to the topologies used in this geodatabase in Figures 11-19 (ESRI 2012 o). An additional advantage to topologies is that whenever a feature class breaks a topological rule, the topology informs the administrator of that fact. This is advantageous in that it assists with QA/QC and allows for much quicker and easier management of a geodatabase (ESRI 2012 o) (ESRI 2012 p).

General Properties

Cluster tolerance is defined as 10 cm. Cluster tolerance is the distance at which there is a conflict between any defined topologies (ESRI 2012 p).

Feature Class Ranking

Feature class ranks determine what feature geometry could be adjusted if one feature topology is within the x,y tolerance of another feature topology. The highest ranked feature classes are Site data (Rank 1) due to site location being the most critical spatial component (ESRI 2012 p). The second highest ranked feature classes are Features of site because these are secondary to the site locations. The lowest ranked feature class is IO as that is the least critical element of all the different types of data collected (ESRI 2012 p).

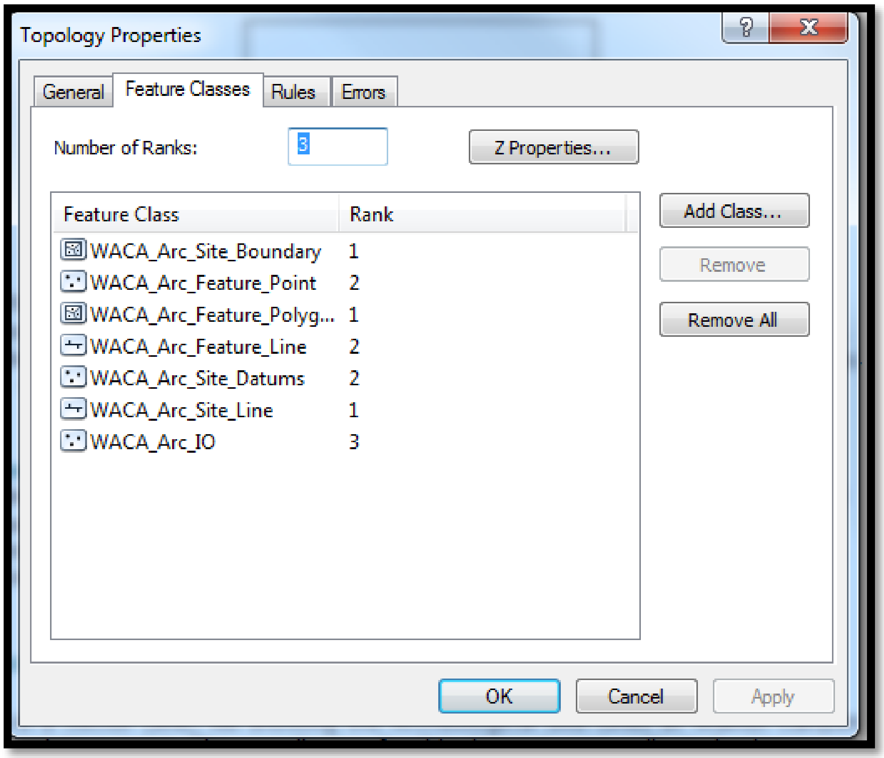

Figure 11. This figure represents feature class rankings. Feature class rankings determine what feature classes will be moved if their locations overlap, that is, which features have the priority for a location over other feature classes.

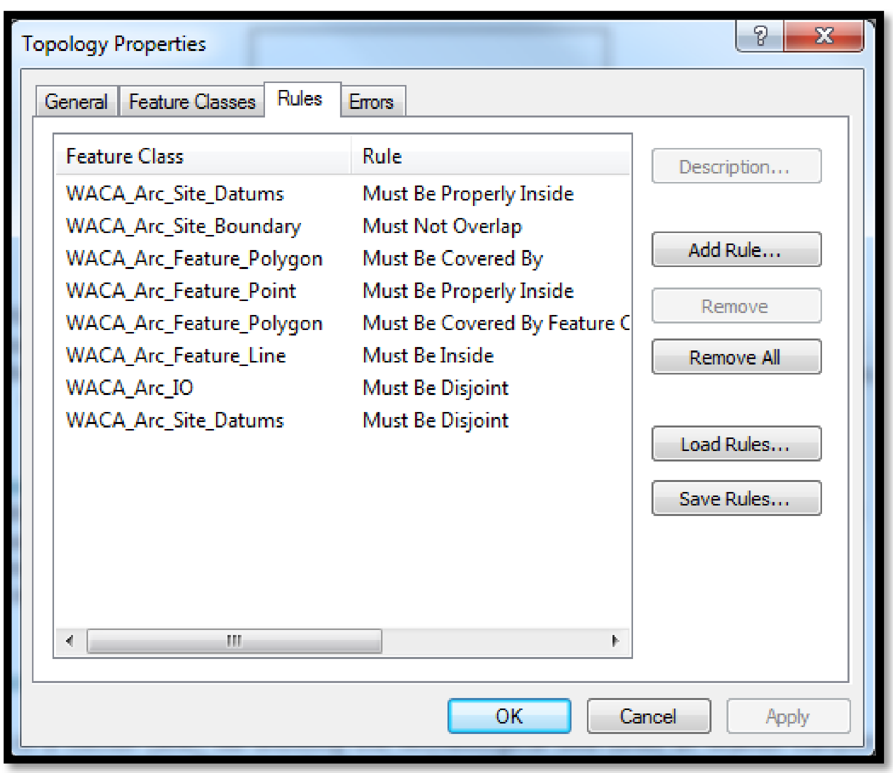

Figure 12. Topologies define how feature classes interact. For instance, in this figure WACA_Arc_IO must be Disjoint (meaning that there canott be 2 IOs in the same location). These types of rules help to ensure consistent data by automating types of QA/QC.

Defining proper topologies is critical to geodatabase management because it allows for streamlined QA/QC and saves administrators significant time in finding errors in spatial data.

Feature Class	**Rule**	**Feature Class**
WACA_Arc_Site_Datums	Must Be Properly inside	WACA_Arc_Site_Boundary
WACA_Arc_Site_Boundary	Must Not Overlap	
WACA_Arc_Feature_Polygon	Must Be Covered By	WACA_Arc_Site_Boundary
WACA_Arc_Feature_Point	Must Be Properly Inside	WACA_Arc_Site_Boundary
WACA_Arc_Feature_Polygon	Must Be Covered By Feature Class Of	WACA_Arc_Site_Boundary
WACA_Arc_Feature_Line	Must Be Inside	WACA_Arc_Site_Boundary
WACA_Arc_IO	Must Be Disjoint	
WACA_Arc_Site_Datums	Must Be Disjoint	
WACA_Arc_Feature_Point	Must Be Disjoint	

Table 5. This table lays out what types of topologies are used in the WACA feature dataset. For instance WACA_Arc_Site_Dastums need to be inside WACA_Arc_Site_Boundary. If there are datums that are not inside of boundaries then the topology will automatically list that as an error.

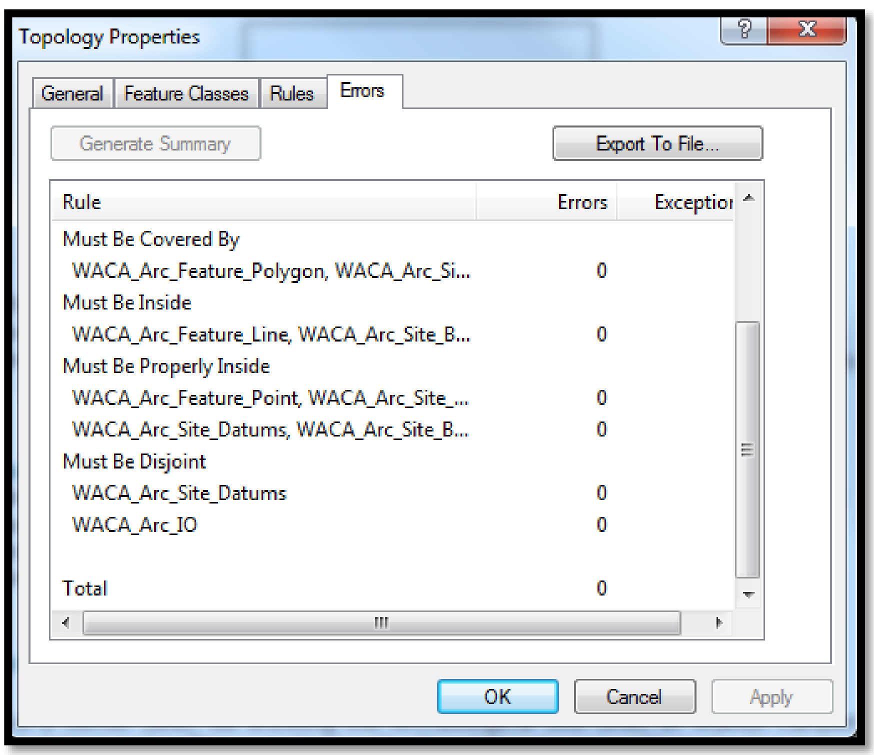

Figure 13. This is an example of what the error return looks like in the Archeological Geodatabase when there are no errors. If there were errors, then they would be listed here.

ADDING MS ACCESS DATA TO A GEODATABASE

MS Access Export Tool

The MS Access export tool was designed by Stan Mish of 7K Information Technologies. The FLAG CR staff was interviewed to determine relevant data from the SQL Server database that they wished to relate to the Archaeological Geodatabase. Stan was then contacted with this information and he designed an export tool within MS Access. This tool is able to contact the SQL Server database and extract the appropriate fields into an MS Access database. To use the tool (Figure 14):

1. Open the MS Access Database FlagArchGisExport_V1.1;
2. Then select "purge all data" which removes the old outdated data in the database;
3. Next, select the "Import GIS site data from FLAGARCH SQL Server" which updates the Access tables with the most recent version directly from the SQL Server database.

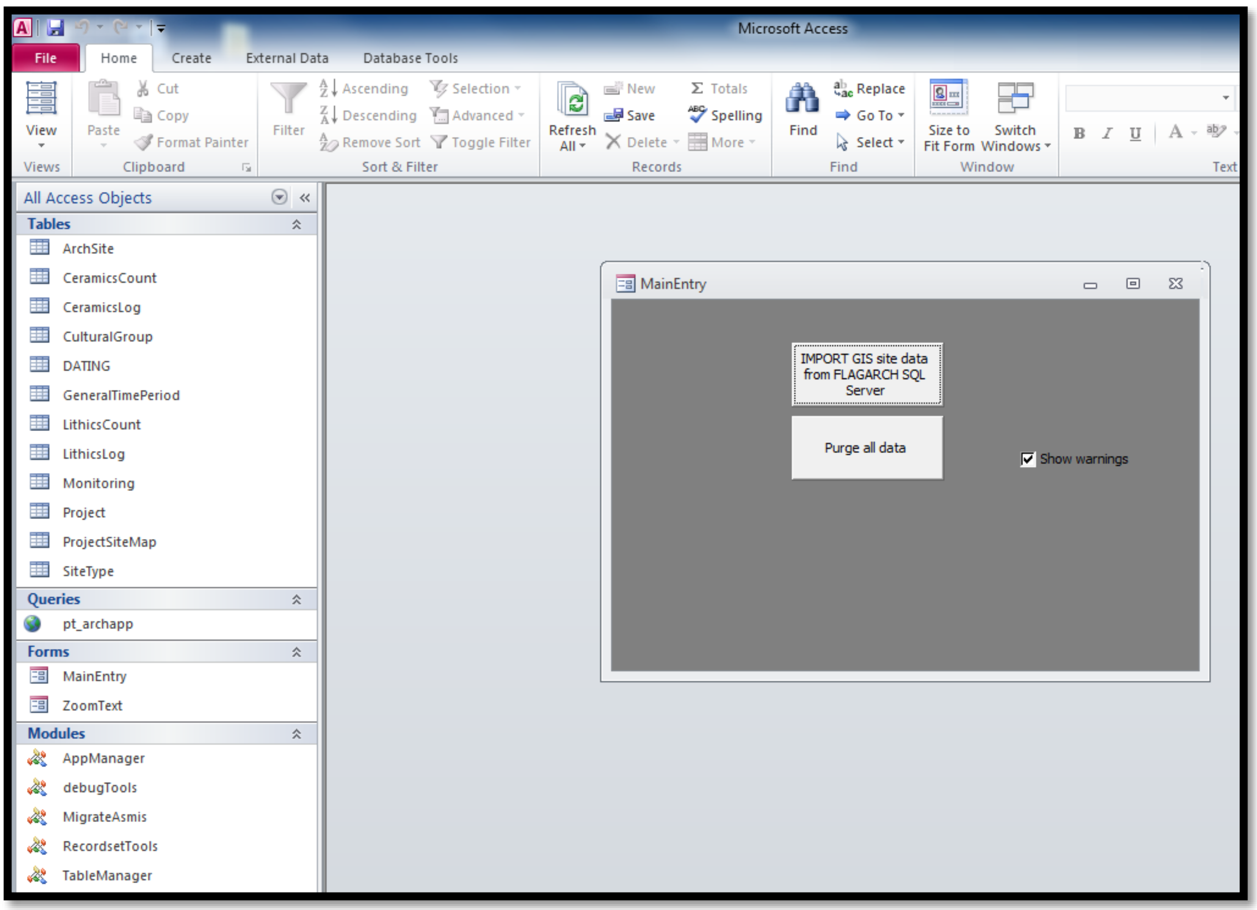

Figure 14. This is what the the FlagArchGisExport_V1.1 tool designed by Stan Mish looks like. To run the tool, use the "Perge all data" button to remove old data from the Access database; then select the "IMPORT GIS site data from FLAGARCH SQL Server" button to import the most current version of data from the FLAGARCH Server. This information is then linked with data in the Archeology Geodatabase.

Adding Non-Spatial Data

In order to add the latest FlagArchGisExport_V1.1 several tools have been created using ArcGIS Geoprocessing Model Builder. Model Builder allows for the stringing of multiple tools together to automate a process (ESRI 2012 a), making the process faster and eliminating human error.

1. Remove the previous FlagArchGisExport_V1.1 tables from the geodatabase using the Delete_ArcDB_Tables Tool. See Appendix C for Python code of this tool.
2. To add the updated FlagArchGisExport_V1.1 tables, use the Add_ArcDB_Tables tool. See Appendix C for Python code of this tool.

Joining Non-Spatial Data

To join the non-spatial tables we need a key within each table that can join all the tables together. The key is the ASMIS_ID, WACA_10XXX or WUPA0XXXX. The X represents a numeric value between 1 and 9. A tool was created to automate this process called Create_ArcDB_Joins. All the Joins are with the WACA_Arc_Site_Datum and WUPA_Arc_Site_Datum feature datasets. Use the Create_ArcDB_Joins tool. See Appendix C for Python code of this tool.

Querying Non-Spatial Data

To query non-spatial data once it has been related: the query tools that come with ArcMap are used to analyze the data and display it spatially. Building query expression is relatively easy in ArcMap so a map named Archeology_Query_Map was created and a tool bar was customized to give access to basic tools used to query and examine the geodatabase (Figure 15).

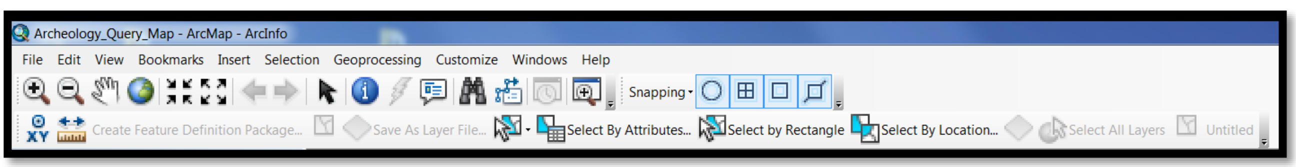

Figure 15. This is the Archeology_Query_Map tool bar. It was customized in GIS to supply CR staff with commonly used tools to analyze the Archeological Geodatabase.

Attribute data can be queried using the Select by Attributes tool. Any attribute can be selected, and using the Get Unique Values button in the tool, you can select from a list of valid values in that field. The field can be queried for an exact value, using =, or, using or, for multiple values. For more information on ArcMap queries go to:

http://resources.arcgis.com/en/help/main/10.1/index.html#//00s50000002t000000

ARCPAD/GPS CORRECT/GPS ANALYST/GPS

GPS is used in many aspects of daily life, including recreational navigation, high precision surveying, and is becoming common in vehicles. It is not surprising that GPS has changed the way that

GIS users collect data (U.S. Goverment 2012). Current high accuracy GPS units coupled with data collection software and post processing differential correction software enables data collection that can be accurate within decimeters (Trimble Navigation Limited 2012 b) (Trimble Navigation Limited 2012 f).

Trimble manufactures GPS units capable of sub-meter data collection. The Trimble GeoExplorer 2005 Series is capable of accuracies of up to 50 cm (Trimble Navigation Limited 2007 a). It has an integrated Satellite Based Augmentation System, SBAS, which allows for wide-area or regional augmentation by taking advantage of additional satellite message broadcasts to improve GPS accuracies in real time (Trimble Navigation Limited 2007 a).

The types of software used for GPS data collection are ArcPad, GPSAnalyst, and GPSCorrect (Trimble Navigation Limited 2012 d) (Trimble Navigation Limited 2012 c) (ESRI 2012 f). ArcPad can be installed onto the GPS unit and onto the computer, both separately and as an extension in ArcMap. However for this work flow ArcPad data manager is not used, GPS Analyst is used so that the GPS data can be differentially corrected. GPSAnalyst is able to check-out data directly from a geodatabase to a file that can be added onto the GPS unit. With ArcPad installed on the GPS unit you can open that file (ESRI 2011 k). This data can now be edited with new GPS coordinates and attribute data to correctly update that information. Alternatively, entirely new data can be collected with appropriate attribute fields (Trimble Navigation Limited 2012 b). With GPSCorrect installed on the GPS unit during the data collection process, an SFF file is created that is used for his file is used for differential correction (Trimble Navigation Limited 2012 f). Once data collection is completed, the data that you collected and edited can be moved into the same file to an appropriate location. Then with ArcMap the data can be checked-in to the geodatabase and differential corrected using GPSAnalyst. After differential correction GPS accuracy of up to 50 cm is possible (Figure 16) (Trimble Navigation Limited 2012 b).

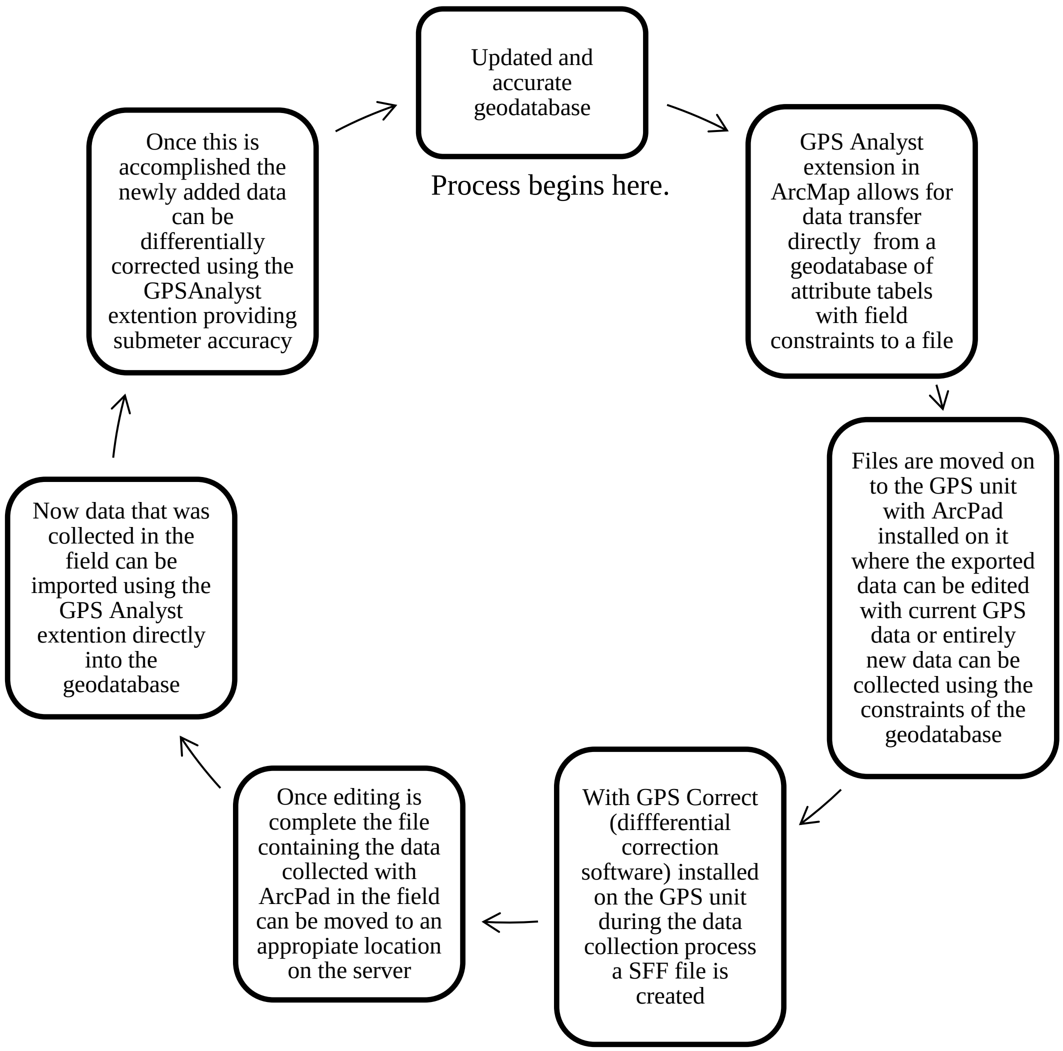

Figure 16. This is the field data collection procedure designed for the FLAG CR Program. The procedure for data collection is as follows:
1. Check-out data to be edited from the Archeological Geodatabase and place in a folder on the server.
2. Move the checked out data to the GPS unit, go into the field, and recollect old inaccurate or new data.
3. Bring the collected data back to the office, copy back onto the server, and import back into the Archeological Geodatabase and differentially correct. Now the data base has been updated and is current and accurate.

GPS DATA CHECK-OUT

There are two maps used to check-out data from the Archaeological Geodatabase; WUPA_Archeology_GPS_Collection and WACA_Archeology_GPS_Collection. They each contain the CR feature classes for the monuments they are named after.

Check-Out ArcMap

The check-out procedure for editing in ArcPad is as follows (ESRI 2012 f) (Trimble Navigation Limited 2012 b):

1. Select the Get Data For ArcPad button on the Trimble GPS Analyst toolbar.
2. The Get Data For ArcPad window opens (**Error! Reference source not found.**).
3. Select the action bar as the drop-down appears.
4. Choose the selection you wish to use. For this practicum select check-out all geodatabase layers only.
5. Continue through the rest of the screens selecting all appropriate boxes and making sure to save your check-out in an appropriate location.

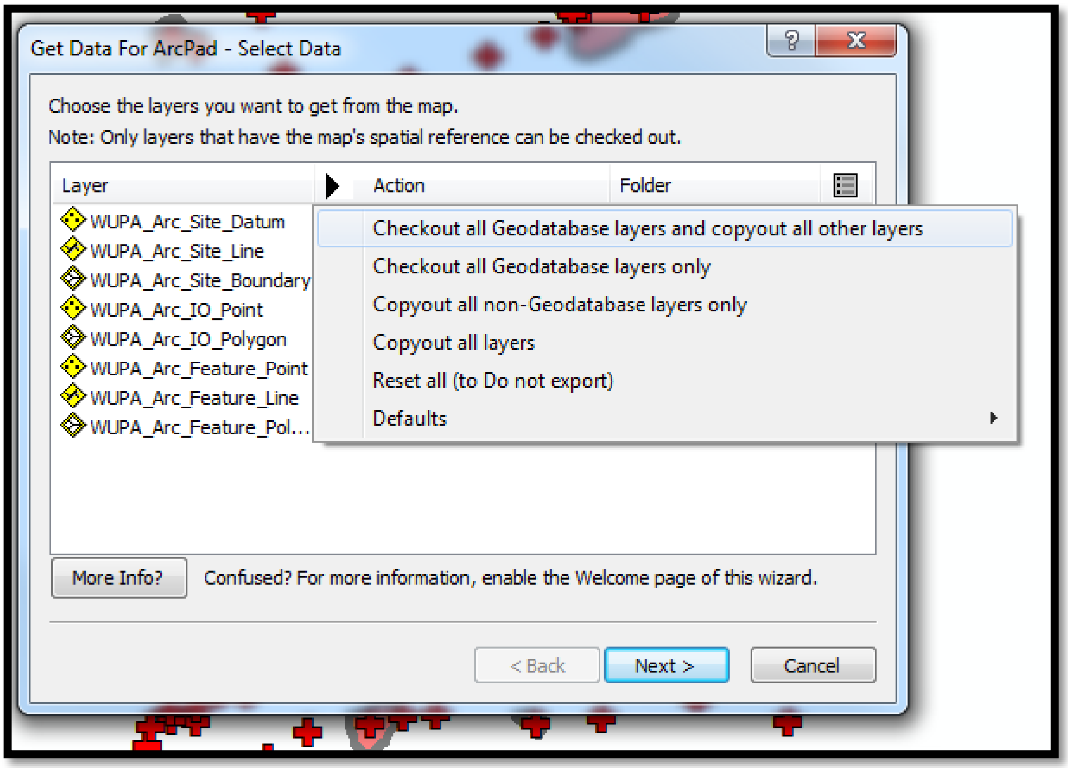

Figure 17. Using the "Get Data For ArcPad" tool, data can be checked out for editing in the field. This was critical to the workflow as much of the Archeological data that exists in the GIS was digitized and is inaccurate.

TRANSFER THE DATA TO THE GPS UNIT

1. Navigate to the location in which to save your export. Leave the window open (Trimble Navigation Limited 2012 b).
2. Connect your GPS unit to your computer.
3. Navigate to the location of your GPS unit. Leave the window open.
4. Copy the file that you exported from ArcMap to your GPS unit.
5. Disconnect your GPS unit.

ARCPAD DATA COLLECTION

1. Turn on the GPS unit (ESRI 2012 f).
2. Open ArcPad.
3. Then navigate to and open the map that you exported from ArcMap
3. Now navigate to the fourth tab from the left that looks like a pencil (Figure 18).
4. Select the feature which is to be edited or collected.

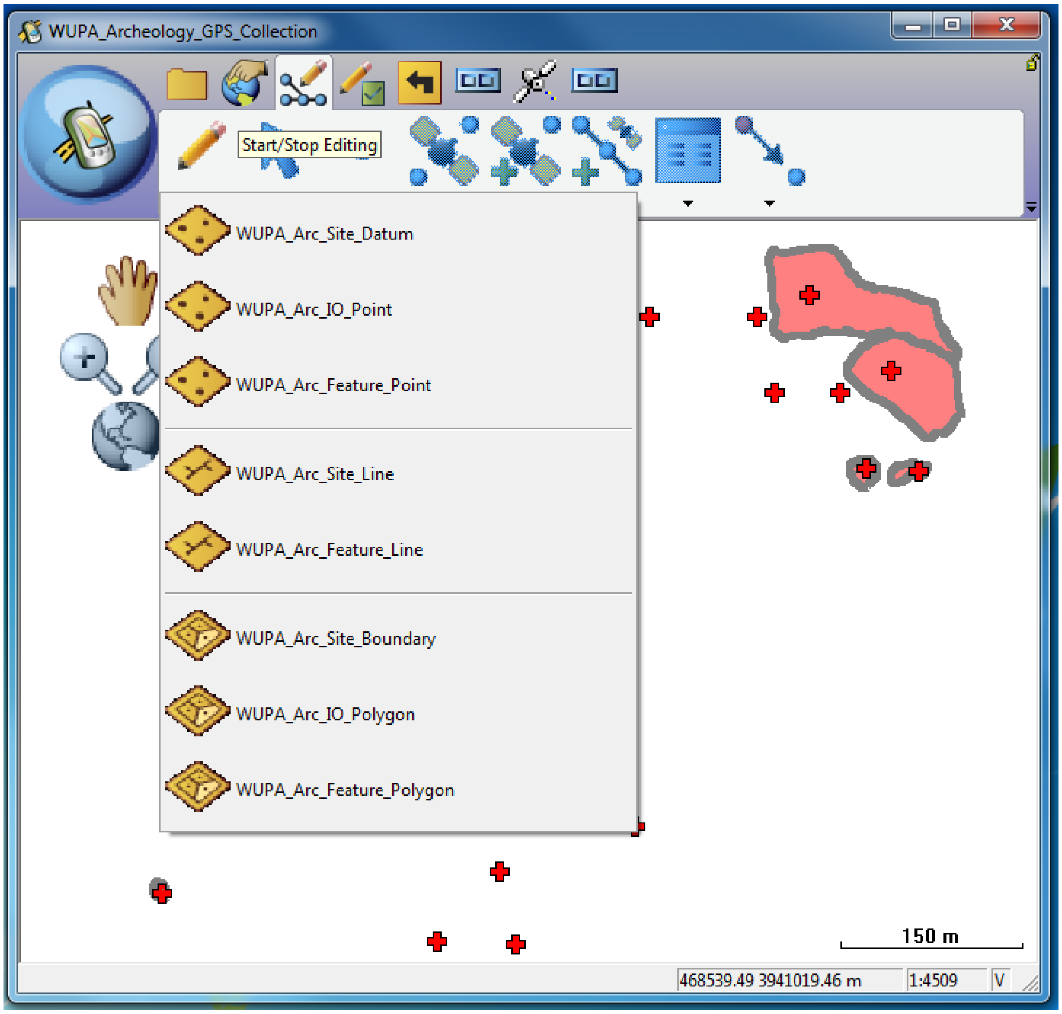

Figure 18. This is ArcPad which allows for data collection in the field with a handheld GPS device. This screen capture represents how you are able to edit data in the field. This dropdown menu allows you to select which feature classe(s) are to be edited, thereby eliminating mistakes.

5. Once you have selected to collect a geographic location site to collect, a form will open (Figure 19).
6. Only the top three fields listed are required.
7. Both fields Site_Type and Recorder_I have dropdown lists created by the domains of the geodatabase.

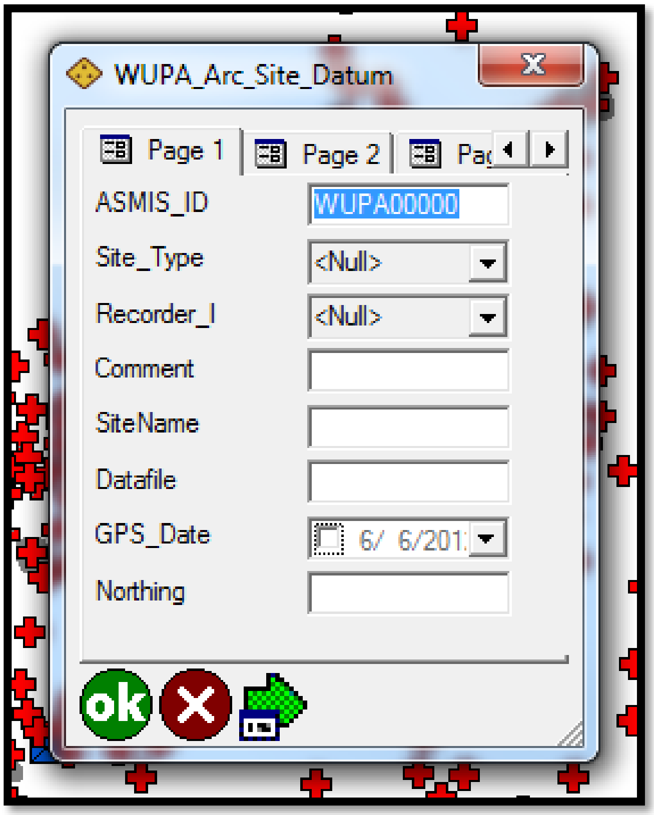

Figure 19. This screen capture of ArcPad depicts what the data entry field of WUPA_Arc_Site_Datum looks like. The fields ASMIS_ID, Site_Type, and Recorder_I are the only required fields. ASMIS_ID needs to be manually entered, while Site_Type and Recorder_I are dropdowns created by domains for those fields from the geodatabase.

8. Now that you have collected data in the field, close ArcPad and turn off the GPS.

GPS DATA CHECK-IN

Transfer the Data from the GPS Unit

1. Connect your GPS unit to your computer.
2. Navigate to the location of your GPS unit. Leave the window open.
3. Navigate to the location in which you wish to save your collected data. Leave the window open.
4. Copy the file that you exported from the GPS unit to the location in which you wish to save your collected data.
5. Disconnect your GPS unit.

Check-in Data to the Geodatabase

1. Start GNSS Editing from the Trimble GPS Analyst toolbar (**Error! Reference source not found.**).
2. Select the features which were edited or newly collected; then click ok.
3. The features have been added to you geodatabase.

Differentially Correct the Data Checked In

1. Start GNSS Editing from the Trimble GPS Analyst toolbar (Trimble Navigation Limited 2012 b).
2. Select the differential correction utility. The Differential Correction Wizard window should open (Figure 20).

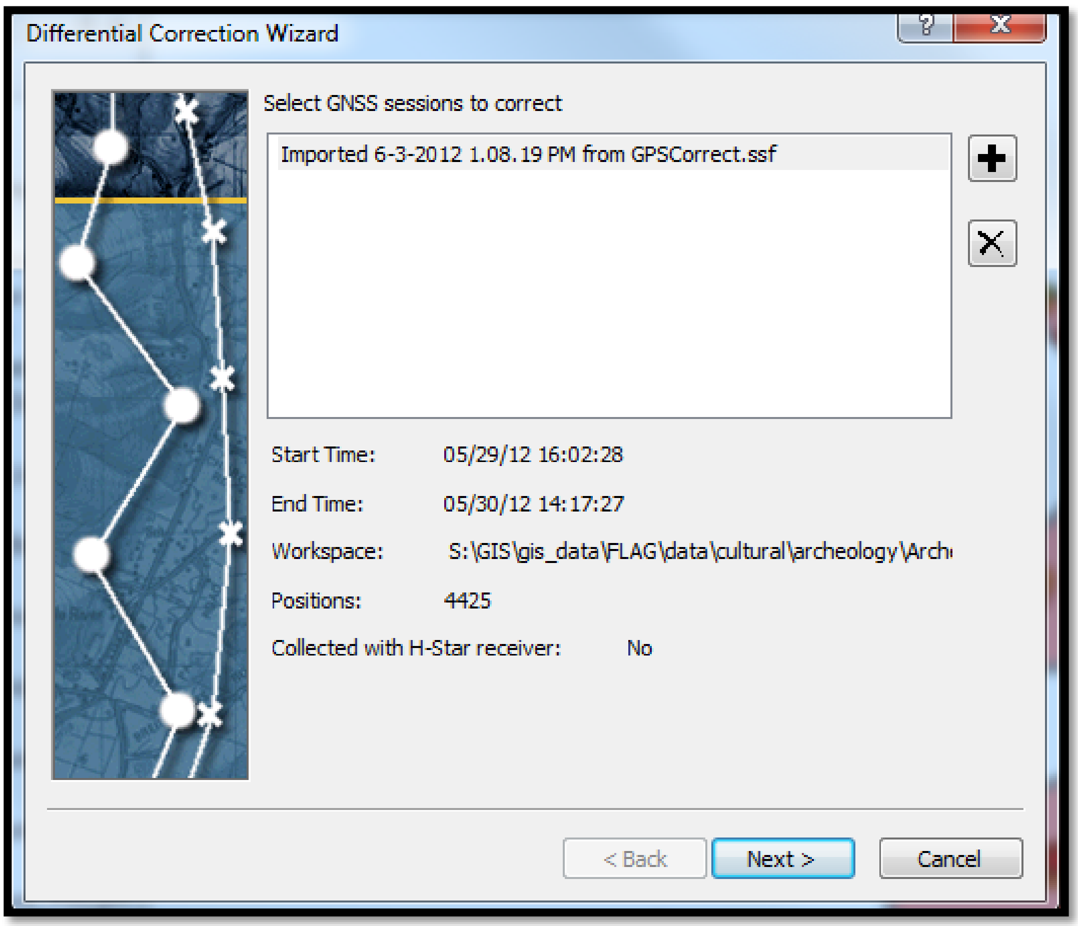

Figure 20. This is a screen shot of the GPS Analyst Differential Correction Wizard. Differential correction allows for increased accuracy of GPS Data once it is brought into the geodatabase. Differential correction ensures that GPS data is as accurate as possible.

3. Follow the screen prompts until you are asked to select a base station for differential correction (Trimble Navigation Limited 2012 b).
4. Select the Base Station Provider search and the select base provider.

5. If necessary, select the integrity index at the top right of the window. This will reorder the list and allow you to choose the base station with the highest integrity index. Be sure to choose a CORS (Trimble Navigation Limited 2012 b).
6. Continue through the various windows selecting options that are relevant.
7. Eventually you will reach the end of the Differential Correction Wizard (**Error! Reference source not found.**).
8. Save your GNSS edits and close the map.

RESULTS

The database is fully integrated into the FLAG CR worfflow, and has significantly increased the amount of data being generated on a consistent basis, while the efforts to maintain that data by the GIS Specialist has significantly decreased. Overall, the database attribute accuracy is good, with few errors associated with it. The domains have been edited several times, and it is likely that they will continue to be edited throughout the life of the geodatabase. The consistency within those attribute fields should be relatively easy to maintain.

Topologies have successfully been used within the geodatabase to identify sites with missing boundaries and datums. This has been leveraged to gather the most necessary and pertinent information possible. Allowing the CR staff to prioritize what sites need to be reevaluated for accuracy and consistency, as sites that lack a boundary or a datum, typically have not been visited in a significant amount of time or were digitized from paper maps and have never been recorded with a GPS.

Field data collection has been significantly streamlined due to the simplified check-in, collection, and check-out processes. In 2012 the rate of blanks in required fields in the geodatabase was 0 of 46, or 0% of the 23 sites at WACA, and 1 of 116, or less than 1% of the 58 sites at WUPA, compared with 2011 when the rate of blanks in required fields was 11 out of 20 required fields, or 55% of the 10 sites at WACA, and 128 of 194, or 66% of the 67 sites at WUPA. This shows that the total number of errors with the new workflow was reduced to less than 1% in 2012 compared with 2011 which had a 65% blank field rate.

The overall result of the newly designed geodatabase data collection methods and associated non-spatial data is that both the spatial data and attributes of that spatial data will be more consistent. Access to this reliable source will lead to increased efficiencies for managerial decisions, funding justification, and field data collection.

There are currently issues with ArcExplorer and with personel geodatabases that cause ArcExplorer to not read feature classes or .lyr files. As a work around I weekly copy feature datasets

WUPA and WACA from the personel geodatabase to a file geodatabase which is linked to .lyr files so that CR staff who use ArcExplorer to access GIS data.

Improvements to the Geodatabase could include a Unique numbering system for IO points and polygons. While there was a tracking system at one point in an access database deciphering how it worked is difficult but may be feasible at a later time.

In the future I hope to integrate GIS streamlined workflows into Natural Resources and Facilities Mainteance. The integration of easily accessible GIS information is critical to the survival of GIS within the Park Service. GIS has long been guarded by GIS specialists and IT professionals as something which only they should have access to. Therefore, many areas of the Park Service are not aware of the value of GIS, and it is now my opportunity to provide that access and demonstrate how effective it can be. I view my role as GIS Specialist as insuring the accuracy and availability of the data so that others can freely access it on demand. My hope is that I can design and implement this type of geodatabase to improve workflow for all departments within the FLAG.

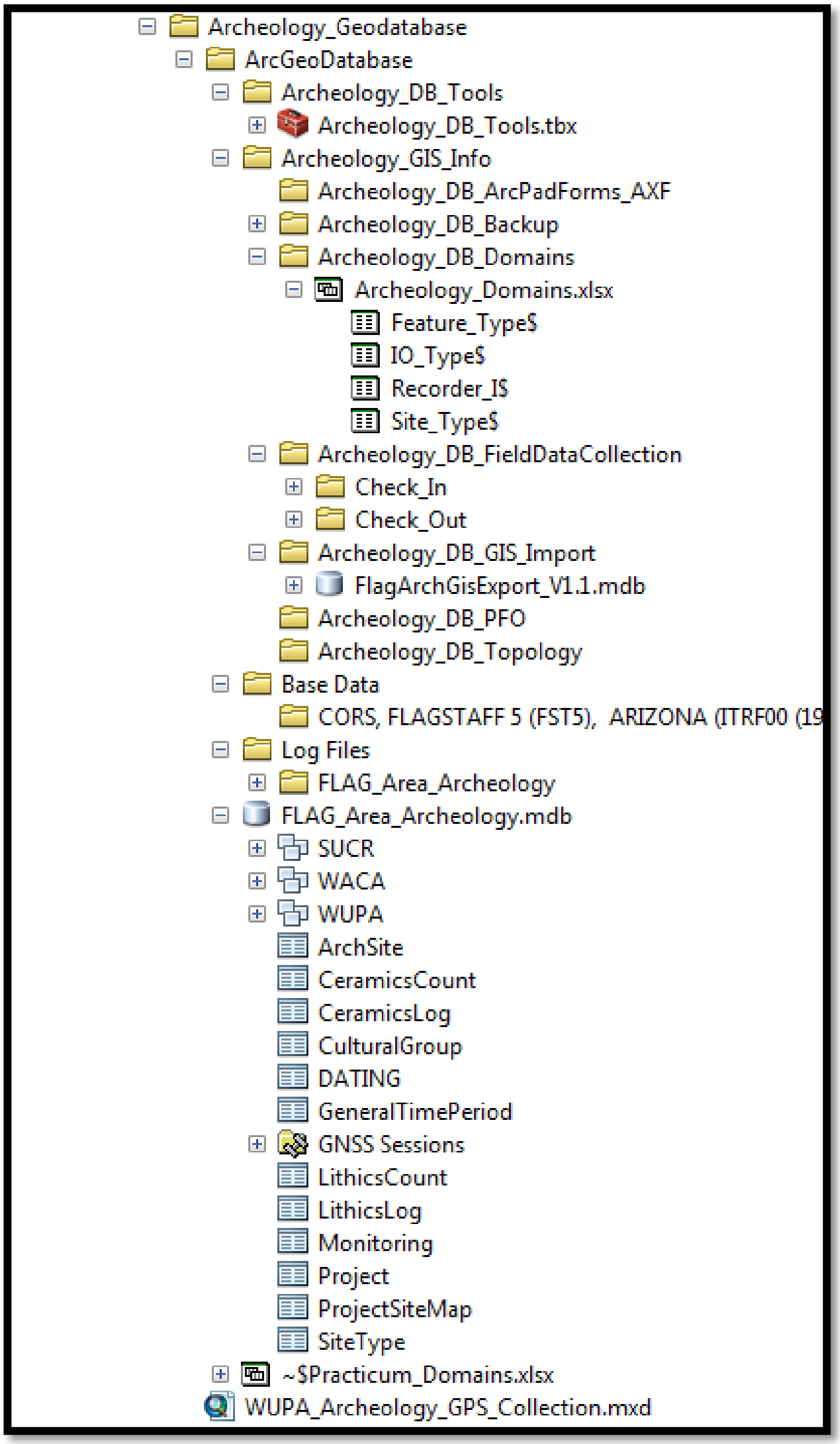

Figure 21. These are all items created in association with this practicum logically organized. The Archeology_DB_Tools store the tools created for this practicum. Archeology_Domains contain the Excel spreadsheet that stores the domains. Archology_DB_FieldDataCollection stores the data that is checked-in and the data that was checked-out. The Archeology_DB_GIS_Import stores the FlagArchGisExport_V1.1 to link data from SQL Server with the GIS. Lastly, the FLAG_Area_Archeology.mdb stores the feature datasets, feature classes and related data tables for each of the monuments.

CONCLUSION

A steamlined workflow was created and implemented into the CR Program of FLAG. As part of this process a geodatabase was created specifically for the CR Program and data from the CR SQL Server Database was linked through and export tool to the Geodatabase so that the data can be queried and displayed spatially. A successful training was planned and executed for the CR staff and supplemental support for works flows was provided. Over 50 Archeological Sites were updated with more accurate GPS locations, the greatest number within the last 2 years. Even more impressive is that no data was lost.

Since the conception of this practicum, my role for the FLAG has changed significantly. I began as a part-time student employee and over time moved into the position of GIS Specialist. What I found is that my ambition to provide accurate GIS information and demonstrate the usefulness of that information has only increased. The implementation of the Archeological Geodatabase means that the CR Program has access to consistent, frequently updated, and valuable information. My work has evolved from spending hours of my time, almost daily, to post process the data collected for the CR Division cumbersome and inconsistent workflow, too simply providing QA/QC using topologies, backing up the geodatabase once a week, and occasionally troubleshooting errors with the GPS units. The benefits are clear.

The implementation of automation involves a great deal of effort. Countless hours of researching, reworking, troubleshooting, interviews, emails, and failures will never outweigh the long-term benefits of a streamlined data flow and consistent data. The ability to step back from a complicated workflow involving daily manual data processing and redirect my time and energy to more productive endeavors, is significant, not to mention the advantagesof having access to reliable and up-to-date data for analysis and justification of funding.

The integration of easily accessible GIS information is critical to the survival of GIS within the Park Service. GIS has long been guarded by GIS specialists and IT professionals as something which only they should have access to. Therefore, many areas of the Park Service are not aware of the value of GIS, and it is now my opportunity to provide that access and demonstrate how effective it can be. I view my role as GIS Specialist as insuring the accuracy and availability of the data so that others can freely access it on demand. My hope is that I can design and implement this type of geodatabase to improve workflow for all departments within the FLAG.

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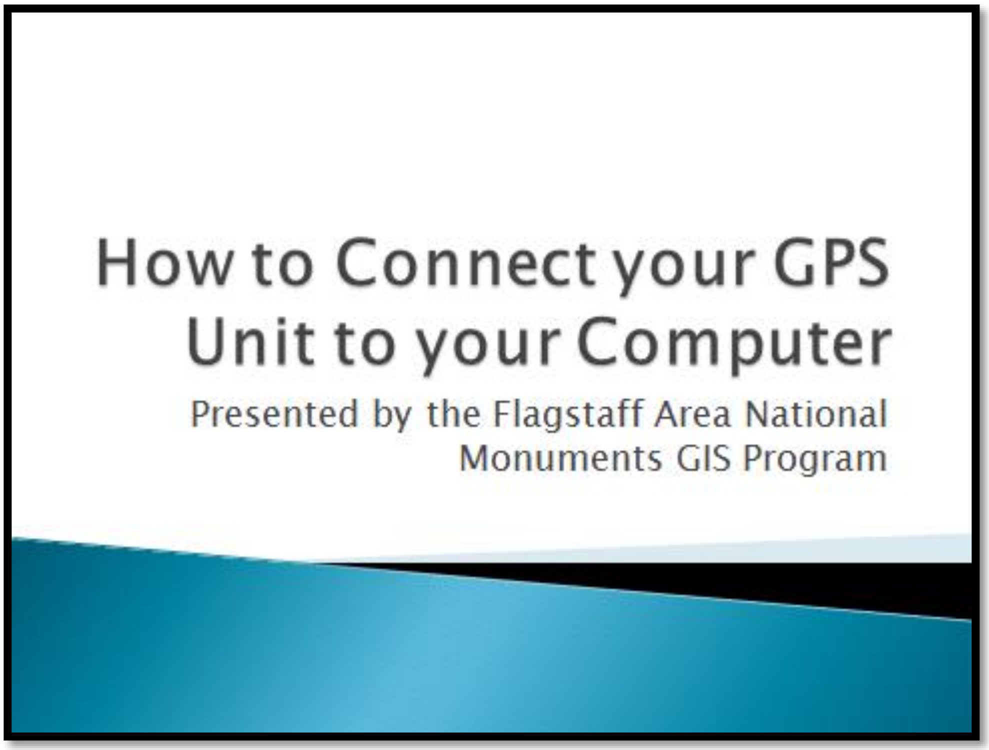
APPENDIX A. ARCHEOLOGICAL GEODATABASE USER GUIDES

All of the ARCHEOLOGICAL GEODATABASE USER GUIDES were developed as part of the annual training program of the Flagstaff Area National Monuments GIS Program. The staff of this program included Kerry Gaiz, Bryan Hansen, and Michael Jones. Most of the work done on the User Guides was completed by Kerry and Bryan. It is thanks to them that these User Guides were so useful.

HOW TO CONNECT YOUR GPS UNIT TO YOUR COMPUTER



Hardware Checklist

- GPS Unit
- Cradle (for GeoXTs only)
- USB Cable
- Power cord

Configuration

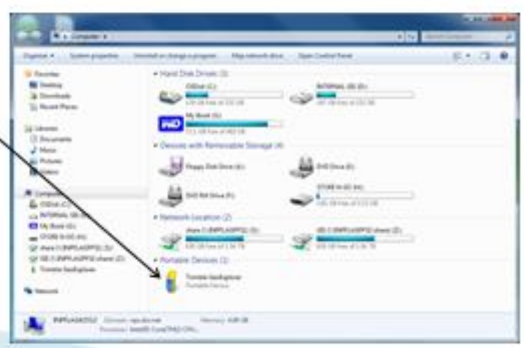
- Trimble GeoXT
  - Make sure that the cradle is connected to your computer with a USB cable
  - Place the GPS unit into the cradle inserting the top part first and then pressing down on the bottom part until you hear it click into the cradle
- Juno
  - Connect the USB cable from the unit to the computer

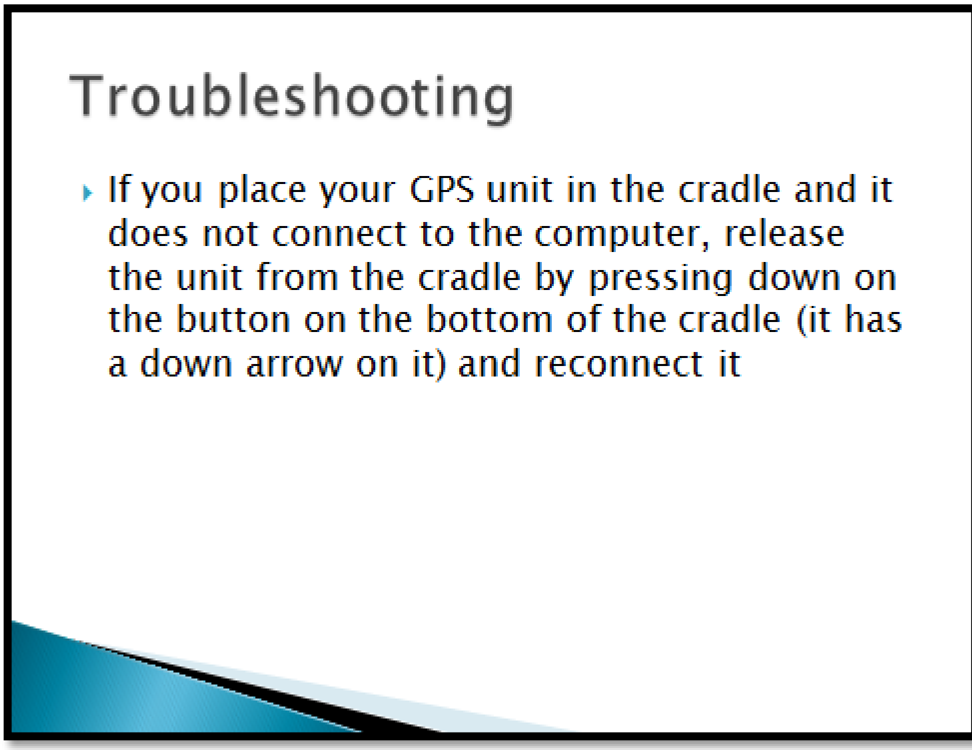
Check the connection

- Windows Mobile Device Center should open when you connect the GPS unit to the computer
- In the lower left corner there should be an green check mark indicating that the unit is connected

Check the connection

- You can also find your GPS unit in **My Computer**
- Navigate to the Start Menu > My Computer and you should see your unit under the Portable Devices section



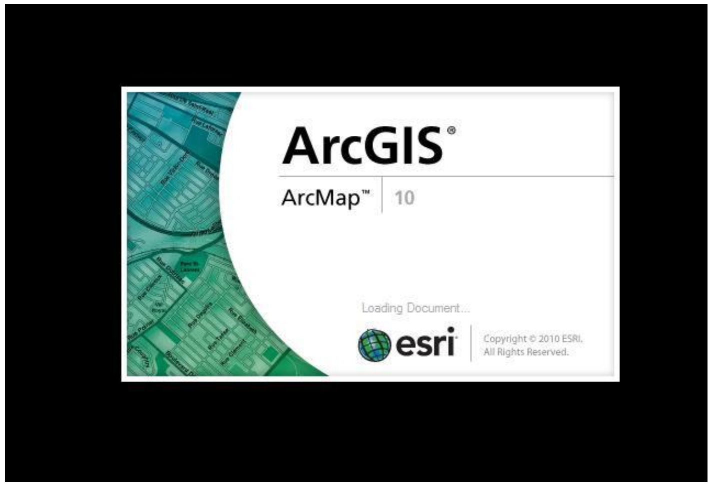


CHECKING OUT DATA FOR ARCPAD

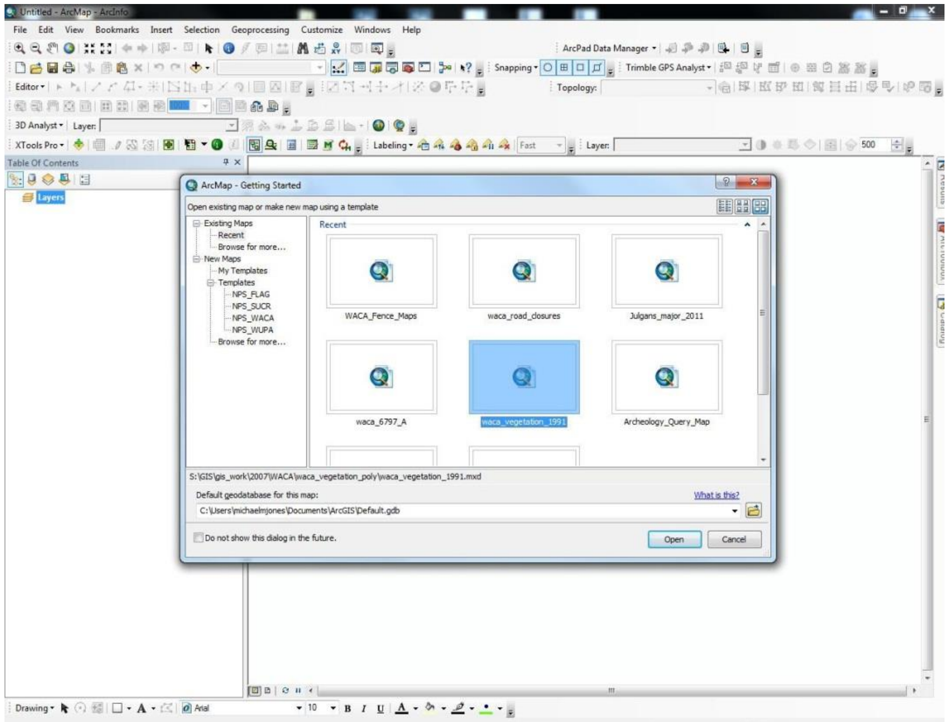
Checking Out Data for ArcPad 2012

1. Open ArcMap on your Computer

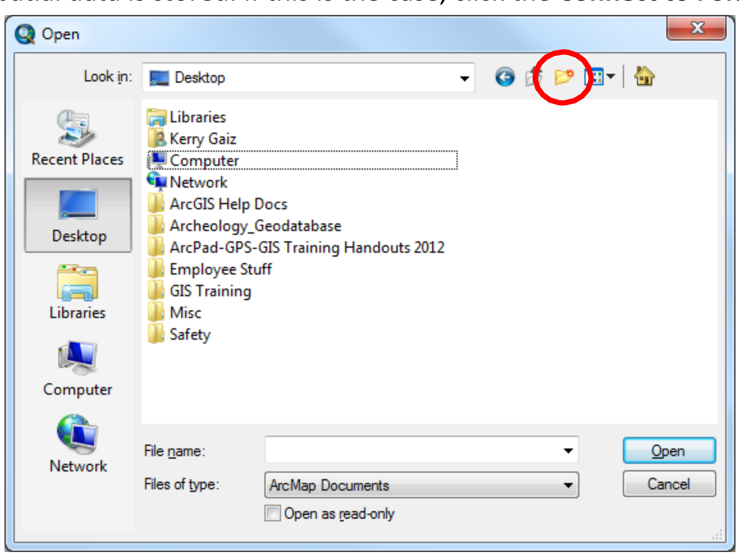
2. This will appear while ArcMap is loading


ArcGIS®
ArcMap™ | 10
Loading Document...
esri
Copyright © 2010 ESRI.
All Rights Reserved.

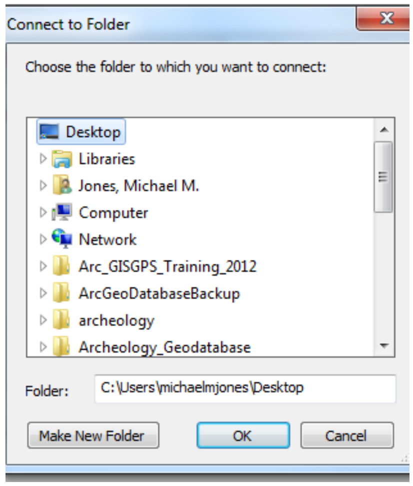
3. Your screen should look something like this. If you were using a map previously and wanted to use it again you could select that map. Otherwise, click **Cancel**.



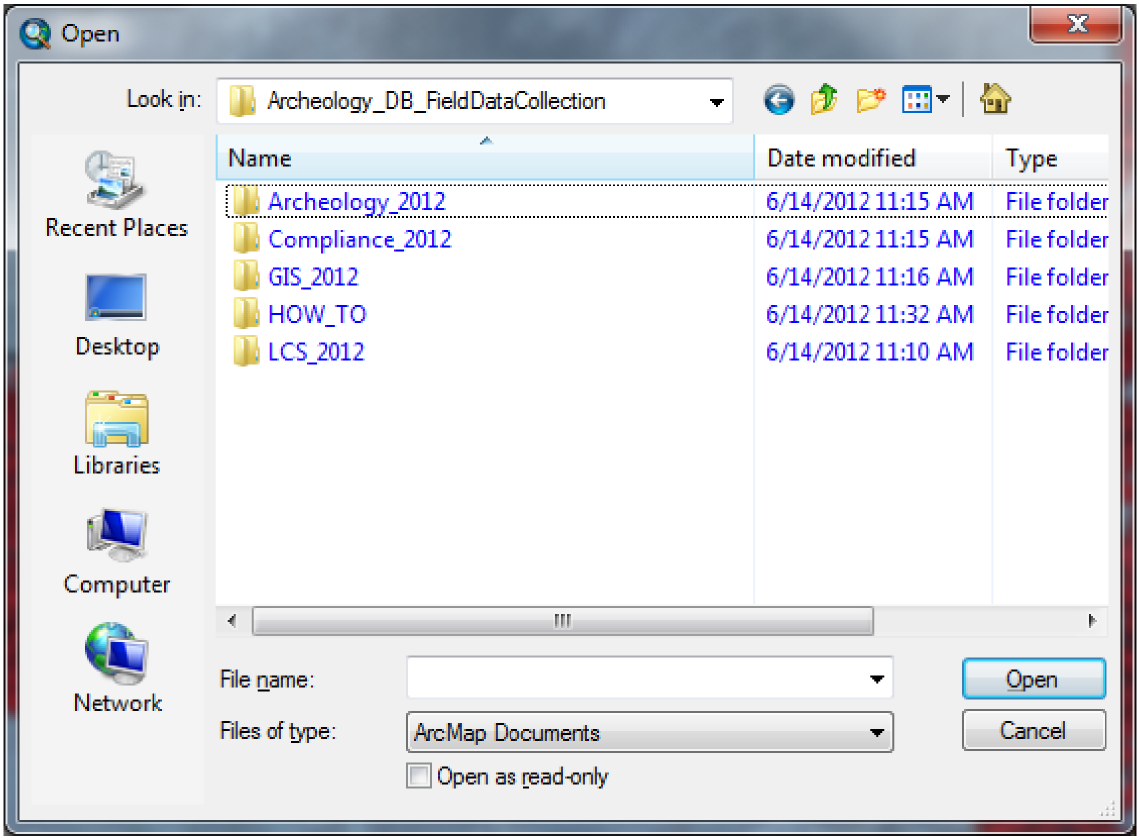
4. Click the **Open** icon on the main toolbar or navigate to **File > Open**. ArcMap might not automatically recognize all folders on your computer, so you may have to connect to the folders where your spatial data is stored. If this is the case, click the **Connect to Folder** button.



5. The file structure of your computer will open. Navigate to the **Shared (S:\)** drive and click on it, but do not open it. Click **OK**.



6. Navigate to the Archeology Geodatabase **S:\ > GIS > gis_data > FLAG > data > cultural > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection >** and then choose the appropriate folder whether you're in Archeology, Compliance, GIS, or LCS and open the folder. Click on the appropriate .mxd map file (WACA or WUPA) and click **Open**.

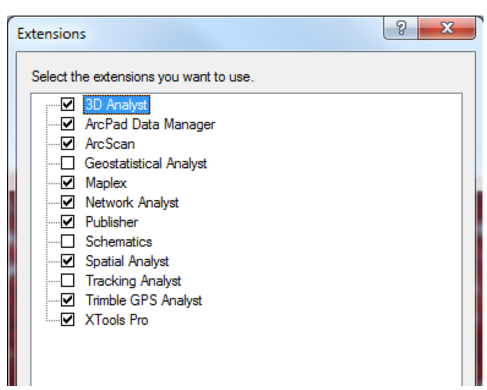

Open
Look in:
Archeology_DB_FieldDataCollection
Recent Places
Desktop
Libraries
Computer
Network
Name
Date modified
Type
Archeology_2012
6/14/2012 11:15 AM
File folder
Compliance_2012
6/14/2012 11:15 AM
File folder
GIS_2012
6/14/2012 11:16 AM
File folder
HOW_TO
6/14/2012 11:32 AM
File folder
LCS_2012
6/14/2012 11:10 AM
File folder
File name:
Files of type:
ArcMap Documents
Open as read-only
Open
Cancel

7. You should see something similar to the screenshot below (you might not see a base map).

Sensitive Data Removed

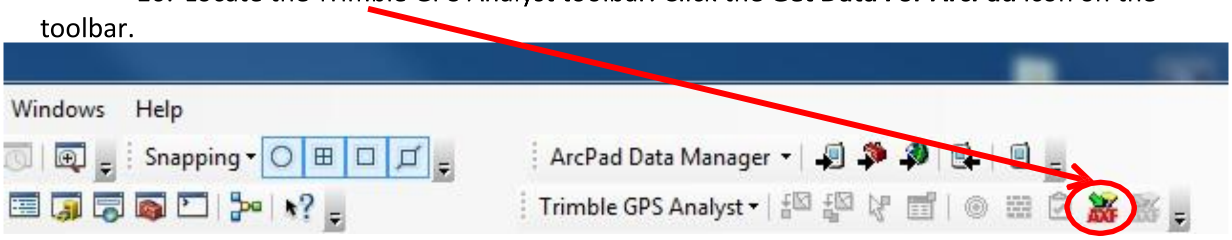
8.

A few ArcMap settings may need to be changed before data can be checked out to ArcPad. On the menu, click on **Customize > Extensions…** and make sure the boxes for **ArcPad Data Manager** and **Trimble GPS Analyst** are checked. Click on **Customize**, hover over **Toolbars** and make sure that **Trimble GSP Analyst** is checked.

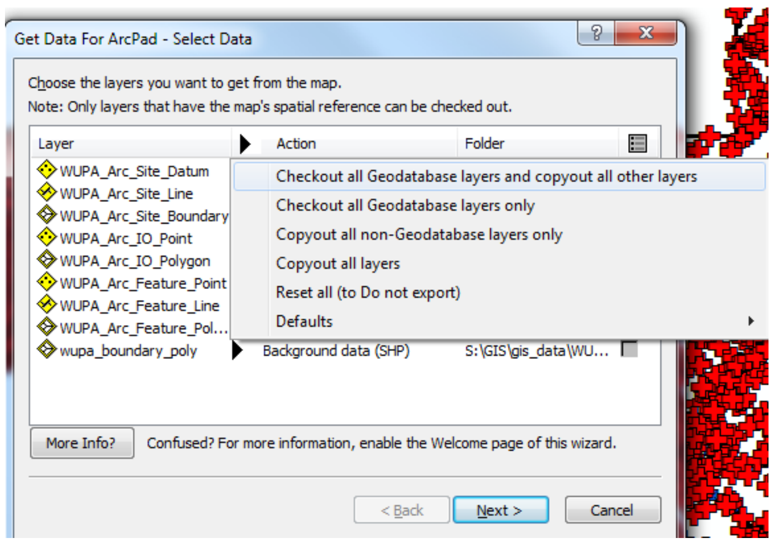


9. Zoom to the general area of your project.

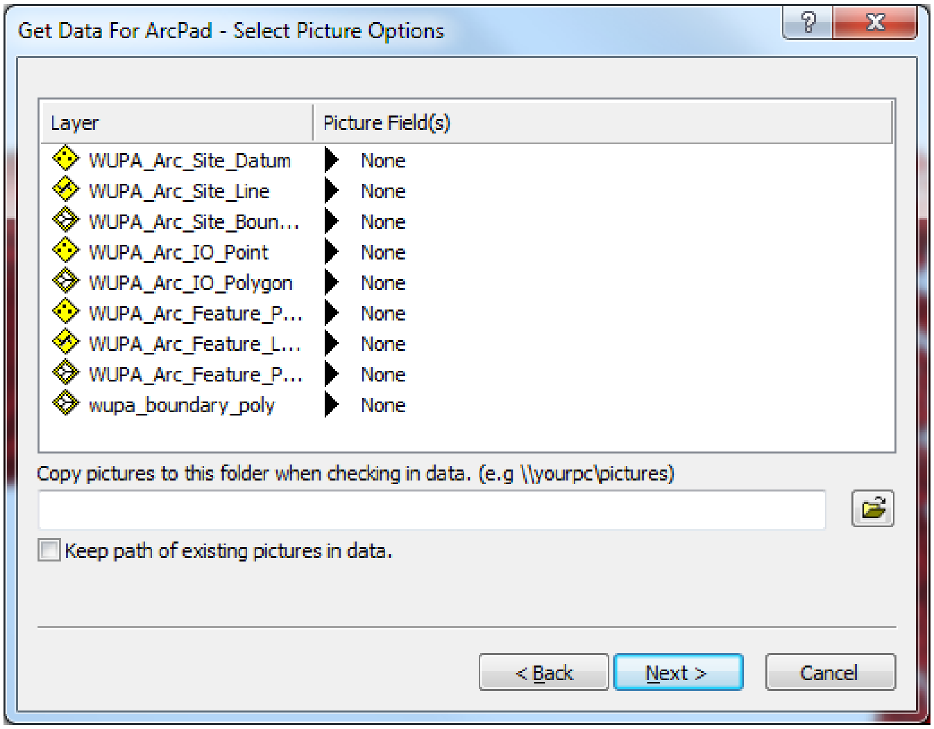
10. Locate the Trimble GPS Analyst toolbar. Click the **Get Data For ArcPad** icon on the toolbar.



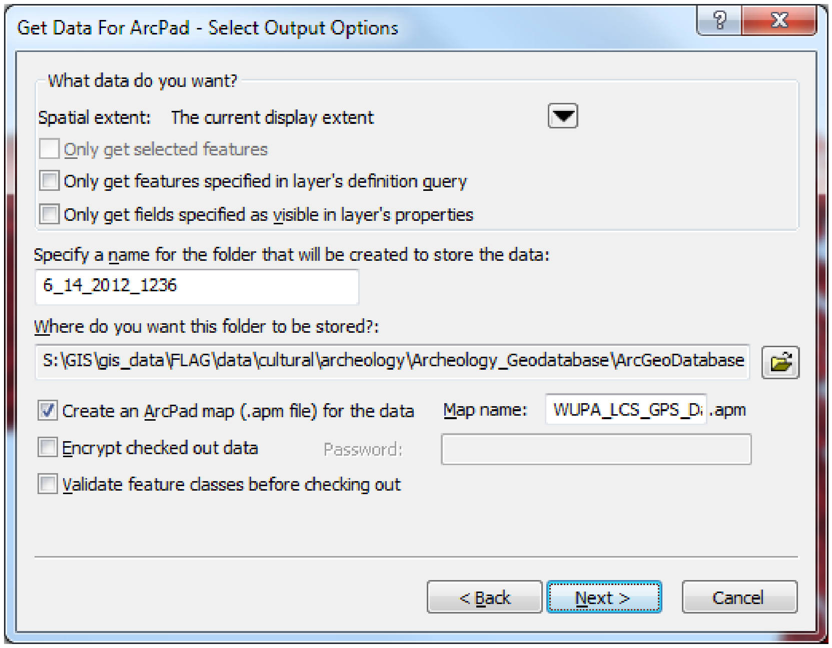
11. Click on the word **Action** in the top center of the window. Then select **Checkout all Geodatabase layers and copyout all other layers** from the resulting drop-down. Click **Next**.



The next screen accounts for photos associated with our data. We will not be using this feature for this project, so simply click **Next**.

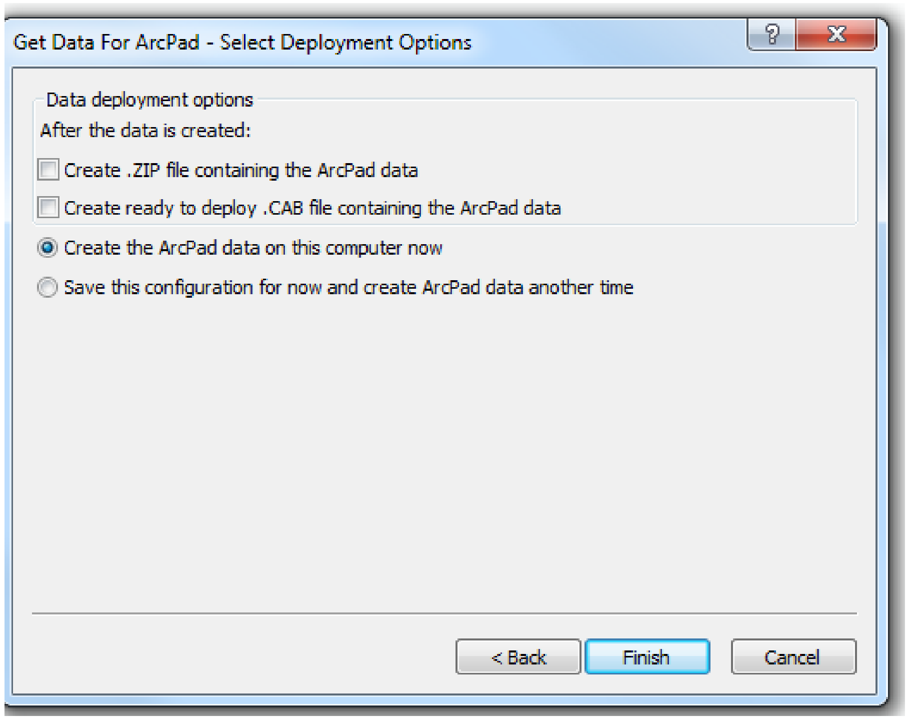


12. Make sure your check boxes match the screenshot below. Do not click **Next** yet.

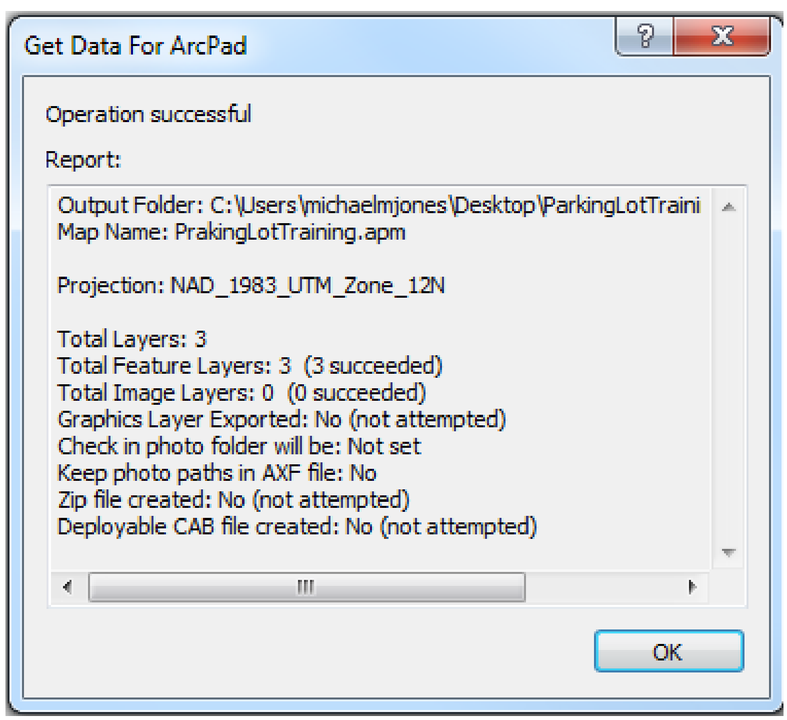


13. In the **Specify a name for the folder that will be created to store the data**, enter today's date and time. In the **Where do you want this folder to be stored?** section click the Browse for Folder icon and navigate to your Desktop. Then navigate to **S:\ > GIS > gis_data > FLAG > data > cultural > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection > appropriate subfolder > Checkout** and click **OK.** The **Map name** field should default to the .mxd name of the map (such as WUPA_LCS_GPS_Data) so leave it as is. Click **Next**.

14. Leave this window to the defaulted settings and click **Finish**.

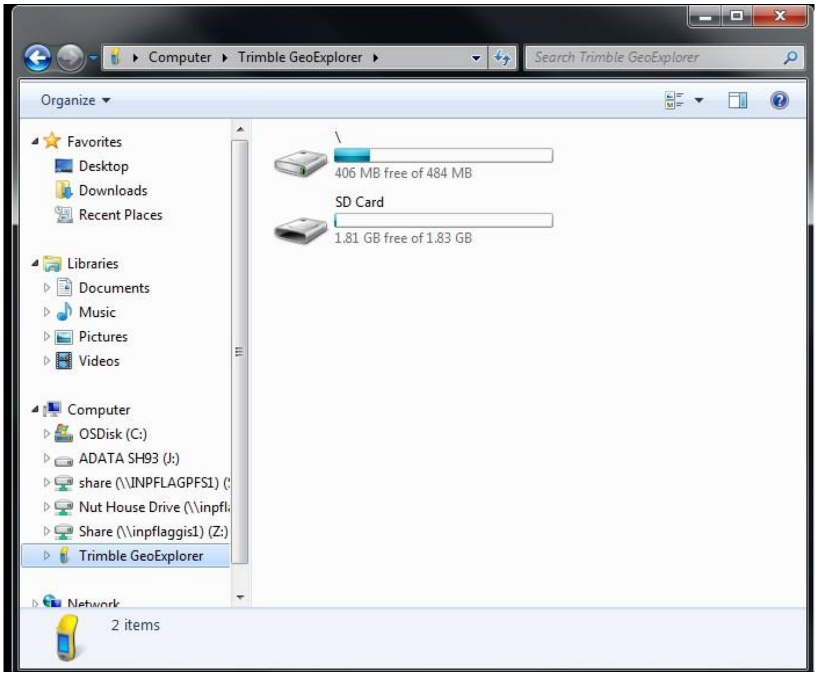


15. This screen confirms that you have completed the checkout process.

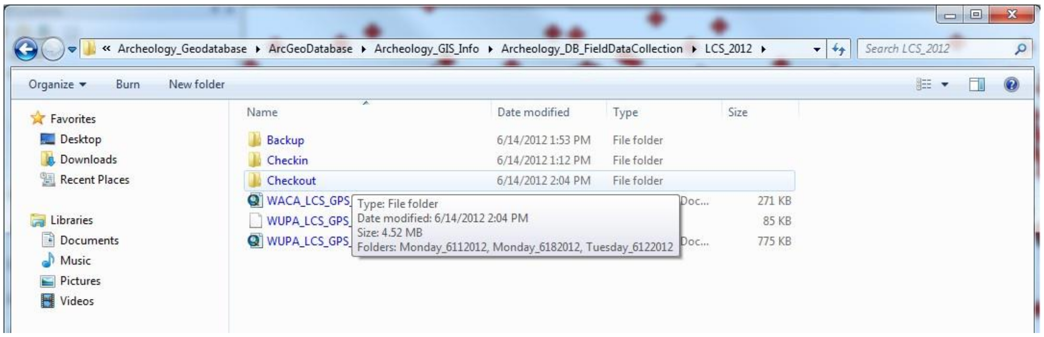


16. Now we are ready to transfer the 'checked out' data to our GPS Unit.

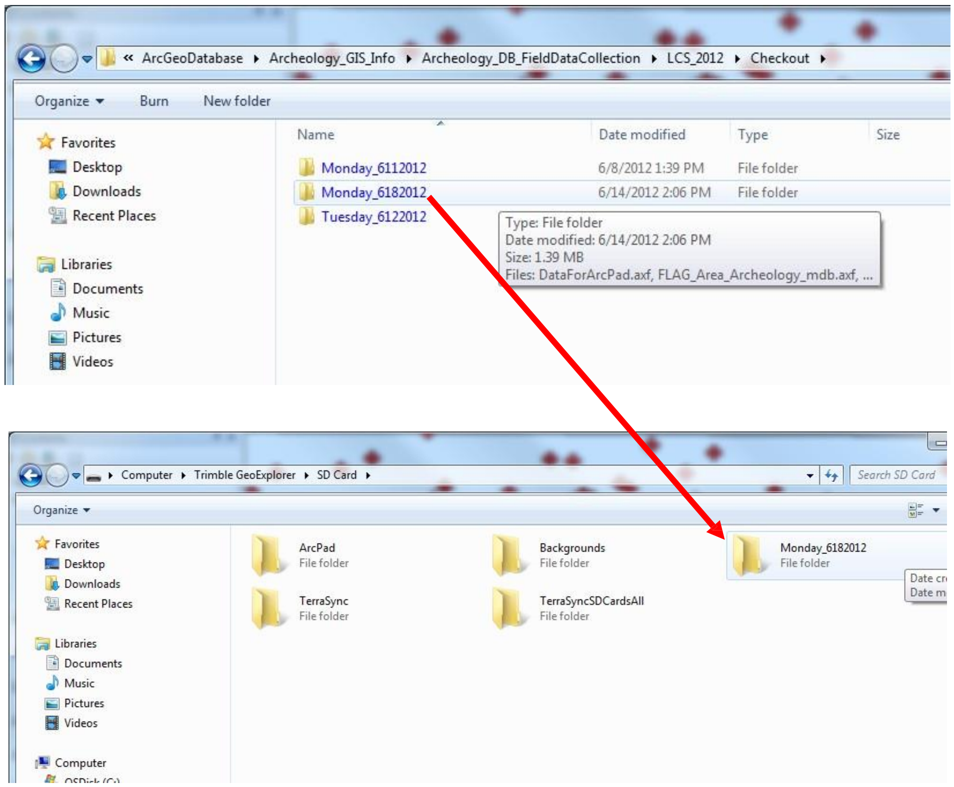
17. Open MyComputer and navigate to your GPS Unit. Open the SD Card (or if your unit does not currently have an SD card, open the hard drive).



18. Open **S:\ > GIS > gis_data > FLAG > data > cultural > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection > appropriate subfolder > Checkout** in Windows Explorer.



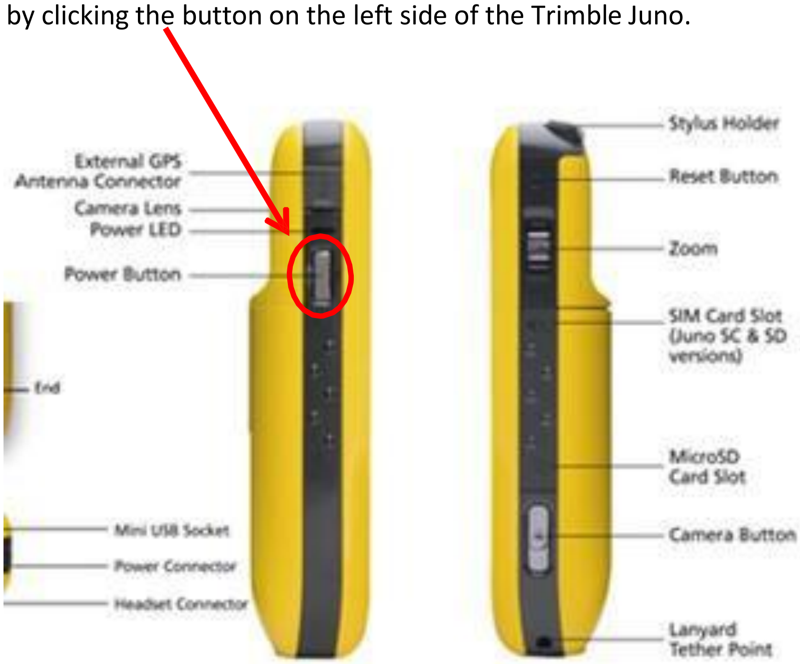
19. Open the **Checkout** folder. The folder you created in the checkout process should be inside (named with today's date). Simply drag (or copy) this folder to the GPS Unit's SD Card (or hard drive if there is no SD card). Make sure the entire folder and contents have been copied. Now you are ready to collect data in the field!



Collecting Data in the field

1. Turn on your GPS Unit by clicking the green button on the front of the Trimble GeoXT

or by clicking the button on the left side of the Trimble Juno.



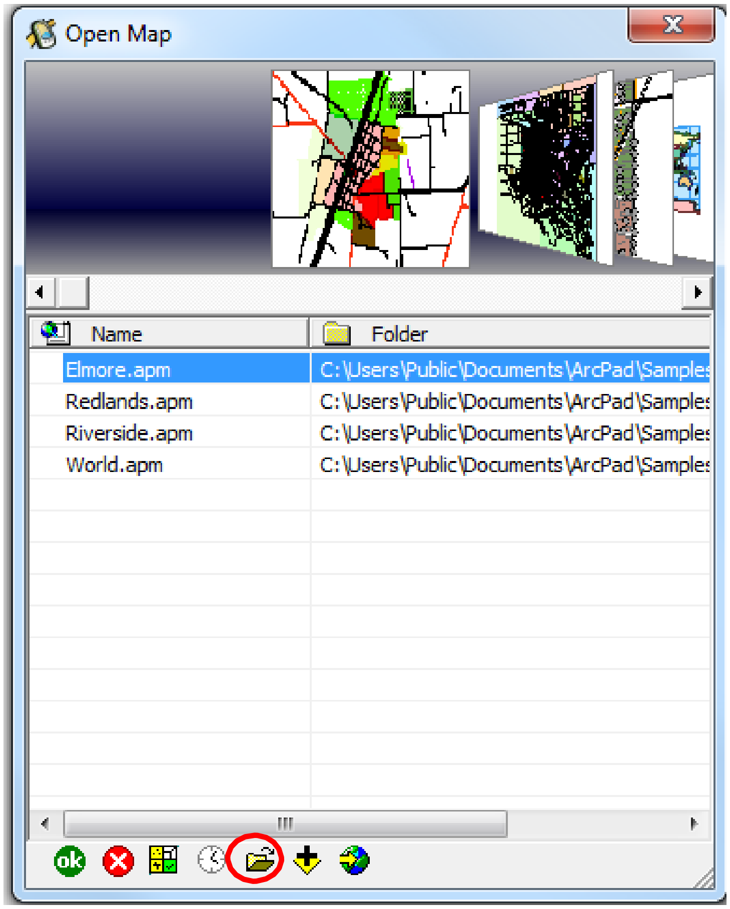
2. Enter the password if necessary.

3. Open **ArcPad** by opening the **Start Menu >**

4. Once Arc Pad has opened (be patient…it takes a while) the following window will appear:

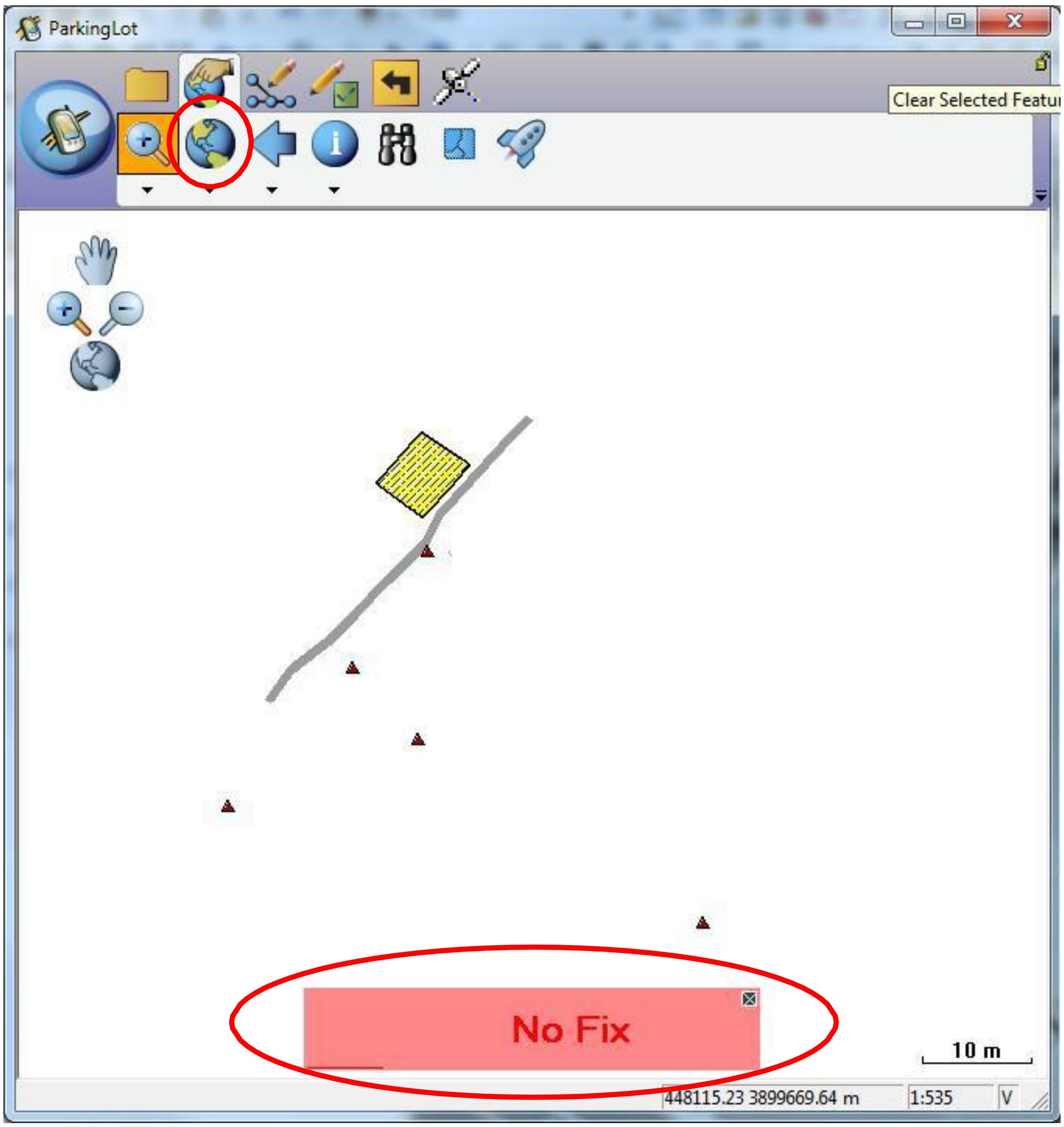
5. Select **Choose Map to Open.**

6. The **Open Map** window



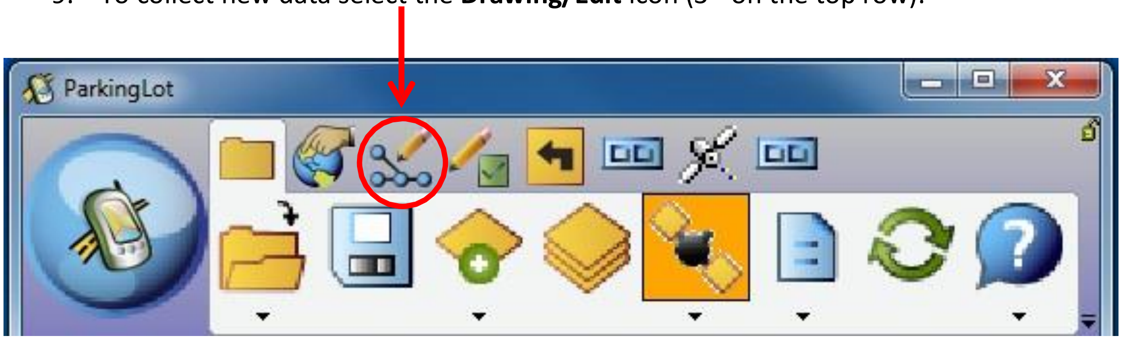
7. Select the .apm map file that you transferred to the GPS Unit or use the Open button at the bottom of the screen to browse for your map. Tap **OK.**

8. You should see something similar to the screenshot below after opening your map. If you don't see any lines, points, or polygons that you collected, navigate to the **Browse toolbar** (second icon on top) and tap the **Zoom Full Extent button** (the globe).

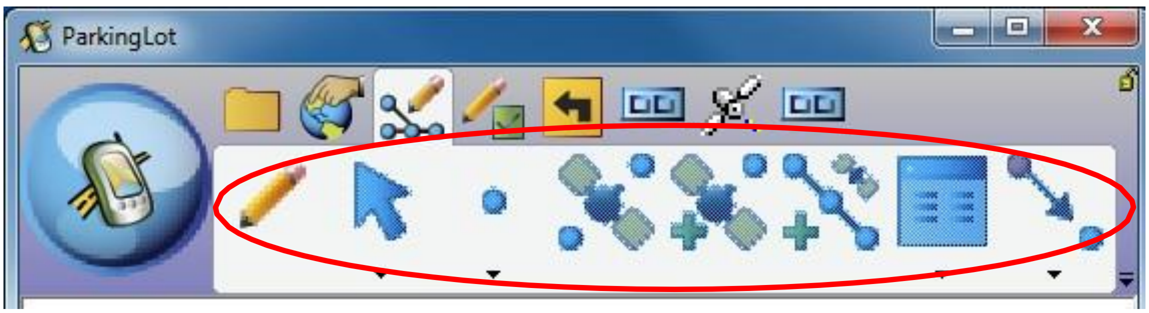


The bar on the bottom of your screen may be red and you may be receiving messages that you need to constantly dismiss. This is OK; it means that your GPS is searching for satellites. This can take up to 5 minutes depending on your location or how long it has been since the unit was last used.

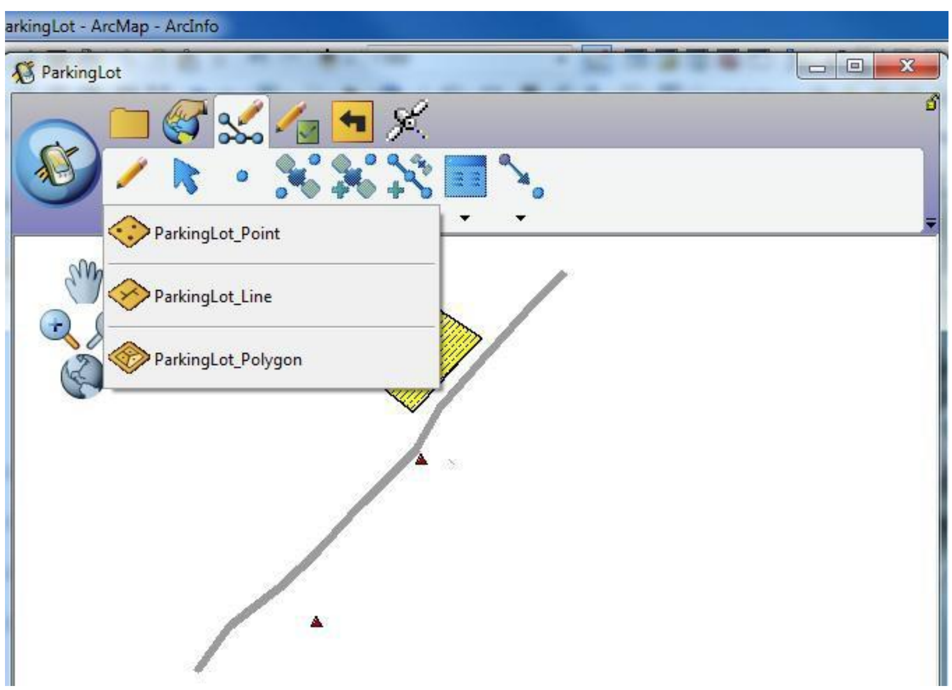
9. To collect new data select the **Drawing/Edit** icon (3rd on the top row).



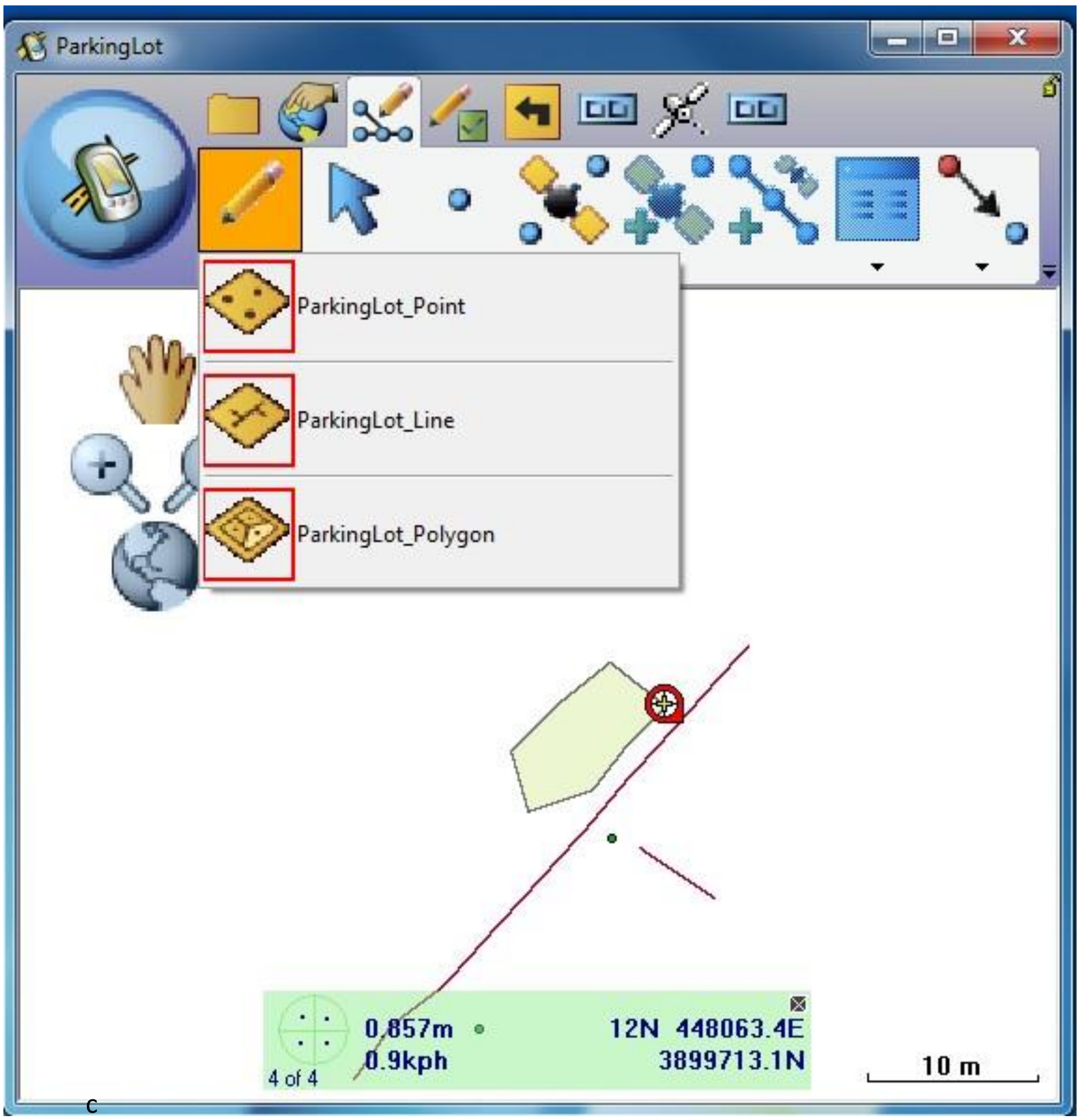
10. This opens the **Drawing/Edit** toolbar.



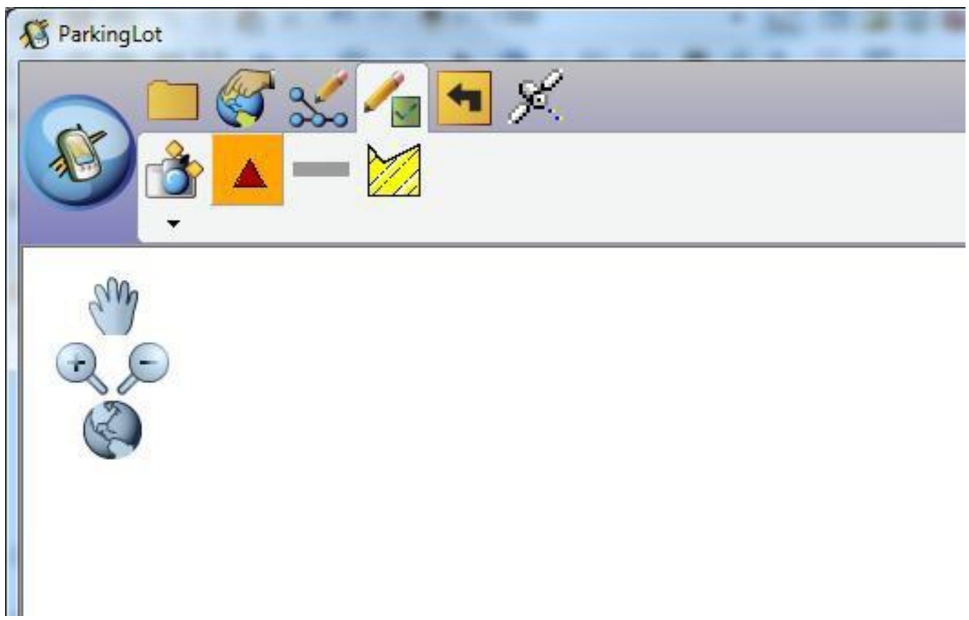
11. Click the **Start/Stop feature editing** icon (looks like a pencil). When you do so, you must choose which layers you want to edit or add features to.



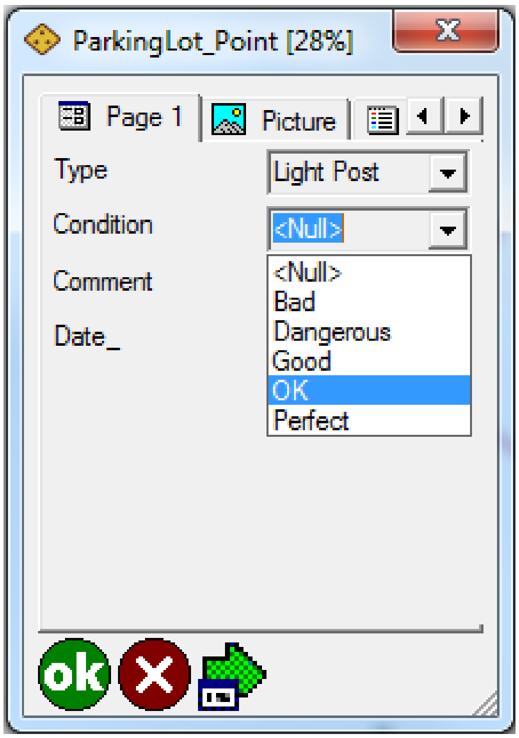
12. Select all three layers by clicking on them. They should have a red box around the icon when selected.

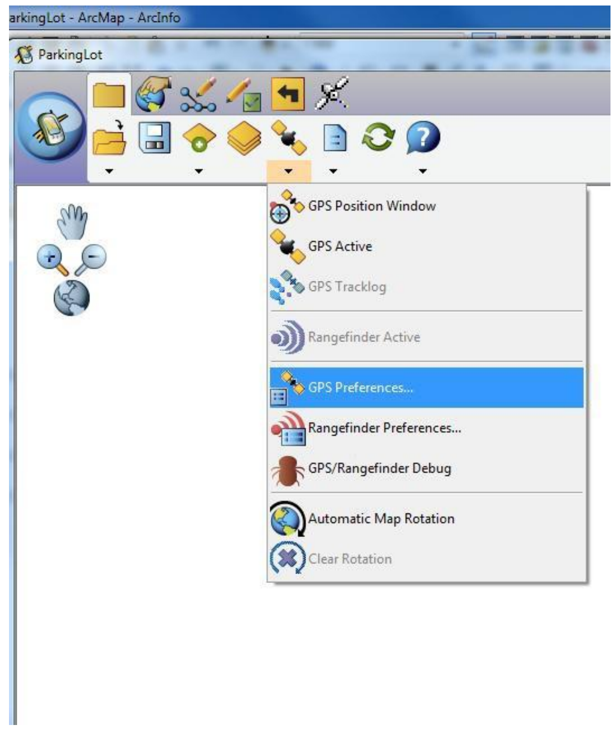


13. We are ready to edit data. Let's begin by collecting a point. Navigate to the **QuickCapture** toolbar (4th icon top row). This toolbar is dynamic. The layers you see below vary depending on the map you have open. Select the **Point** feature (in this map - the triangle).



14. A window appears similar to the screenshot below-left. The % indicated at the top of the window increases with time as your GPS unit averages more points. The number of points to be averaged to collect one point is determined in GPS Preferences which is accessed by clicking the black arrow under the **GPS Active icon on the Main toolbar > GPS Preferences > Capture tab**

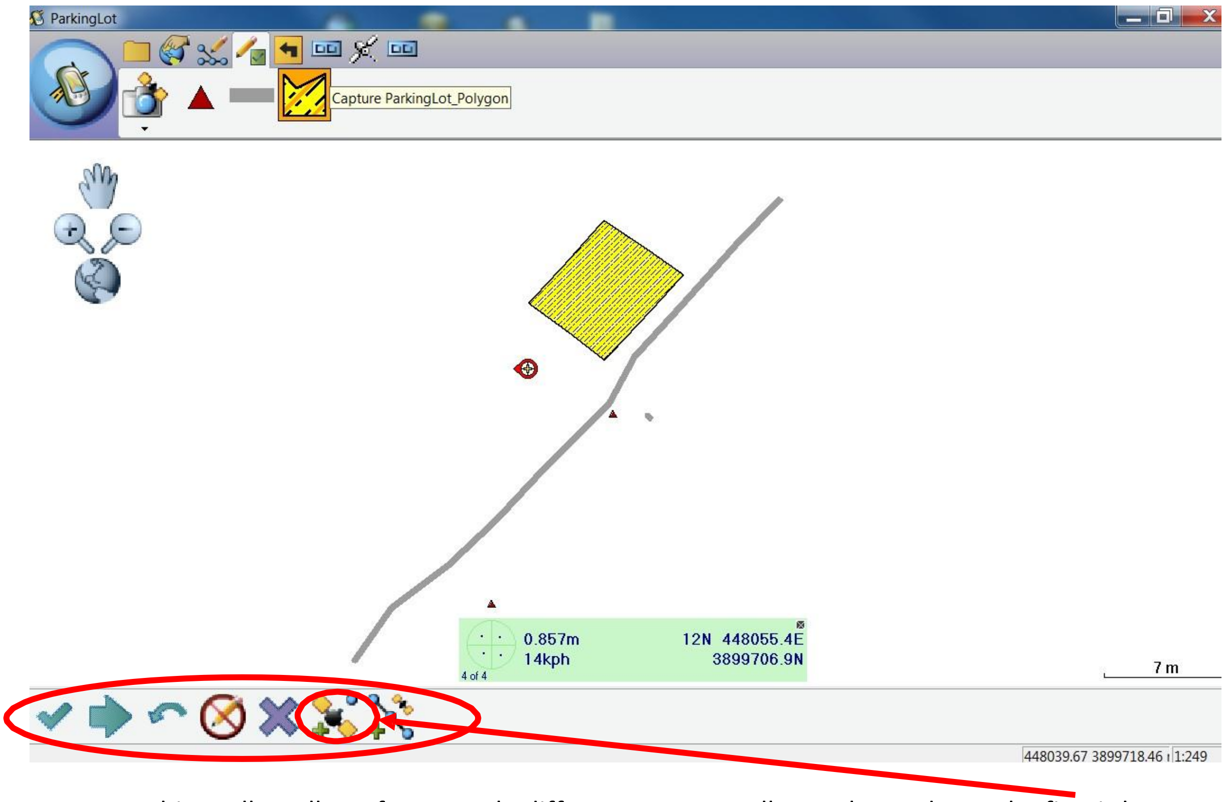




15. Returning to the Capture Window, select the down carrot next to each field (Type, Condition) and select the most appropriate option from each drop down. When the percentage at the top of the window reaches 100% and you've filled out the field forms, tap **OK.**

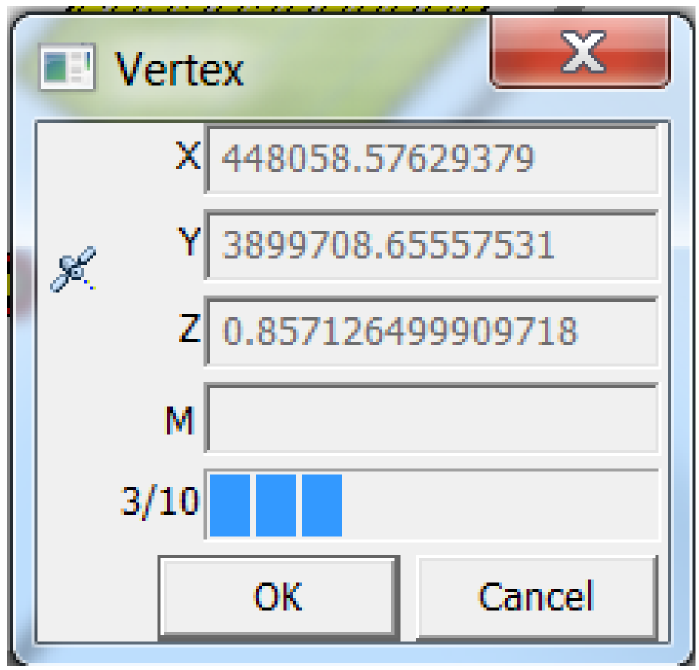
*** Some data collection procedures will have more than one page of fields to be entered so you will need to select those additional page tabs to complete the fields.

16. Now let's capture a polygon. Since we are already in an edit session, navigate to the **Quick Capture toolbar** (4th tab on the top). Select the **Capture ParkingLot_Polygon** icon. A new toolbar opens at the bottom of the screen.



This toolbar allows for a couple different ways to collect polygon data. The first is by capturing separate vertices that connect themselves when the feature is finished; this is called **Capture Vertex.** Select this option if you want to take a vertex at your current location and then walk to another location and take another vertex and so on. This is useful for marking straight edges.

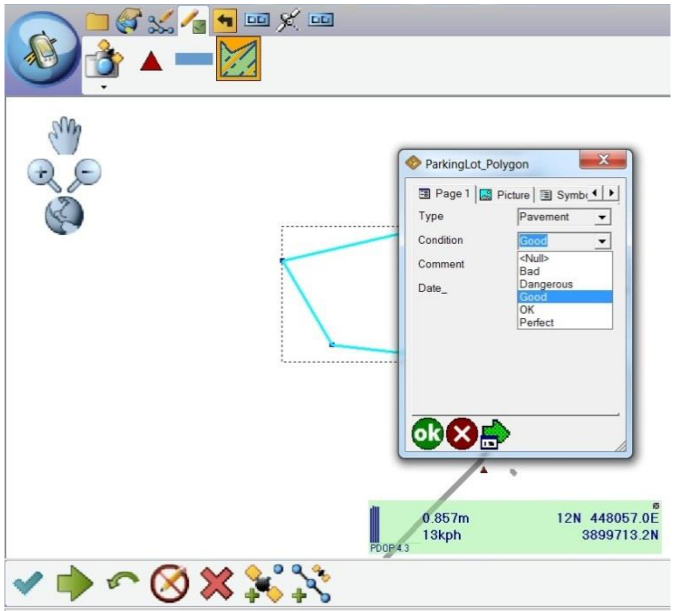
17. When you capture a vertex the window below appears and begins to take points. The ratio at the bottom (3/10) signals the number of points already taken to the total number that need to be taken.



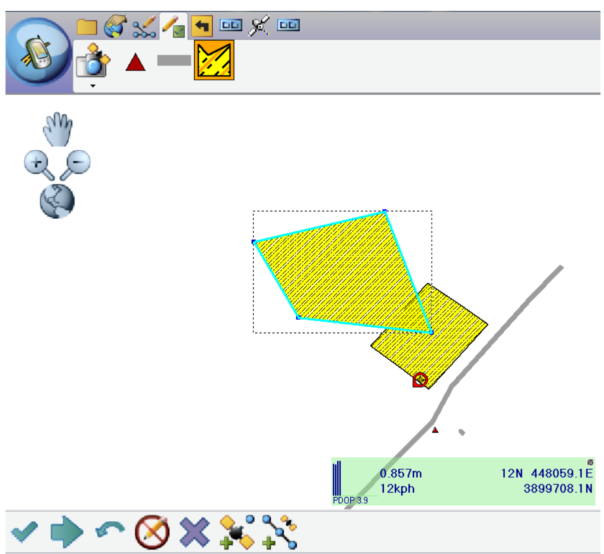
18. The second option on the toolbar is **Capture Vertices.** This option constantly collects GPS points and essentially traces your movement instead of taking individual points and connecting them.

19. The **Undo** button can be used to undo a vertex or multiple vertices in the event that you collected something by mistake.

20. Once you are finished collecting either vertices to create a polygon or continuous GPS positions to create a polygon, select the **Proceed to Attribute Capture** button on the bottom toolbar (it's the thick green arrow pointing to the right). Enter pertinent attribute information using the drop-downs.



21. Once your polygon is finished you should see it on the GPS Screen. (Below)



22. Collecting a line feature follows the same procedure as collecting a polygon feature. Use the **Capture Vertex** or **Capture Vertices** tools in a similar fashion to collect lines.

CHECK IN DATA INTO ARCPAD

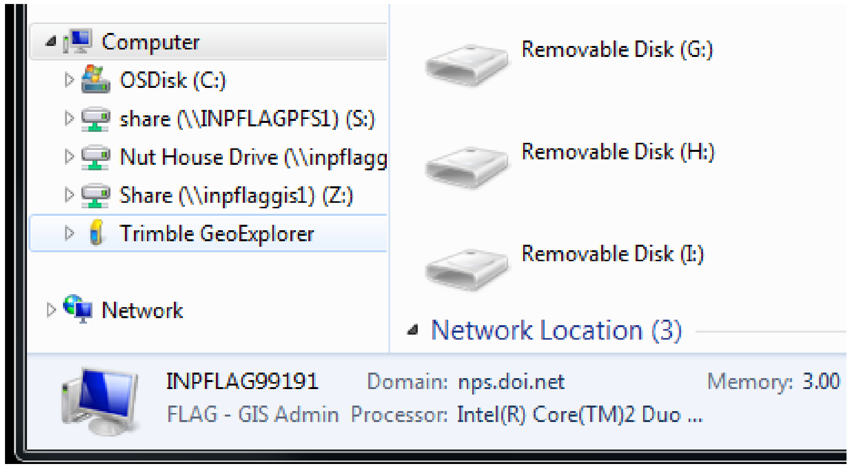
Checking Data Into ArcPad 2012

*****BEFORE CHECKING IN DATA MAKE SURE THAT ARCPAD IS CLOSED ON YOUR GPS UNIT*****

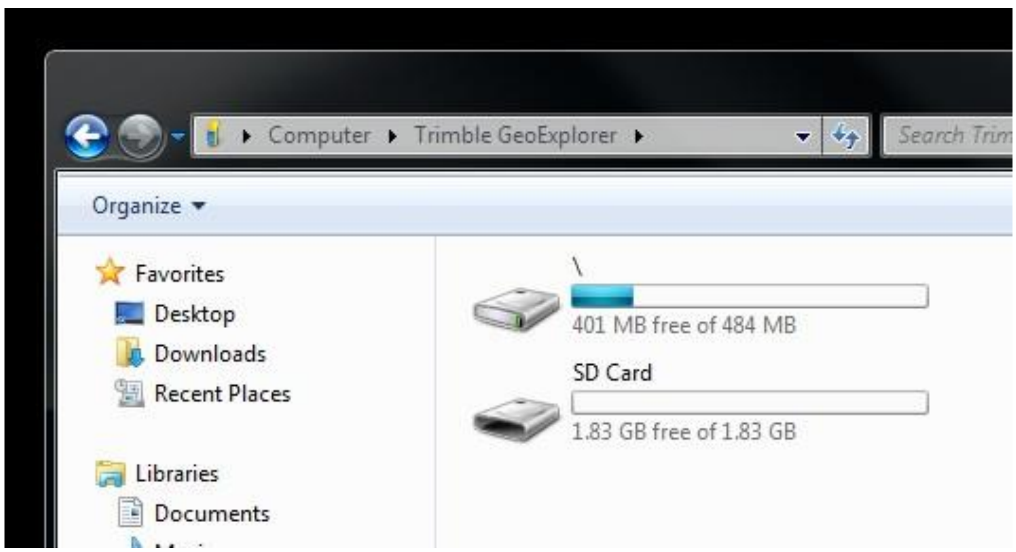
1. Place your GeoXT GPS unit into the cradle, or attach with a USB cord for the Junos.

   Type in the password if necessary. You should see something like this:

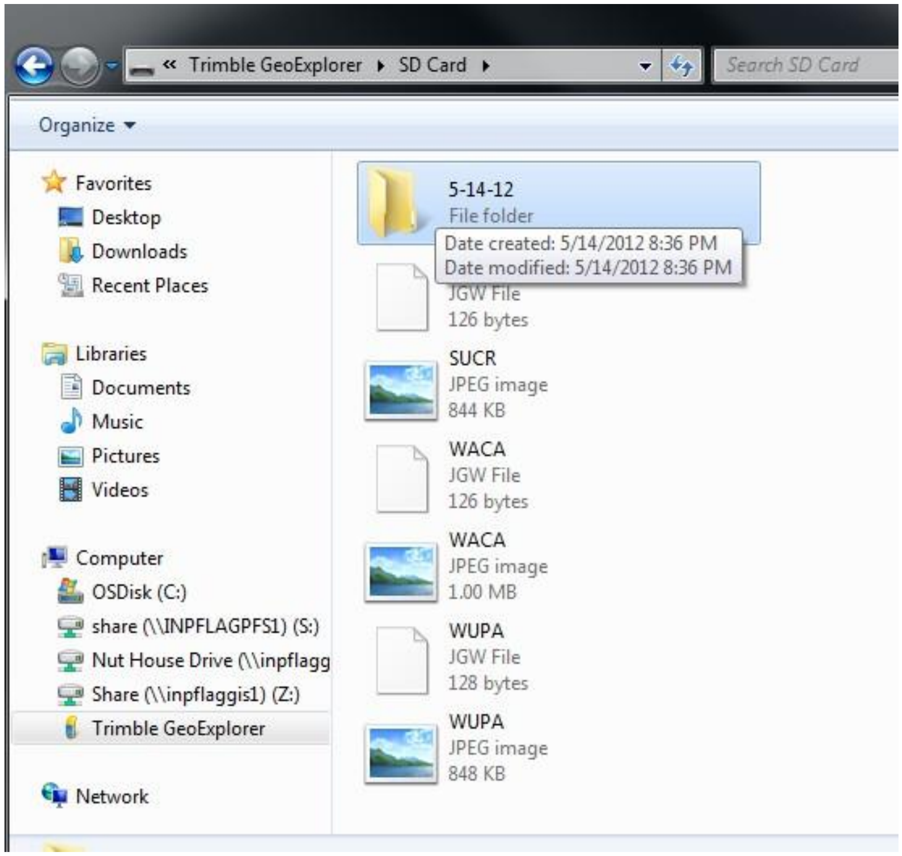
2. Close the Windows Mobile Device Center and open MyComputer from the Start Menu. Open your Trimble GPS unit by double clicking on it.



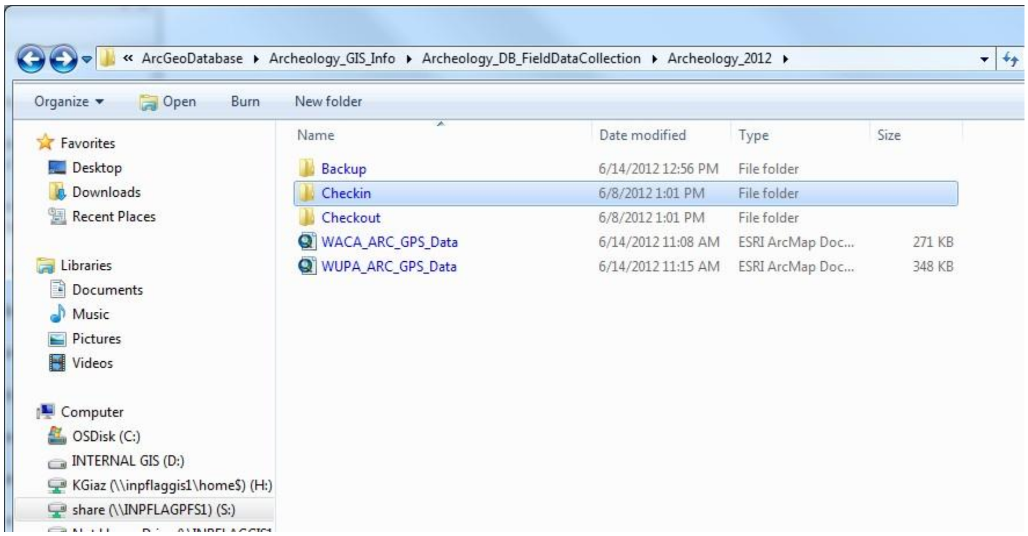
3. You should see something like this (if your unit does not have an SD card you will only see an icon for the hard drive).



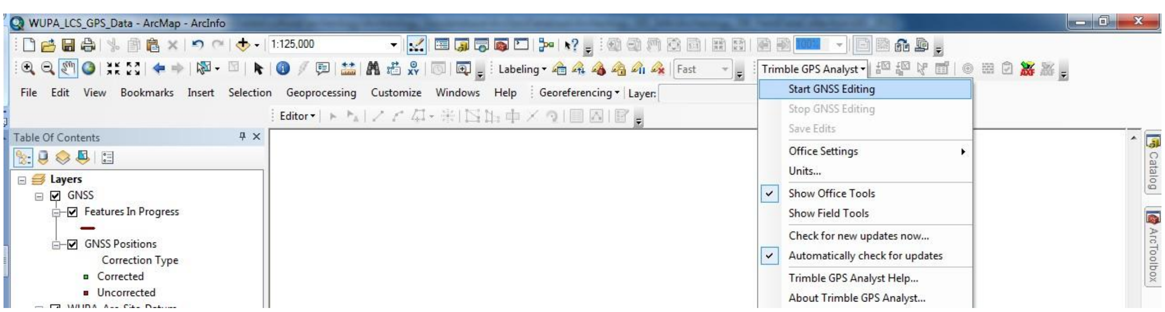
4. Double Click the SD card or the location that you saved your checkout data. You should see something similar to this:



5. Copy your working folder from the GPS unit and paste it to **S:\ > GIS > gis_data > FLAG > data > cultural > archeology > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection > appropriate subfolder > Checkin**. Make sure that the entire folder and its contents have been copied.

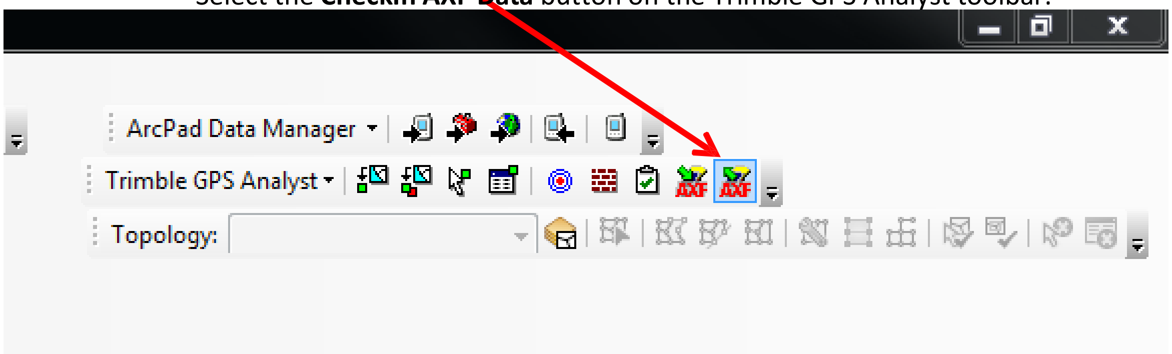


6. Open ArcMap and open the .mxd map that you started with when you checked out your data located here: **S:\ > GIS > gis_data > FLAG > data > cultural > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection > appropriate subfolder > WUPA/WACA map file.** Locate the **Trimble GPS Analyst toolbar** and select the black arrow next to the name of the toolbar. Click **Start GNSS Editing**.

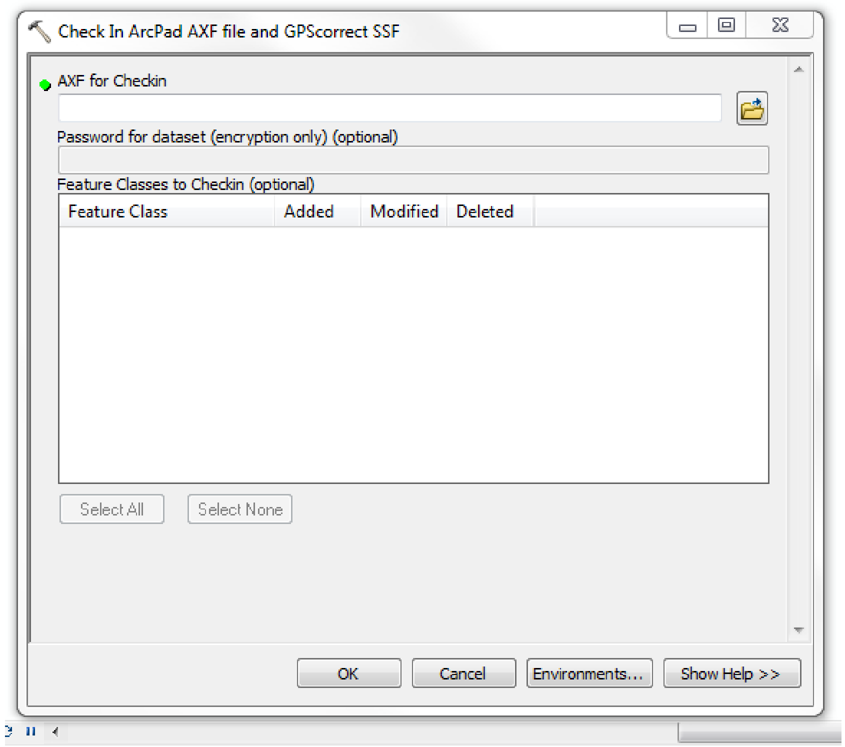


7. Now that you are in an editing session you can download and differentially correct your data.

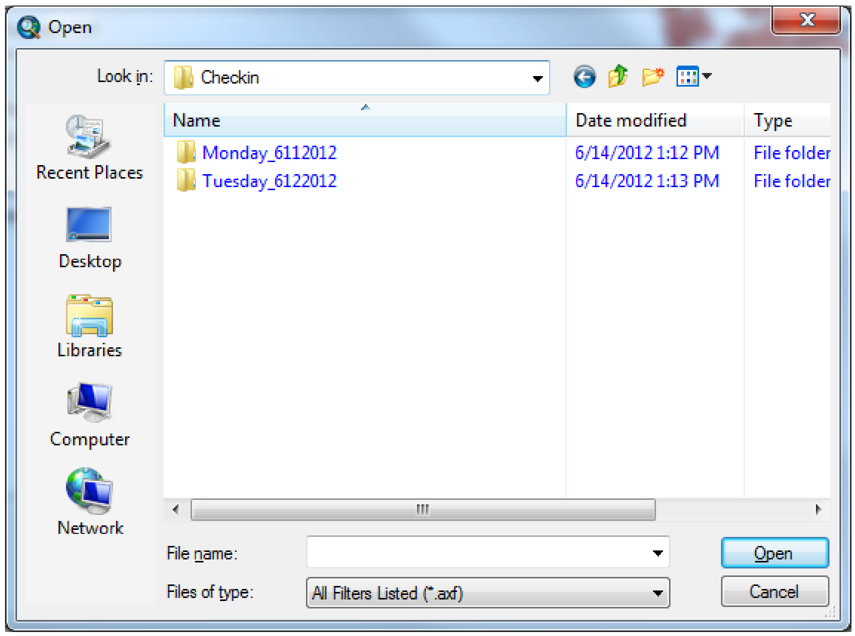
Select the **CheckIn AXF Data** button on the Trimble GPS Analyst toolbar.



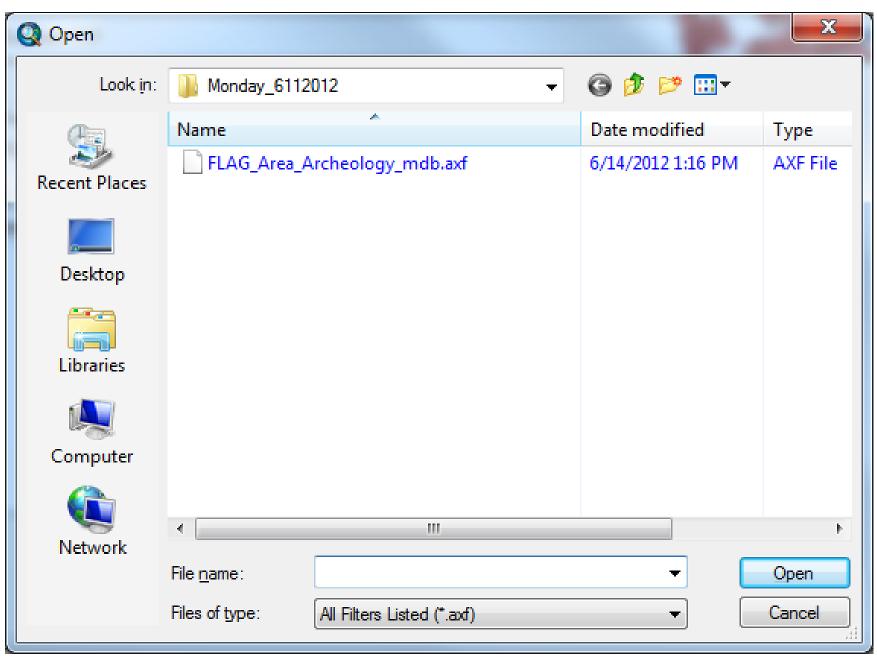
8. The following window appears:



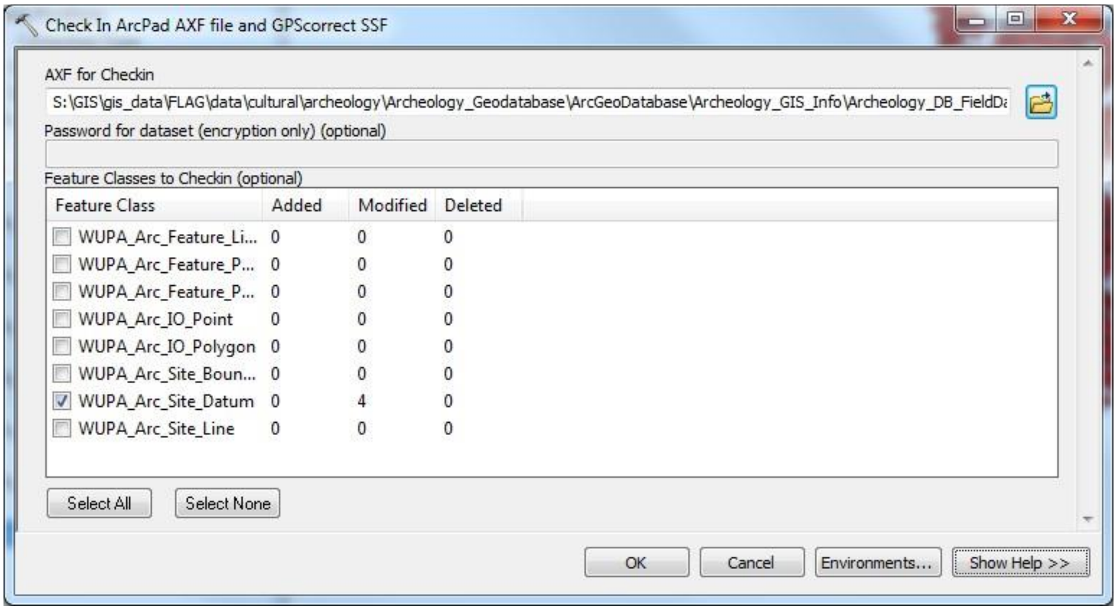
9. Click on the browse button to the right of the **AXF for Checkin** field. Navigate to the **S:\ > GIS > gis_data > FLAG > data > cultural > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection > appropriate subfolder > dated folder**



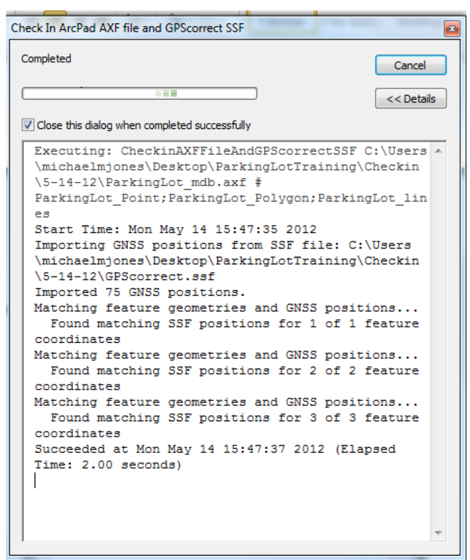
10. You should see something similar to this once the folder is open. Select the .axf file and click**Open**.



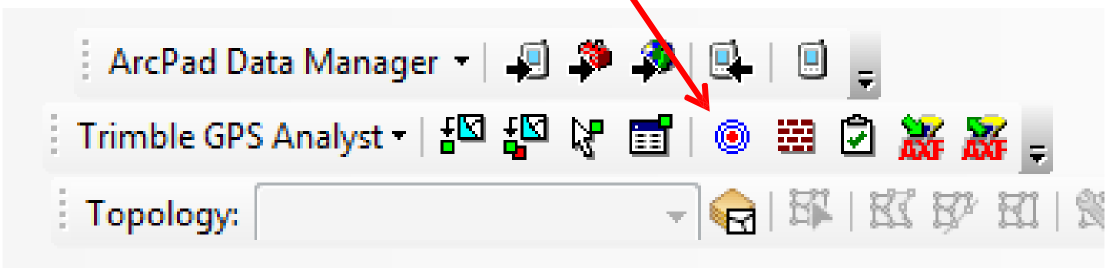
11. The following window appears. The features classes listed and number of features added, modified or deleted should reflect the work you did during the session. If you didn't add, modify, or delete any features from a feature class, please **uncheck** the check box next to that feature class. Refer to the screenshot below. Click **OK.**



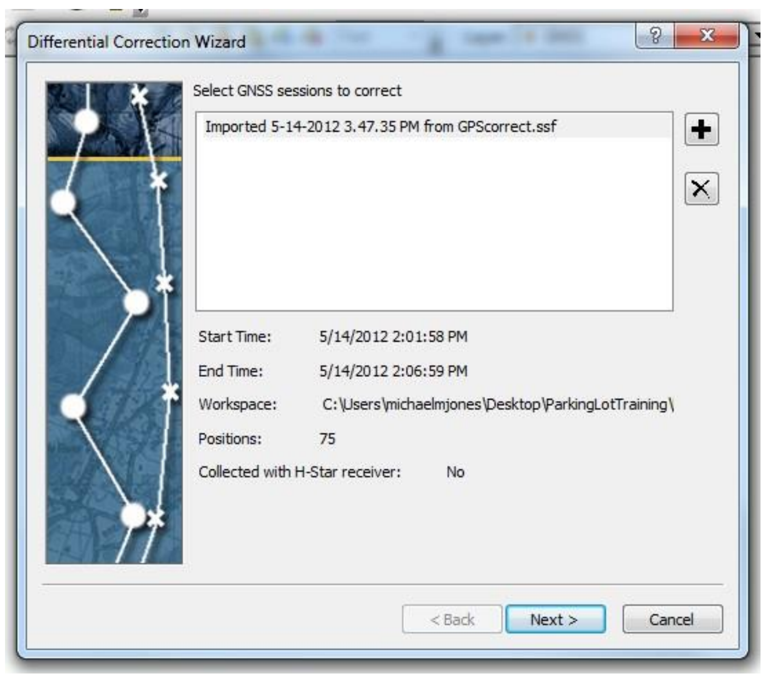
12. This window should appear and then disappear. Click **Close** if prompted by the window after Check in is completed.



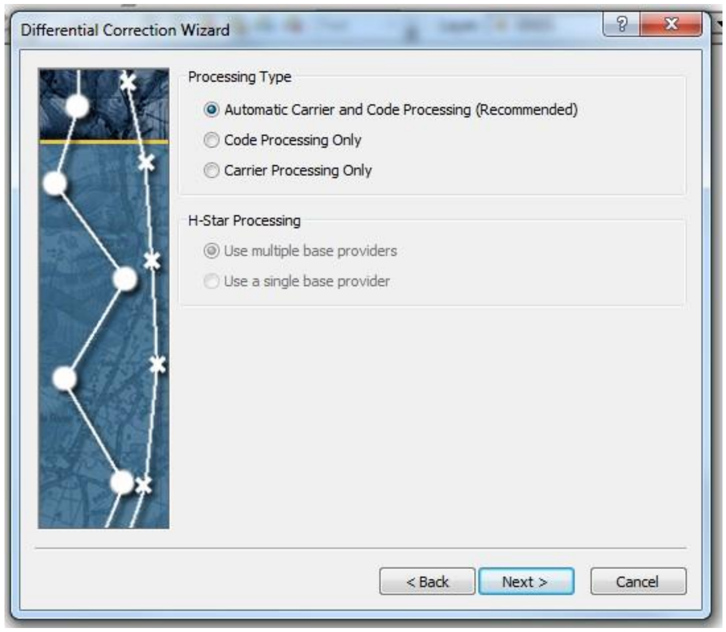
13. The data that you collected is now appended to the Geodatabase, but we need to perform differential correction on it. Select differential correction from the Trimble GPS Analyst toolbar.



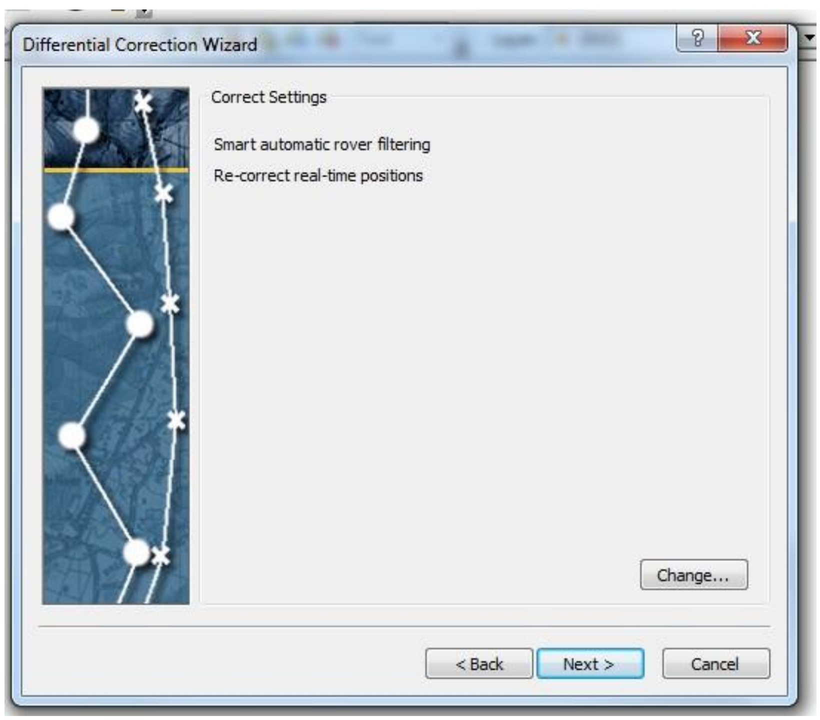
14. The Differential Correction Wizard appears. The .ssf file we imported should automatically be entered. Review the collection time range to verify. Click **Next**.



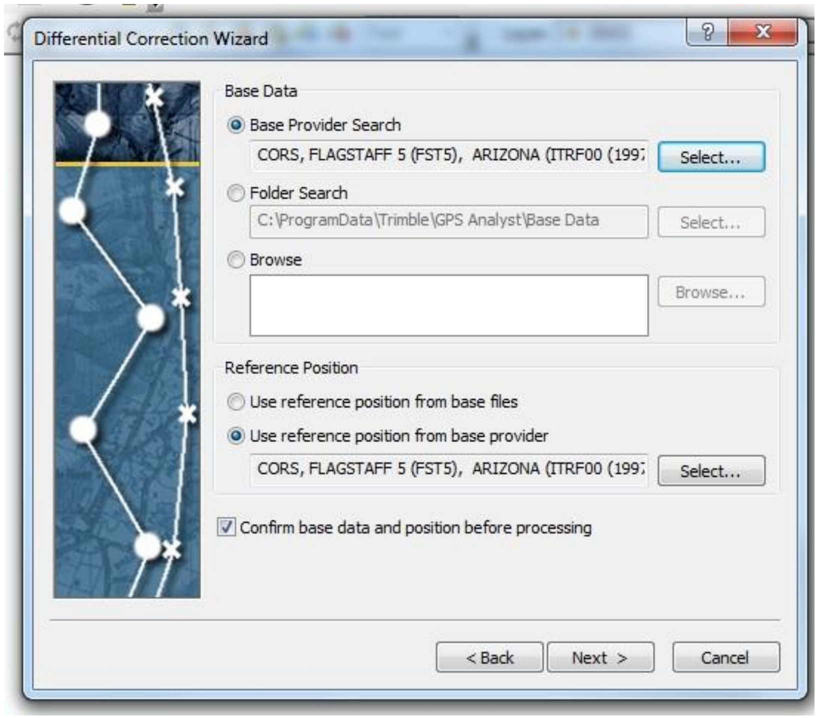
15. Leave the default settings in the following window. Click **Next**.



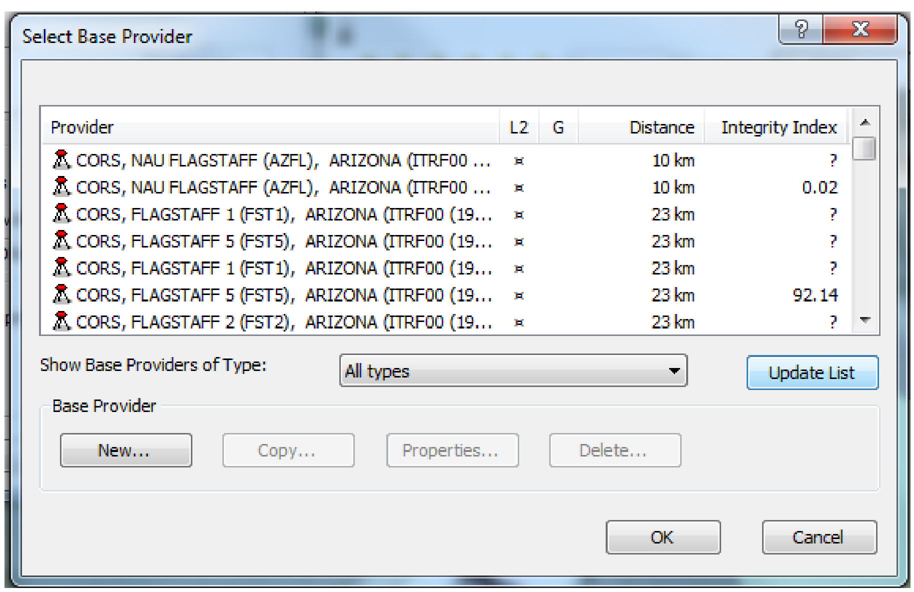
16. Leave the settings at default in this window as well. Click **Next**.



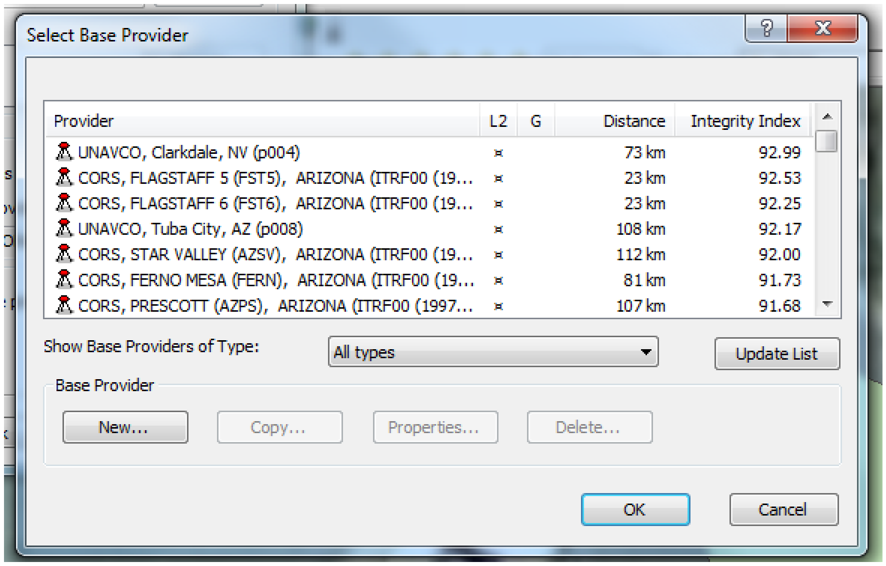
17. A Base Data Provider needs to be selected in this window. This is a local or regional station that has collected data for use in differential collection. In general, it takes about half an hour for correction files to become available. Click **Select...** to the right of Base Provider Search



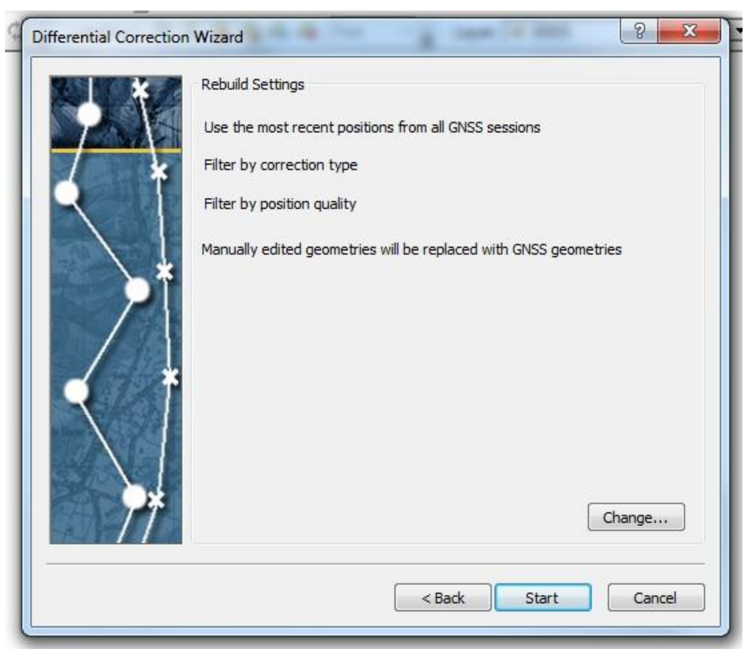
18. Click on **Update List**. This will search online for relevant correction data.



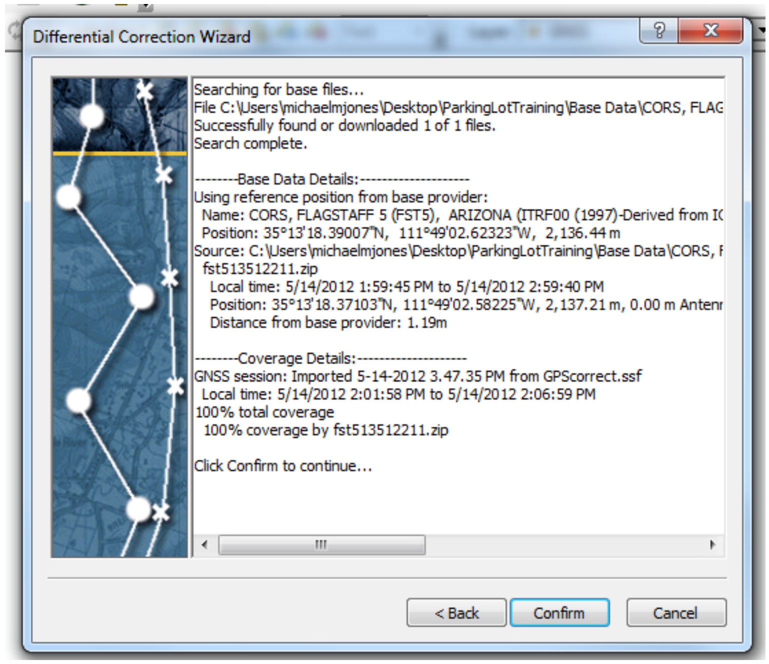
19. Once the update has completed, click once on the **Integrity Index** column heading to reorder the list. Select the **CORS Station** for Flagstaff with the highest Integrity Index value and click **OK**.



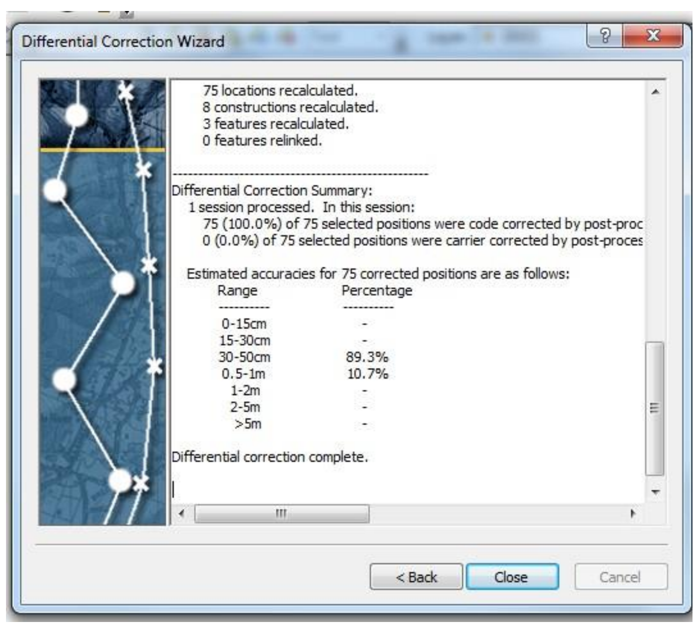
20. You will be returned to the Differential Correction Wizard window. Click **Next**, and then click **Start** without changing any other settings.



21. You should see something similar to this. You may not have to confirm before the program differentially corrects and goes to the final window. Click **Confirm** if prompted.



22. You should see something like the screenshot below. If you don't see this try the differential correction process again. Successful correction is indicated by a high percentage of positions at least "code corrected" and accuracy ranges falling within the collection capabilities of the GPS unit.

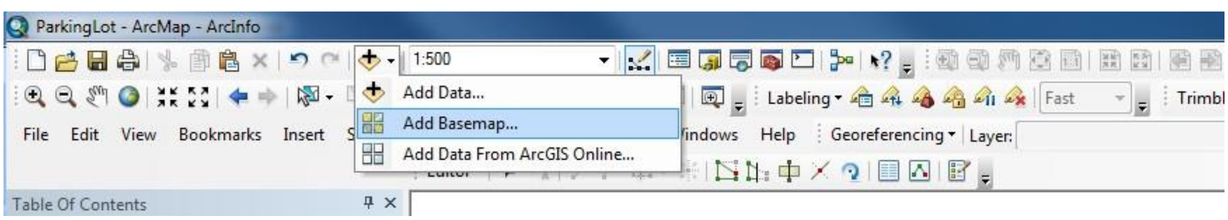


23. Click **Close**. Locate your Trimble GPS Analyst toolbar and click the black arrow next to the toolbar name and select **Save Edits.** Then select **Stop GNSS Editing.**

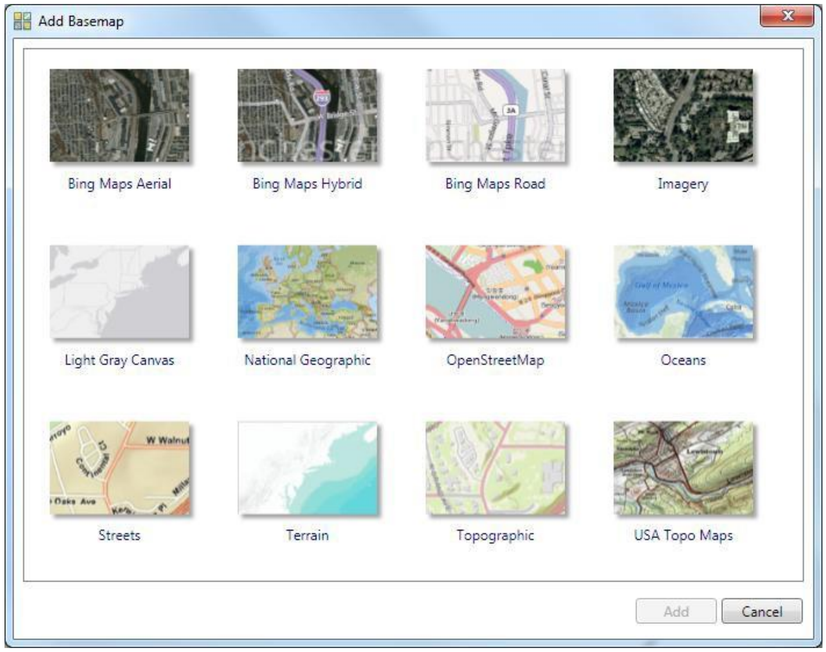
*****The next step is VERY IMPORTANT, please DO NOT skip it*****

24. Now that we've checked in our data and have differentially corrected it successfully, we need to backup our data and remove it from our GPS unit. Open Windows Explorer and navigate to the checkout folder on your GPS unit's SD card (or hard drive). **Cut** the folder and navigate to **S:\ > GIS > gis_data > FLAG > data > cultural > Archeology_Geodatabase > ArcGeoDatabase > Archeology_GIS_Info > Archeology_DB_FieldDataCollection > appropriate subfolder > Backup** and paste the folder into this backup folder.

25. Returning to your map…if you want to see the data collected in context you can add a basemap by clicking the drop-down arrow next to the **Add Data** button on the main toolbar and select **Add Basemap…**



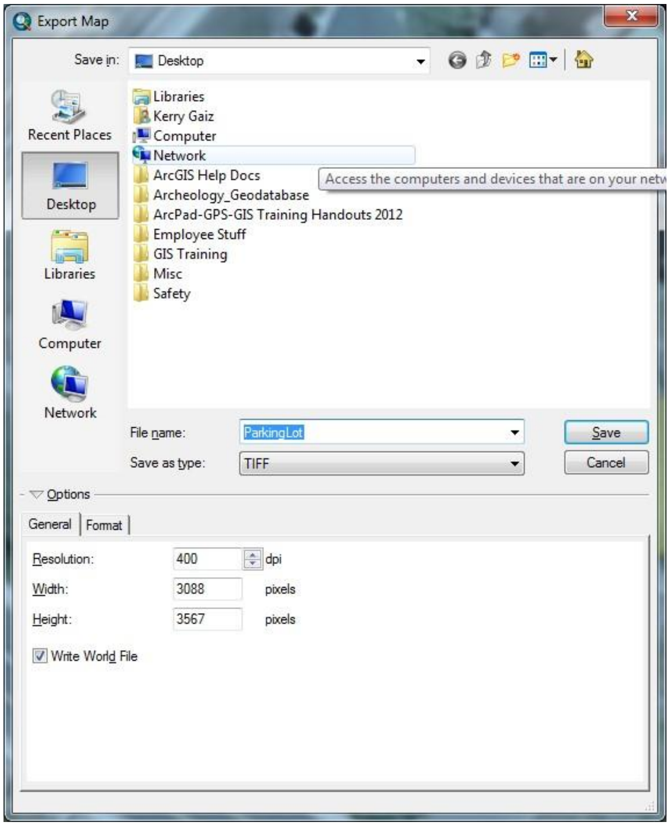
The following window should appear:



26. Select **Bing Maps Aerial** and click **Add.** Click **Close** if prompted with a transformation warning window.

27. **Save** your map.

28. To export your map as a JPEG or PDF for easy viewing and sharing, click **File > Export Map**



Save your map in your preferred format. PDF is recommended. Notice that the map name that you used to save the map as an .mxd file is the default for the PDF, but can be changed if desired. Click **Save**. Exit ArcMap when finished.

APPENDIX B. EMAIL

This email was sent By Kelly Stehman and was of particular significance as it server for the basis for the feature class that were created in this practicum.

Email

Sent on 01/11/2012 at 11:06 AM

From: Kelly_Stehman@nps.gov Sent on 01/11/2012 at 11:06 AM

CC: Lisa_Baldwin@nps.gov

To: Michael_M_Jones@nps.gov

Mike,

I attached a couple documents for you to skim. The first is the ASM (Arizona State Museum) standards, the second is our site recording form. The pertinent info from the ASM doc is summarized below. These are good documents for you to keep around. Let me know what you think.

Most archaeologists define sites based on consideration of age of remains as well as density and diversity of artifacts and features and the spatial arrangements of these remains within the area under consideration. The following guidelines should be used to define archaeological sites:

All sites should contain:

1. physical remains of past human activity that are at least 50 years old. Additionally, sites should consist of at least one of the following:

2. 30+ artifacts of a single class (e.g., 30 sherds, 30 lithics, 30 tin cans) within an area 15 meters (50 feet) in diameter, except when all pieces appear to originate from a single source (e.g., one ceramic pot, one core, one glass bottle).

3. 20+ artifacts which include at least 2 classes of artifact types (e.g., sherds, groundstone, nails, glass) within an area 15 meters (50 feet) in diameter,

4. one or more archaeological features in temporal association with any number of artifacts.

5. two or more temporally associated archaeological features without artifacts.

Non-linear, isolated features without associated artifacts may be recorded at the discretion of the archaeologist. An "isolated feature" is defined as a feature that does not have any other features within a 100 meter (325 feet) diameter. This might include isolated rock piles, mine shafts, prospecting pits or unidentified depressions without artifact associations.

To reiterate, archaeological discoveries that satisfy the above criteria must be documented as sites in order to comply with Arizona State Museum requirements.

ASM (AZSITE) Feature Definition

One of the reasons for re-organizing the AZSITE database was to make possible database searches of general classes of features. To do this, it is necessary to minimize the number of synonymous terms under which features may be listed. The following list of features has been compiled in an effort to be comprehensive while, at the same time, retaining some control over the number of synonymous terms used to name features. Consequently, while the AZSITE database does not require use of these terms, consistent use, where possible, will improve the usefulness of the database as a research tool.

Various systems of classifying features strictly by form or strictly by function were tried and discarded as too inconsistent with the way archaeologists really work in the field. Hence, the following list includes names that combine both form and function. For example, the term Compound Wall implies the form of a wall with the function of delineating a habitation area. If this name is not appropriate, there are less specific feature names to consider. The term Wall may be used, which does not imply that the wall functioned as part of a habitation. Or the term Undefined Rock Alignment may be used, which implies that the feature's form is unclear. In both cases, the Feature Use field should help provide further specificity as to the feature's function.

For sites where the only evidence of human activity is a scatter (Artifact Scatter, Lithic Scatter, Sherd Scatter or Trash Scatter), the scatter must be listed as a feature, otherwise the AZSITE database will not contain any component information. For sites where a scatter is just one of two or more features and component information will accompany other features, it is not necessary to list the scatter as a feature. In both cases, the artifacts should be described in the Artifacts section of Side C, as detailed on page 17. It is not necessary to repeat assemblage information in the Feature Remarks section of the Feature Record.

Feature names should be as specific as possible without overstating the evidence. For example, a depression known to be a pithouse should be named Pithouse. A depression only thought to be a pithouse should be named Undefined Depression and then further suggestions as to the nature of the depression should be included in Feature Remarks. A rock alignment that is not clearly a Wall or a Linear Border should be named Undefined Rock Alignment.

Certain feature names are broadly inclusive. For example, Mine includes all forms of excavated areas associated with mining and further description of the feature as adit, prospect or vent shaft should be included in Feature Remarks. Water Control Device should be used for all features (e.g., check dams or headgates) used to trap and direct water flow to a specific area.

Site Datum: point, designated by previously/newly installed metal stake or tag, or arbitrary point within the site boundary (usually the middle of the site)

Site Boundary: area, containing all features and artifact scatters associated with the site

Site Line: line, linear feature with associated artifacts...road grade/railroad/trail with cans, glass, metal.....

**spatial data for a feature can be gathered a variety of ways (points, line, polys). We take into account the scope of the project, the size, shape, and position of the feature as well as the satellite position to get the most accurate data.. So, a one room square pueblo (3x3 meters) located at the bottom of walnut canyon would likely be represented by a feature point, whereas the same pueblo located in Antelope Prairie could be represented as a Feature Poly.

Feature Point:: point, center point of a feature (see feature list on our site documentation form). example, hearth that is 1-2m in diameter, location of rock art panel, fence post, room....

Feature Polygon: poly, area of a feature (see feature list on our site documentation form). example, hearth that is 1-2m in diameter, location of rock art panel, fence post, room....

Feature Line: line, linear feature. road, fence, rock alignment, wall segment

Isolated Occurrence: can be a point, line, or poly. see ASM definition.

1993_ArizonaStateMuseum_ArchaeologicalSiteRecordingManual_.pdf

FLAG Site Recording Form.doc

Kelly M. Stehman, M.A., RPA
Archeologist
Flagstaff Area National Monuments
(928) 522-7090

APPENDIX C. FEATURE DATASET METADATA SAMPLE

Only one example of metadata is provided as it is so extensive that it would require too much space and not provide a significant amount of information.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      <citeinfo>
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        <geoform>vector digital data</geoform>
        <onlink>http://nrdata.nps.gov/WACA/WACADATA/waca_xxxx.zip</onlink>
        <onlink>http://science.nature.nps.gov/nrdata</onlink>
      </citeinfo>
    </citation>
    <descript>
      <abstract>This is a vector (Polygon) file showing the Archeological Site Features at Walnut Canyon National Monument. The coordinates for this dataset were collected using a Trimble GeoExplorer3 receiver, GeoXT 2005, and GeoXT 2008.</abstract>
      <purpose>To show the location of Archeological Site Features at Walnut Canyon National Monument. The intended use of all data in the park's GIS library is to support diverse park activities including planning, management, maintenance, research, and interpretation.</purpose>
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        <sngdate />
      </timeinfo>
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    <status>
      <progress>Complete</progress>
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<posacc>

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<horizpar>The data were collected according to an accuracy standard of maintaining a maximum PDOP (Position Dilution of Precision) of 6, while tracking a minimum of 4 SV (satellite vehicles). These data were differentially corrected and have estimated accuracies in the X and Y direction of 0 to 5 meters, using the above standards while SA (selective availability) is set to zero. No tests were done to confirm this. In Trimble Pathfinder Office software, accuracy is not represented. Instead, precision is an estimation of the positional error (closeness to truth) available as feature attributes. To estimate precisions the software uses: receiver type (for noise), baseline length, Dilution of Precision, covariance and reference variance components. It is a repeatability measure not an accuracy measure. Horizontal Precision for line and area features looks at all the individual points that make up the line/area feature and a mean value is computed by the software.</horizpar>
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</srcinfo>

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<procdesc>The GPS processing software was Trimble Pathfinder Office (unknown version). GPS files were differentially corrected using an unknown base station. The corrected GPS files were edited for known deviant and duplicate data. The differentially corrected features were then exported into ESRI ArcView version 3.2 shapefile format based on NAD83 datum using Pathfinder Office software version 4.00.</procdesc>
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</attr>
</detailed>
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<eaover>The first 2 items in the attribute table are the default attribute information found in the ArcView shapefile format. The next item, COMMENT, represents user-defined attributes from the GPS's datalogger data dictionary user input. The remaining items had Pathfinder software produced values: Max_PDOP, Max_HDOP, Corr_Type, Rcvr_Type, GPS_Date, GPS_Time, Update_Sta, Feat_Name, Datafile, Unfilt_Pos, Filt_Pos, Data_Dicti, GPS_Week, GPS_Second, GPS_Height, Vert_Prec, Horz_Prec, Std_Dev, Northing, Easting, Point_ID. The remaining items in the attribute table were added and calculated by the FLAG GIS Specialist: PARK, SITENO, ASMIS_ID, Map_Method, Map_Source, Src_Date, Edit_Date, GIS_Notes.</eaover>
<eadetcit>The user-defined items and values are described in detail above. Contact ESRI (Environmental Systems Research Institute, Inc.) for detailed explanations of their internal file structure at "http://www.esri.com". Contact Trimble at http://www.trimble.com" for a more detailed explanation of generated attributes that can be exported for feature type.</eadetcit>
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APPENDIX D. TOOLS PYTHON SCRIPTING

Create_ArcDB_Domains

```
# ---------------------------------------------------------------------------
# Create_ArcDB_Domains.py
# Created on: 2012-06-03 17:18:25.00000
#   (generated by ArcGIS/ModelBuilder)
# Description: This tool was designed to convert Excel spread sheets into domains within the Archeological Geodatabase.
# ---------------------------------------------------------------------------
# Import arcpy module
import arcpy

# Local variables:
Feature_Type_ = "S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_Domains\\Archeology_Domains.xlsx\\Feature_Type$"
IO_Type_ = "S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_Domains\\Archeology_Domains.xlsx\\IO_Type$"
Recorder_I_ = "S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_Domains\\Archeology_Domains.xlsx\\Recorder_I$"
Site_Type_ = "S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_Domains\\Archeology_Domains.xlsx\\Site_Type$"
FLAG_Area_Archeology_mdb = "S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLAG_Area_Archeology.mdb"
# Process: Table To Domain
arcpy.TableToDomain_management(Feature_Type_, "Code", "Description", FLAG_Area_Archeology_mdb, "Feature_Type", "The type of feature that you are collecting information on", "REPLACE")
# Process: Table To Domain (2)
```

arcpy.TableToDomain_management(IO_Type_, "Code", "Description", FLAG_Area_Archeology_mdb, "IO_Type", "The type of isolated occurance that you are collecting information on", "REPLACE")

Process: Table To Domain (3)

arcpy.TableToDomain_management(Recorder_I_, "Code", "Description", FLAG_Area_Archeology_mdb, "Recorder_I", "The name of the person who is recording the GPS information", "REPLACE")

Process: Table To Domain (4)

arcpy.TableToDomain_management(Site_Type_, "Code", "Description", FLAG_Area_Archeology_mdb, "Site_Type", "The type of archeological site that you are collecting GPS information on", "REPLACE")

ArcDB_Domains_To_Fields

ArcDB_Domains_To_Fields.py

Created on: 2012-06-05 16:11:42.00000

(generated by ArcGIS/ModelBuilder)

Usage: ArcDB_Domains_To_Fields <WACA_Arc_Site_Line__2_> <WUPA_Arc_Feature_Line__2_> <WUPA_Arc_Feature_Point__2_> <WUPA_Arc_Feature_Polygon__3_> <WUPA_Arc_IO_Point__2_> <WUPA_Arc_IO_Polygon__2_> <WUPA_Arc_Site_Boundary__2_> <WACA_Arc_Feature_Line__2_> <WACA_Arc_Feature_Point__2_> <WACA_Arc_Feature_Polygon__3_> <WACA_Arc_IO_Point__2_> <WACA_Arc_IO_Polygon__2_> <WACA_Arc_Site_Boundary__2_> <WACA_Arc_Site_Datums__2_> <WUPA_Arc_Site_Datum__2_> <WUPA_Arc_Site_Line__2_> <WUPA_Arc_Site_Line__4_> <WUPA_Arc_Site_Datum__4_> <WUPA_Arc_Site_Boundary__4_> <WUPA_Arc_IO_Polygon__4_> <WUPA_Arc_IO_Point__4_> <WUPA_Arc_Feature_Polygon__4_> <WUPA_Arc_Feature_Point__4_> <WUPA_Arc_Feature_Line__4_> <WACA_Arc_Site_Line__4_> <WACA_Arc_Site_Datums__4_> <WACA_Arc_Site_Boundary__4_> <WACA_Arc_IO_Polygon__4_> <WACA_Arc_IO_Point__4_> <WACA_Arc_Feature_Polygon__4_> <WACA_Arc_Feature_Point__4_> <WACA_Arc_Feature_Line__4_>

Description: This tool is designed so that domains can be quickly and easily added to the appropriate fields based on predetermined decisions on what fields get what domains.

Import arcpy module

```
import arcpy
# Script arguments
WACA_Arc_Site_Line__2_ = arcpy.GetParameterAsText(0)
if WACA_Arc_Site_Line__2_ == '#' or not WACA_Arc_Site_Line__2_:
    WACA_Arc_Site_Line__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Site_Line" # provide a default value if unspecified

WUPA_Arc_Feature_Line__2_ = arcpy.GetParameterAsText(1)
if WUPA_Arc_Feature_Line__2_ == '#' or not WUPA_Arc_Feature_Line__2_:
    WUPA_Arc_Feature_Line__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Feature_Line" # provide a default value if unspecified
WUPA_Arc_Feature_Point__2_ = arcpy.GetParameterAsText(2)
if WUPA_Arc_Feature_Point__2_ == '#' or not WUPA_Arc_Feature_Point__2_:
    WUPA_Arc_Feature_Point__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Feature_Point" # provide a default value if unspecified
WUPA_Arc_Feature_Polygon__3_ = arcpy.GetParameterAsText(3)
if WUPA_Arc_Feature_Polygon__3_ == '#' or not WUPA_Arc_Feature_Polygon__3_:
    WUPA_Arc_Feature_Polygon__3_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Feature_Polygon" # provide a default value if unspecified
WUPA_Arc_IO_Point__2_ = arcpy.GetParameterAsText(4)
if WUPA_Arc_IO_Point__2_ == '#' or not WUPA_Arc_IO_Point__2_:
    WUPA_Arc_IO_Point__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_IO_Point" # provide a default value if unspecified
WUPA_Arc_IO_Polygon__2_ = arcpy.GetParameterAsText(5)
if WUPA_Arc_IO_Polygon__2_ == '#' or not WUPA_Arc_IO_Polygon__2_:
    WUPA_Arc_IO_Polygon__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_IO_Polygon" # provide a default value if unspecified
WUPA_Arc_Site_Boundary__2_ = arcpy.GetParameterAsText(6)
```

```
    if WUPA_Arc_Site_Boundary__2_ == '#' or not WUPA_Arc_Site_Boundary__2_:
        WUPA_Arc_Site_Boundary__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Boundary" # provide a default value if unspecified
    WACA_Arc_Feature_Line__2_ = arcpy.GetParameterAsText(7)
    if WACA_Arc_Feature_Line__2_ == '#' or not WACA_Arc_Feature_Line__2_:
        WACA_Arc_Feature_Line__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Line" # provide a default value if unspecified
    WACA_Arc_Feature_Point__2_ = arcpy.GetParameterAsText(8)
    if WACA_Arc_Feature_Point__2_ == '#' or not WACA_Arc_Feature_Point__2_:
        WACA_Arc_Feature_Point__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Point" # provide a default value if unspecified
    WACA_Arc_Feature_Polygon__3_ = arcpy.GetParameterAsText(9)
    if WACA_Arc_Feature_Polygon__3_ == '#' or not WACA_Arc_Feature_Polygon__3_:
        WACA_Arc_Feature_Polygon__3_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Polygon" # provide a default value if unspecified
    WACA_Arc_IO_Point__2_ = arcpy.GetParameterAsText(10)
    if WACA_Arc_IO_Point__2_ == '#' or not WACA_Arc_IO_Point__2_:
        WACA_Arc_IO_Point__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_IO_Point" # provide a default value if unspecified
    WACA_Arc_IO_Polygon__2_ = arcpy.GetParameterAsText(11)
    if WACA_Arc_IO_Polygon__2_ == '#' or not WACA_Arc_IO_Polygon__2_:
        WACA_Arc_IO_Polygon__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_IO_Polygon" # provide a default value if unspecified
    WACA_Arc_Site_Boundary__2_ = arcpy.GetParameterAsText(12)
    if WACA_Arc_Site_Boundary__2_ == '#' or not WACA_Arc_Site_Boundary__2_:
        WACA_Arc_Site_Boundary__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Site_Boundary" # provide a default value if unspecified
```

```
WACA_Arc_Site_Datums__2_ = arcpy.GetParameterAsText(13)
if WACA_Arc_Site_Datums__2_ == '#' or not WACA_Arc_Site_Datums__2_:
    WACA_Arc_Site_Datums__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Site_Datums" # provide a default value if unspecified
WUPA_Arc_Site_Datum__2_ = arcpy.GetParameterAsText(14)
if WUPA_Arc_Site_Datum__2_ == '#' or not WUPA_Arc_Site_Datum__2_:
    WUPA_Arc_Site_Datum__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Datum" # provide a default value if unspecified
WUPA_Arc_Site_Line__2_ = arcpy.GetParameterAsText(15)
if WUPA_Arc_Site_Line__2_ == '#' or not WUPA_Arc_Site_Line__2_:
    WUPA_Arc_Site_Line__2_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Line" # provide a default value if unspecified
WUPA_Arc_Site_Line__4_ = arcpy.GetParameterAsText(16)
if WUPA_Arc_Site_Line__4_ == '#' or not WUPA_Arc_Site_Line__4_:
    WUPA_Arc_Site_Line__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Line" # provide a default value if unspecified
WUPA_Arc_Site_Datum__4_ = arcpy.GetParameterAsText(17)
if WUPA_Arc_Site_Datum__4_ == '#' or not WUPA_Arc_Site_Datum__4_:
    WUPA_Arc_Site_Datum__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Datum" # provide a default value if unspecified
WUPA_Arc_Site_Boundary__4_ = arcpy.GetParameterAsText(18)
if WUPA_Arc_Site_Boundary__4_ == '#' or not WUPA_Arc_Site_Boundary__4_:
    WUPA_Arc_Site_Boundary__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Boundary" # provide a default value if unspecified
WUPA_Arc_IO_Polygon__4_ = arcpy.GetParameterAsText(19)
if WUPA_Arc_IO_Polygon__4_ == '#' or not WUPA_Arc_IO_Polygon__4_:
```

```
            WUPA_Arc_IO_Polygon__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_IO_Polygon" # provide a default value if unspecified
        WUPA_Arc_IO_Point__4_ = arcpy.GetParameterAsText(20)
        if WUPA_Arc_IO_Point__4_ == '#' or not WUPA_Arc_IO_Point__4_:
            WUPA_Arc_IO_Point__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_IO_Point" # provide a default value if unspecified
        WUPA_Arc_Feature_Polygon__4_ = arcpy.GetParameterAsText(21)
        if WUPA_Arc_Feature_Polygon__4_ == '#' or not WUPA_Arc_Feature_Polygon__4_:
            WUPA_Arc_Feature_Polygon__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Feature_Polygon" # provide a default value if unspecified
        WUPA_Arc_Feature_Point__4_ = arcpy.GetParameterAsText(22)
        if WUPA_Arc_Feature_Point__4_ == '#' or not WUPA_Arc_Feature_Point__4_:
            WUPA_Arc_Feature_Point__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Feature_Point" # provide a default value if unspecified

        WUPA_Arc_Feature_Line__4_ = arcpy.GetParameterAsText(23)
        if WUPA_Arc_Feature_Line__4_ == '#' or not WUPA_Arc_Feature_Line__4_:
            WUPA_Arc_Feature_Line__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Feature_Line" # provide a default value if unspecified
        WACA_Arc_Site_Line__4_ = arcpy.GetParameterAsText(24)
        if WACA_Arc_Site_Line__4_ == '#' or not WACA_Arc_Site_Line__4_:
            WACA_Arc_Site_Line__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Site_Line" # provide a default value if unspecified
        WACA_Arc_Site_Datums__4_ = arcpy.GetParameterAsText(25)
        if WACA_Arc_Site_Datums__4_ == '#' or not WACA_Arc_Site_Datums__4_:
            WACA_Arc_Site_Datums__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Site_Datums" # provide a default value if unspecified
```

```
WACA_Arc_Site_Boundary__4_ = arcpy.GetParameterAsText(26)
if WACA_Arc_Site_Boundary__4_ == '#' or not WACA_Arc_Site_Boundary__4_:
    WACA_Arc_Site_Boundary__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Site_Boundary" # provide a default value if unspecified
WACA_Arc_IO_Polygon__4_ = arcpy.GetParameterAsText(27)
if WACA_Arc_IO_Polygon__4_ == '#' or not WACA_Arc_IO_Polygon__4_:
    WACA_Arc_IO_Polygon__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_IO_Polygon" # provide a default value if unspecified
WACA_Arc_IO_Point__4_ = arcpy.GetParameterAsText(28)
if WACA_Arc_IO_Point__4_ == '#' or not WACA_Arc_IO_Point__4_:
    WACA_Arc_IO_Point__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_IO_Point" # provide a default value if unspecified
WACA_Arc_Feature_Polygon__4_ = arcpy.GetParameterAsText(29)
if WACA_Arc_Feature_Polygon__4_ == '#' or not WACA_Arc_Feature_Polygon__4_:
    WACA_Arc_Feature_Polygon__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Polygon" # provide a default value if unspecified
WACA_Arc_Feature_Point__4_ = arcpy.GetParameterAsText(30)
if WACA_Arc_Feature_Point__4_ == '#' or not WACA_Arc_Feature_Point__4_:
    WACA_Arc_Feature_Point__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Point" # provide a default value if unspecified
WACA_Arc_Feature_Line__4_ = arcpy.GetParameterAsText(31)
if WACA_Arc_Feature_Line__4_ == '#' or not WACA_Arc_Feature_Line__4_:
    WACA_Arc_Feature_Line__4_ =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Line" # provide a default value if unspecified
# Local variables:
WACA_Arc_Feature_Line =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WACA\\WACA_Arc_Feature_Line"
```

WACA_Arc_Feature_Point =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_Feature_Point"

WACA_Arc_Feature_Polygon =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_Feature_Polygon"

WACA_Arc_IO_Point =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_IO_Point"

WACA_Arc_IO_Polygon =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_IO_Polygon"

WACA_Arc_Site_Boundary =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_Site_Boundary"

WACA_Arc_Site_Datums =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_Site_Datums"

WACA_Arc_Site_Line =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WACA\\WACA_Arc_Site_Line"

WUPA_Arc_Feature_Line =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WUPA\\WUPA_Arc_Feature_Line"

WUPA_Arc_Feature_Point =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WUPA\\WUPA_Arc_Feature_Point"

WUPA_Arc_Feature_Polygon =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WUPA\\WUPA_Arc_Feature_Polygon"

WUPA_Arc_IO_Point =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.mdb\\WUPA\\WUPA_Arc_IO_Point"

```
WUPA_Arc_IO_Polygon =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_IO_Polygon"
WUPA_Arc_Site_Boundary =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Boundary"
WUPA_Arc_Site_Datum =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Datum"
WUPA_Arc_Site_Line =
"C:\\Users\\michaelmjones\\Desktop\\Practicum\\Archeology_Geodatabase\\FLAG_Area_Archeology.md
b\\WUPA\\WUPA_Arc_Site_Line"
# Process: Assign Domain To Field (4)
arcpy.AssignDomainToField_management(WUPA_Arc_Feature_Point, "Site_Type",
"Feature_Type", "")
# Process: 5
arcpy.AssignDomainToField_management(WUPA_Arc_Site_Boundary, "Site_Type",
"Site_Type", "")
# Process: 7
arcpy.AssignDomainToField_management(WUPA_Arc_IO_Polygon, "IO_Type", "IO_Type",
"")
# Process: 6
arcpy.AssignDomainToField_management(WUPA_Arc_Site_Boundary, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (18)
arcpy.AssignDomainToField_management(WUPA_Arc_IO_Polygon, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (15)
arcpy.AssignDomainToField_management(WACA_Arc_Site_Datums, "Site_Type",
"Site_Type", "")
# Process: Assign Domain To Field (11)
arcpy.AssignDomainToField_management(WACA_Arc_Feature_Polygon, "Site_Type",
"Feature_Type", "")
```

```
# Process: Assign Domain To Field (24)
arcpy.AssignDomainToField_management(WACA_Arc_Site_Datums, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (28)
arcpy.AssignDomainToField_management(WACA_Arc_Feature_Polygon, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (10)
arcpy.AssignDomainToField_management(WACA_Arc_Feature_Point, "Site_Type",
"Feature_Type", "")
# Process: 1
arcpy.AssignDomainToField_management(WUPA_Arc_Site_Line, "Site_Type", "Site_Type",
"")
# Process: Assign Domain To Field (29)
arcpy.AssignDomainToField_management(WACA_Arc_Feature_Point, "Recorder_I",
"Recorder_I", "")
# Process: 2
arcpy.AssignDomainToField_management(WUPA_Arc_Site_Line, "Recorder_I", "Recorder_I",
"")
# Process: Assign Domain To Field (9)
arcpy.AssignDomainToField_management(WACA_Arc_Feature_Line, "Site_Type",
"Feature_Type", "")
# Process: Assign Domain To Field (3)
arcpy.AssignDomainToField_management(WUPA_Arc_Feature_Line, "Site_Type",
"Feature_Type", "")
# Process: Assign Domain To Field (30)
arcpy.AssignDomainToField_management(WACA_Arc_Feature_Line, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (22)
arcpy.AssignDomainToField_management(WUPA_Arc_Feature_Line, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (12)
arcpy.AssignDomainToField_management(WACA_Arc_IO_Point, "IO_Type", "IO_Type", "")
# Process: 3
```

```
arcpy.AssignDomainToField_management(WUPA_Arc_Site_Datum, "Site_Type", "Site_Type", "")
# Process: Assign Domain To Field (27)
arcpy.AssignDomainToField_management(WACA_Arc_IO_Point, "Recorder_I", "Recorder_I", "")
# Process: 4
arcpy.AssignDomainToField_management(WUPA_Arc_Site_Datum, "Recorder_I", "Recorder_I", "")
# Process: Assign Domain To Field (2)
arcpy.AssignDomainToField_management(WACA_Arc_Site_Line, "Site_Type", "Site_Type", "")
# Process: Assign Domain To Field (5)
arcpy.AssignDomainToField_management(WUPA_Arc_Feature_Polygon, "Site_Type", "Feature_Type", "")
# Process: Assign Domain To Field (23)
arcpy.AssignDomainToField_management(WACA_Arc_Site_Line, "Recorder_I", "Recorder_I", "")
# Process: Assign Domain To Field (20)
arcpy.AssignDomainToField_management(WUPA_Arc_Feature_Polygon, "Recorder_I", "Recorder_I", "")
# Process: Assign Domain To Field (25)
arcpy.AssignDomainToField_management(WACA_Arc_Site_Boundary, "Recorder_I", "Recorder_I", "")
# Process: Assign Domain To Field (19)
arcpy.AssignDomainToField_management(WUPA_Arc_IO_Point, "Recorder_I", "Recorder_I", "")
# Process: Assign Domain To Field (14)
arcpy.AssignDomainToField_management(WACA_Arc_Site_Boundary, "Site_Type", "Site_Type", "")
# Process: Assign Domain To Field (6)
arcpy.AssignDomainToField_management(WUPA_Arc_IO_Point, "IO_Type", "IO_Type", "")
# Process: Assign Domain To Field (26)
arcpy.AssignDomainToField_management(WACA_Arc_IO_Polygon, "Recorder_I", "Recorder_I", "")
```

```
# Process: Assign Domain To Field (21)
arcpy.AssignDomainToField_management(WUPA_Arc_Feature_Point, "Recorder_I",
"Recorder_I", "")
# Process: Assign Domain To Field (13)
arcpy.AssignDomainToField_management(WACA_Arc_IO_Polygon, "IO_Type", "IO_Type",
"")
```

Delete_ArcDB_Tables

```
# ---------------------------------------------------------------------------
# Delete_ArcDB_Tables.py
# Created on: 2012-06-06 10:59:33.00000
#   (generated by ArcGIS/ModelBuilder)
# Description: This tool is used to remove the old tables from the geodatabase.  It selects each table and
deletes it, leaving it open for new tables from the FlagArchGisExport_V1.1 tool.
# ---------------------------------------------------------------------------
# Import arcpy module
import arcpy
# Local variables:
ArchSite =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\ArchSite"
CeramicsCount =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\CeramicsCount"
CeramicsLog =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\CeramicsLog"
CulturalGroup =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\CulturalGroup"
DATING =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\DATING"
```

```
GeneralTimePeriod =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\GeneralTimePeriod"
LithicsCount =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\LithicsCount"
LithicsLog =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\LithicsLog"
Monitoring =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\Monitoring"
Project =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\Project"
ProjectSiteMap =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\ProjectSiteMap"
SiteType =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb\\SiteType"
# Process: Delete
arcpy.Delete_management(SiteType, "Table")
# Process: Delete (2)
arcpy.Delete_management(ProjectSiteMap, "Table")
# Process: Delete (3)
arcpy.Delete_management(Project, "Table")
# Process: Delete (4)
arcpy.Delete_management(Monitoring, "Table")
# Process: Delete (5)
arcpy.Delete_management(LithicsLog, "Table")
# Process: Delete (6)
arcpy.Delete_management(LithicsCount, "Table")
# Process: Delete (7)
```

```
arcpy.Delete_management(GeneralTimePeriod, "Table")
# Process: Delete (8)
arcpy.Delete_management(DATING, "Table")
# Process: Delete (9)
arcpy.Delete_management(CulturalGroup, "Table")
# Process: Delete (10)
arcpy.Delete_management(CeramicsLog, "Table")
# Process: Delete (11)
arcpy.Delete_management(CeramicsCount, "Table")

# Process: Delete (12)
arcpy.Delete_management(ArchSite, "Table")
```

Add_ArcDB_Tables

```
# ---------------------------------------------------------------------------
# Add_ArcDB_Tables.py
# Created on: 2012-06-06 11:06:07.00000
#   (generated by ArcGIS/ModelBuilder)
# Description: This tool adds tables from the FlagArchGisExport_V1.1 tool to the Archeological
geodatabase so that information can be joined and then queried and displayed spatially with in ArcMap.
# ---------------------------------------------------------------------------
# Import arcpy module
import arcpy
# Local variables:
FLAG_Area_Archeology_mdb__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLA
G_Area_Archeology.mdb"
CeramicsLog__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Arch
eology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\CeramicsLog"
CulturalGroup__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Arch
eology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\CulturalGroup"
```

DATING__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\DATING"
GeneralTimePeriod__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\GeneralTimePeriod"
LithicsCount__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\LithicsCount"
LithicsLog__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\LithicsLog"
Monitoring__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\Monitoring"
Project__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\Project"
ProjectSiteMap__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\ProjectSiteMap"
SiteType__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\SiteType"
ArchSite__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\ArchSite"
CeramicsCount__2_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\CeramicsCount"
FLAG_Area_Archeology_mdb__3_ =
"S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\FLAG_Area_Archeology.mdb"

```
# Process: Table to Geodatabase (multiple)
arcpy.TableToGeodatabase_conversion("S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\CeramicsLog;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\CulturalGroup;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\DATING;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\GeneralTimePeriod;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\LithicsCount;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\LithicsLog;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\Monitoring;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\Project;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\ProjectSiteMap;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\SiteType;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\ArchSite;S:\\GIS\\gis_data\\FLAG\\data\\cultural\\archeology\\Archeology_Geodatabase\\ArcGeoDatabase\\Archeology_GIS_Info\\Archeology_DB_GIS_Import\\FlagArchGisExport_V1.1.mdb\\CeramicsCount", FLAG_Area_Archeology_mdb__3_)
```

APPENDIX E. ARCHEOLOGICAL GEODATABASE DESIGN

This technical description of this geodatabase design may differ slightly from that described in this paper. This is due to the fluid nature of geodatabases. They are not static and continue to evolve as they are used. One particular result of this evolution is annotation which has been added to the geodatabase to increase the usefulness of the information. If you have any questions in regard to the technical aspects of the geodatabase design, please contact Michael M. Jones at Michael_m_jones@nps.gov.

Report Creation							
	Date	Sunday, August 12, 2012					
	Author	michaelmjones/NPS on INPFLAG99191					
System Information							
	Operating System	Microsoft Windows NT 6.1.7601 Service Pack 1					
	.Net Framework	2.0.50727.5456					
	Diagrammer	10.0.1.0					
Geodatabase							
	Workspace Type	Personal Geodatabase					
Table Of Contents							
Domains	*Listing of Coded Value and Range Domains.*						
ObjectClasses	*Listing of Tables and FeatureClasses.*						

Relationships	*Listing of Geodatabase Relatioships.*						
Spatial Reference	*Listing of Spatial References used by FeatureClasses and FeatureDatasets.*						
Domains							
Domain Name	**Owner**	**Domain Type**					
AnnotationStatus		Coded Value					
BooleanSymbolValue		Coded Value					
Feature_Type		Coded Value					
HorizontalAlignment		Coded Value					
IO_Type		Coded Value					
Recorder_I		Coded Value					
Site_Type		Coded Value					
VerticalAlignment		Coded Value					
WACA_Arc_Feature_Line_Rep_Rules		Coded Value					
WACA_Arc_Feature_Point_Rep_Rules		Coded Value					
WACA_Arc_Feature_Polygon_Rep_Rules		Coded Value					
WACA_Arc_IO_Point_Rep_Rules		Coded Value					

WACA_Arc_IO_Polygon_Rep_Rules		Coded Value						
WACA_Arc_Site_Boundary_Rep_Rules		Coded Value						
WACA_Arc_Site_Datums_Rep_Rules		Coded Value						
WACA_Arc_Site_Line_Rep_Rules		Coded Value						
WUPA_Arc_Feature_Line_Rep_Rules		Coded Value						
WUPA_Arc_Feature_Point_Rep_Rules		Coded Value						
WUPA_Arc_Feature_Polygon_Rep_Rules		Coded Value						
WUPA_Arc_IO_Point_Rep_Rules		Coded Value						
WUPA_Arc_IO_Polygon_Rep_Rules		Coded Value						
WUPA_Arc_Site_Boundary_Rep_Rules		Coded Value						
WUPA_Arc_Site_Datum_Rep_Rules		Coded Value						
WUPA_Arc_Site_Line_Rep_Rules		Coded Value						
AnnotationStatus								
Owner								

Description	Valid annotation state values.						
Domain Type	Coded Value						
Field Type	Small Integer						
Merge Policy	Default Value						
Split Policy	Duplicate						
Domain Members							
Name	**Value**						
Placed	0						
Unplaced	1						
BooleanSymbolValue							
Owner							
Description	Valid values are Yes and No.						
Domain Type	Coded Value						
Field Type	Small Integer						
Merge Policy	Default Value						
Split Policy	Duplicate						
Domain Members							
Name	**Value**						
Yes	1						
No	0						
Feature_Type							
Owner							

Description	The type of feature that you are collecting information on						
Domain Type	Coded Value						
Field Type	String						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Access	Access						
Agricultural Structure	Agricultural Structure						
Artifact Scatter	Artifact Scatter						
Ash/Charcoal Stain	Ash/Charcoal Stain						
Ball Court	Ball Court						
Bedrock/Boulder Grinding Stone	Bedrock/Boulder Grinding Stone						
Brush Structure	Brush Structure						
Burial/Grave/Inhumation/HR	Burial/Grave/Inhumation/HR						
Cache	Cache						
Cairn	Cairn						
Cave	Cave						
Check Dam	Check Dam						

Cist	Cist						
Corral	Corral						
Dendroglyph	Dendroglyph						
Depression,Undefined	Depression,Undefined						
Ditch/Canal	Ditch/Canal						
Door	Door						
Enclosure, Livestock	Enclosure, Livestock						
Enclosure, Other	Enclosure, Other						
Ephemeral Stone Alignment	Ephemeral Stone Alignment						
Fence/Gate	Fence/Gate						
Garden Plot	Garden Plot						
Hand/Toe Holds	Hand/Toe Holds						
Hearth	Hearth						
Hogan	Hogan						
Inscription	Inscription						
Kiln	Kiln						
Kiva	Kiva						
Lean-to	Lean-to						
Log Cabin	Log Cabin						
Midden	Midden						
Mine	Mine						
Modified Tree	Modified Tree						

Open Use Area	Open Use Area						
Outhouse	Outhouse						
Petroglyph Panel	Petroglyph Panel						
Pictograph Panel	Pictograph Panel						
Pithouse	Pithouse						
Plaza	Plaza						
Pot Drop	Pot Drop						
Quarry–Clay	Quarry–Clay						
Quarry–Lithic	Quarry–Lithic						
Quarry–soil/mortar	Quarry–soil/mortar						
Railroad Track/Grade	Railroad Track/Grade						
Ramada	Ramada						
Reservoir/Dam	Reservoir/Dam						
Resource Procurement Area	Resource Procurement Area						
Retaining Wall	Retaining Wall						
Road/Trail	Road/Trail						
Roasting Pit	Roasting Pit						
Rock Alignment, Undefined	Rock Alignment, Undefined						
Rock Feature, Undefined	Rock Feature, Undefined						
Rock Grooves	Rock Grooves						
Rock Pile	Rock Pile						

Rock Ring	Rock Ring						
Rockshelter	Rockshelter						
Shrine	Shrine						
Stairs/Steps/Planking	Stairs/Steps/Planking						
Structure	Structure						
Structure, Multi-unit, masonry	Structure, Multi-unit, masonry						
Structure, Multi-unit, rubble mound	Structure, Multi-unit, rubble mound						
Structure, Other	Structure, Other						
Structure, Single-unit, masonry	Structure, Single-unit, masonry						
Structure, Single-unit, rubble mound	Structure, Single-unit, rubble mound						
Sweat Lodge	Sweat Lodge						
Terrace(s)	Terrace(s)						
Transportation	Transportation						
Wall	Wall						
Water Diversion	Water Diversion						
Wickiup	Wickiup						
Windbreak	Windbreak						
Other	Other						
See Comment Field	Comment						

Unknown	Unknown						
HorizontalAlignment							
Owner							
Description	Valid horizontal symbol alignment values.						
Domain Type	Coded Value						
Field Type	Small Integer						
Merge Policy	Default Value						
Split Policy	Duplicate						
Domain Members							
Name	**Value**						
Left	0						
Center	1						
Right	2						
Full	3						
IO_Type							
Owner							
Description	The type of isolated occurance that you are collecting information on						
Domain Type	Coded Value						
Field Type	String						
Merge Policy	Default Value						

Split Policy	Default Value						
Domain Members							
Name	**Value**						
Artifact	Artifact						
Artifact Scatter	Artifact Scatter						
Ash/Charcoal Stain	Ash/Charcoal Stain						
Bedrock/Boulder Grinding Stone	Bedrock/Boulder Grinding Stone						
Brush Structure	Brush Structure						
Cache	Cache						
Cairn	Cairn						
Cave	Cave						
Check Dam	Check Dam						
Cist	Cist						
Corral	Corral						
Dendroglyph	Dendroglyph						
Depression,Undefined	Depression,Undefined						
Ditch/Canal	Ditch/Canal						
Enclosure, Livestock	Enclosure, Livestock						
Enclosure, Other	Enclosure, Other						
Ephemeral Stone Alignment	Ephemeral Stone Alignment						
Fence/Gate	Fence/Gate						

Garden Plot	Garden Plot						
Hand/Toe Holds	Hand/Toe Holds						
Hearth	Hearth						
Inscription	Inscription						
Kiln	Kiln						
Lean-to	Lean-to						
Modified Tree	Modified Tree						
Outhouse	Outhouse						
Petroglyph Panel	Petroglyph Panel						
Pictograph Panel	Pictograph Panel						
Pot Drop	Pot Drop						
Quarry–Clay	Quarry–Clay						
Quarry–Lithic	Quarry–Lithic						
Quarry–soil/mortar	Quarry–soil/mortar						
Railroad Track/Grade	Railroad Track/Grade						
Ramada	Ramada						
Reservoir / Dam	Reservoir / Dam						
Resource Procurement Area	Resource Procurement Area						
Retaining Wall	Retaining Wall						
Road/Trail	Road/Trail						
Roasting Pit	Roasting Pit						
Rock Alignment, Undefined	Rock Alignment,						

	Undefined						
Rock Feature, Undefined	Rock Feature, Undefined						
Rock Grooves	Rock Grooves						
Rock Pile	Rock Pile						
Rock Ring	Rock Ring						
Rockshelter	Rockshelter						
Shrine	Shrine						
Stairs/Steps/Planking	Stairs/Steps/Planking						
Structure, Other	Structure, Other						
Structure, Single-unit, masonry	Structure, Single-unit, masonry						
Structure, Single-unit, rubble mound	Structure, Single-unit, rubble mound						
Sweat Lodge	Sweat Lodge						
Terrace(s)	Terrace(s)						
Transportation	Transportation						
Wall	Wall						
Water Diversion	Water Diversion						
Wickiup	Wickiup						
Windbreak	Windbreak						
Other	Other						
See Comment Field	Comment						

Unknown	Unknown						
Recorder_I							
Owner							
Description	The name of the person who is recording the GPS information						
Domain Type	Coded Value						
Field Type	String						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Bernie Natseway	BAN						
Bryan Hansen	BH						
Brigid Shaw	BS						
Daniel Rucker	DR						
Erin Gearty	EG						
Jim Hasbargen	JH						
Joshua Kleinman	JJK						
Kerry Gaiz	KG						
Kelly Marie Stehman	KMS						
Krista Richardson-Cline	KR						
Lisa Baldwin	LB						
Lisa Leap	LL						

Michael M Jones	MMJ						
Nicole Arendt	NMA						
Randy Carlton	RC						
Ted Tsouras	TT						
Volunteer Monitoring	VM						
See Comment Field	COM						
Barb Bane	BB						
Charlie Webber	CW						
Chris Donnermeyer	CJD						
Clive Briggs	CB						
Ellen Brennan	EB						
Heidi Strickfaden	HNS						
Ian Hough	IH						
Jessica Bland	JB						
John Canella	JC						
JT Stark	JTS						
Justin Pathe Miller	JM						
KC Carlson	KC						
Lyle John Balenquah	LJB						
Mandy Johnson	MJ						
Matt Marques	MZM						
Nicki Shurack	NS						
Roger Dorr	RD						
Walter Gosart	WG						

Unknown	UNK						
Woody Coochwytewa	WLC						
Sean Berry	SB						
Site_Type							
Owner							
Description	The type of archeological site that you are collecting GPS information on						
Domain Type	Coded Value						
Field Type	String						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Artifact Scatter	Artifact Scatter						
Ceramic Scatter	Ceramic Scatter						
Rock Alignment	Rock Alignment						
Rock Art	Rock Art						
Rock Pile	Rock Pile						
Habitation	Habitation						
Habitation, Open Air	Habitation, Open Air						
Habitation, Protected	Habitation, Protected						

Residential Community/Complex	Residential Community/Complex						
Structure	Structure						
Structure, Storage	Structure, Storage						
Structure, Ranching	Structure, Ranching						
Structure, Agricultural	Structure, Agricultural						
Structure, Other	Structure, Other						
Transportation/Communication	Transportation/Communication						
Water Diversion	Water Diversion						
Check Dam	Check Dam						
Extractive Site	Extractive Site						
Burial/Grave/Inhumation	Burial/Grave/Inhumation						
Comment	Comment						
Other	Other						
Unknown	Unknown						
VerticalAlignment							
Owner							
Description	Valid symbol vertical alignment values.						
Domain Type	Coded Value						
Field Type	Small Integer						

Merge Policy	Default Value						
Split Policy	Duplicate						
Domain Members							
Name	**Value**						
Top	0						
Center	1						
Baseline	2						
Bottom	3						
WACA_Arc_Feature_Line_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WACA_Arc_Feature_Point_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						

Field Type	Integer							
Merge Policy	Default Value							
Split Policy	Default Value							
Domain Members								
Name	**Value**							
Rule_1	1							
WACA_Arc_Feature_Polygon_Rep_Rules								
Owner								
Description	Representation rules							
Domain Type	Coded Value							
Field Type	Integer							
Merge Policy	Default Value							
Split Policy	Default Value							
Domain Members								
Name	**Value**							
Rule_1	1							
WACA_Arc_IO_Point_Rep_Rules								
Owner								
Description	Representation rules							
Domain Type	Coded Value							
Field Type	Integer							
Merge Policy	Default Value							

Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WACA_Arc_IO_Polygon_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WACA_Arc_Site_Boundary_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							

Name	Value						
Rule_1	1						
WACA_Arc_Site_Datums_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WACA_Arc_Site_Line_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						

WUPA_Arc_Feature_Line_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_Feature_Point_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_Feature_Polygon_Rep_Rules							
Owner							

Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_IO_Point_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_IO_Polygon_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						

Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_Site_Boundary_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_Site_Datum_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						

Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
WUPA_Arc_Site_Line_Rep_Rules							
Owner							
Description	Representation rules						
Domain Type	Coded Value						
Field Type	Integer						
Merge Policy	Default Value						
Split Policy	Default Value						
Domain Members							
Name	**Value**						
Rule_1	1						
ObjectClasses							
ObjectClass Name	**Type**	**Geometry**	**Subtype**				
SUCR				SR			
WACA				SR			
WACA_Arc_Feature_Line	Simple FeatureClass	Polyline	-				
WACA_Arc_Feature_Point	Simple FeatureClass	Point	-				

WACA_Arc_Feature_Polygon	Simple FeatureClass	Polygon	-			
WACA_Arc_IO_Point	Simple FeatureClass	Point	-			
WACA_Arc_IO_Polygon	Simple FeatureClass	Polygon	-			
WACA_Arc_Site_Boundary	Simple FeatureClass	Polygon	-			
WACA_Arc_Site_Datums	Simple FeatureClass	Point	-			
WACA_Arc_Site_Line	Simple FeatureClass	Polyline	-			
WUPA			SR			
WUPA_Arc_Feature_Line	Simple FeatureClass	Polyline	-			
WUPA_Arc_Feature_Point	Simple FeatureClass	Point	-			
WUPA_Arc_Feature_Polygon	Simple FeatureClass	Polygon	-			
WUPA_Arc_IO_Point	Simple FeatureClass	Point	-			
WUPA_Arc_IO_PointAnno	Annotation FeatureClass	Polygon	-			
WUPA_Arc_IO_Polygon	Simple FeatureClass	Polygon	-			
WUPA_Arc_Site_Boundary	Simple FeatureClass	Polygon	-			
WUPA_Arc_Site_Datum	Simple FeatureClass	Point	-			
WUPA_Arc_Site_DatumAnno	Annotation FeatureClass	Polygon	-			

WUPA_Arc_Site_Line	Simple FeatureClass	Polyline	-				
Stand Alone ObjectClass(s)							
ArchSite	Table	-	-				
CeramicsCount	Table	-	-				
CeramicsLog	Table	-	-				
CulturalGroup	Table	-	-				
DATING	Table	-	-				
GeneralTimePeriod	Table	-	-				
LithicsCount	Table	-	-				
LithicsLog	Table	-	-				
Monitoring	Table	-	-				
Project	Table	-	-				
ProjectSiteMap	Table	-	-				
SiteType	Table	-	-				
ArchSite							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID			OID	0	0	4	No
subsiteID	subsiteID	subsiteID	Integer	0	0	4	Yes
Asmis_ID	Asmis_ID	Asmis_ID	String	0	0	255	Yes

asmisID	asmisID	asmisID	Integer	0	0	4	Yes
statenum	statenum	statenum	String	0	0	255	Yes
io_name	io_name	io_name	String	0	0	255	Yes
Mgmtzone	Mgmtzone	Mgmtzone	String	0	0	255	Yes
NRSTATUS	NRSTATUS	NRSTATUS	String	0	0	255	Yes
BurnUnit	BurnUnit	BurnUnit	String	0	0	255	Yes
LastCondition	LastCondition	LastCondition	String	0	0	255	Yes
LastConditionAssessDate	LastConditionAssessDate	LastConditionAssessDate	Date	0	0	8	Yes
isvt	isvt	isvt	Integer	0	0	4	Yes
isnagpra	isnagpra	isnagpra	Small Integer	0	0	2	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
CeramicsCount							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Prec n.**	**Scal e**	**Lengt h**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
CeramicsLogID	CeramicsLogID	CeramicsLogID	Integer	0	0	4	Yes

Count_	Count_	Count_	Integer	0	0	4	Yes
AlphaCount	AlphaCount	AlphaCount	String	0	0	255	Yes
ware	ware	ware	String	0	0	255	Yes
type	type	type	String	0	0	255	Yes
form	form	form	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
ID	Yes	No	ID				
CeramicsLog							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Prec n.**	**Scal e**	**Lengt h**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
subsiteid	subsiteid	subsiteid	Integer	0	0	4	Yes
Date_	Date_	Date_	Date	0	0	8	Yes
SiteArea	SiteArea	SiteArea	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				

subsiteid	Yes	No	subsiteid				
CulturalGroup							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Prec n.**	**Scal e**	**Lengt h**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
subsiteid	subsiteid	subsiteid	Integer	0	0	4	Yes
CulturalGroup	CulturalGroup	CulturalGroup	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
subsiteid	Yes	No	subsiteid				
DATING							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Prec n.**	**Scal e**	**Lengt h**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes

SubsiteID	SubsiteID	SubsiteID	Integer	0	0	4	Yes
FR_CODE	FR_CODE	FR_CODE	String	0	0	255	Yes
FR_YEAR	FR_YEAR	FR_YEAR	String	0	0	255	Yes
FR_TYPE	FR_TYPE	FR_TYPE	String	0	0	255	Yes
FR_METH	FR_METH	FR_METH	String	0	0	255	Yes
TO_CODE	TO_CODE	TO_CODE	String	0	0	255	Yes
TO_YEAR	TO_YEAR	TO_YEAR	String	0	0	255	Yes
TO_TYPE	TO_TYPE	TO_TYPE	String	0	0	255	Yes
TO_METH	TO_METH	TO_METH	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SubsiteID	Yes	No	SubsiteID				
GeneralTimePeriod							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
subsiteid	subsiteid	subsiteid	Integer	0	0	4	Yes
GeneralTimePeriod	GeneralTimePeriod	GeneralTimePeriod	String	0	0	255	Yes

Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
subsiteid	Yes	No	subsiteid				
LithicsCount							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Prec n.**	**Scal e**	**Lengt h**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
LithicsLogID	LithicsLogID	LithicsLogID	Integer	0	0	4	Yes
Rock	Rock	Rock	String	0	0	255	Yes
Reduc	Reduc	Reduc	String	0	0	255	Yes
Count_	Count_	Count_	Integer	0	0	4	Yes
AlphaCount	AlphaCount	AlphaCount	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
LithicsLogID	Yes	No	LithicsLogID				
LithicsLog							

Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
subsiteid	subsiteid	subsiteid	Integer	0	0	4	Yes
Date_	Date_	Date_	Date	0	0	8	Yes
SiteArea	SiteArea	SiteArea	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
subsiteid	Yes	No	subsiteid				
Monitoring							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
SubsiteID	SubsiteID	SubsiteID	Integer	0	0	4	Yes

Date_	Date_	Date_	Date	0	0	8	Yes
NextDate	NextDate	NextDate	Date	0	0	8	Yes
Schedule	Schedule	Schedule	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SubsiteID	Yes	No	SubsiteID				
Project							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Prec n.**	**Scal e**	**Lengt h**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
Project_ID	Project_ID	Project_ID	String	0	0	255	Yes
Name	Name	Name	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
ProjectSiteMap							
Alias							
Dataset Type	Table						

FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID			OID	0	0	4	No
ProjectID	ProjectID	ProjectID	Integer	0	0	4	Yes
SubsiteID	SubsiteID	SubsiteID	Integer	0	0	4	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SubsiteID	Yes	No	SubsiteID				
SiteType							
Alias							
Dataset Type	Table						
FeatureType							
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID			OID	0	0	4	No
ID	ID	ID	Integer	0	0	4	Yes
subsiteid	subsiteid	subsiteid	Integer	0	0	4	Yes
SITETYPE	SITETYPE	SITETYPE	String	0	0	255	Yes
Subtype Name	**Default Value**	**Domain**					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				

subsiteid	Yes	No	subsiteid				
WACA_Arc_Feature_Line							
Alias		**Geometry:**Polyline					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Feature_Nu	Feature_Nu	Feature_Nu	Double	0	0	8	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes

Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Avg_Vert_P	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Avg_Horz_P	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
Comments	Comments	Comments	String	0	0	50	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
Shape_Length0	Shape_Length	Shape_Length	Double	0	0	8	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Feature_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_Feature_Line_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				

WACA_Arc_Feature_Point							
Alias		**Geometry:**Point					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Feature_Nu	Feature_Nu	Feature_Nu	Double	0	0	8	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes

Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Feature_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_Feature_Point_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WACA_Arc_Feature_Polygon							

Alias		**Geometry:**Polygon					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Feature_Nu	Feature_Nu	Feature_Nu	Double	0	0	8	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comments	String	0	0	50	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes

Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Avg_Vert_P	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Avg_Horz_P	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
Shape_Length0	Shape_Length	Shape_Length	Double	0	0	8	Yes
Shape_Area0	Shape_Area	Shape_Area	Double	0	0	8	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Feature_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_Feature_Polygon_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				

SHAPE_INDEX	Yes	Yes	SHAPE				
WACA_Arc_IO_Point							
Alias		**Geometry:**Point					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
TrackingNo	TrackingNo	TrackingNo	String	0	0	20	Yes
IO_Type	IO_Type	IOType	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes

Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
IO_Type		IO_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_IO_Point_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WACA_Arc_IO_Polygon							
Alias		**Geometry:**Polygon					

		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
TrackingNo	TrackingNo	TrackingNo	String	0	0	20	Yes
IO_Type	IO_Type	IOType	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes

Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
IO_Type		IO_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_IO_Polygon_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WACA_Arc_Site_Boundary							
Alias		**Geometry:**Polygon					
		Average Number of Points:0					

		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
COMMENT	COMMENT	COMMENT	String	0	0	50	Yes
GPS_DATE	GPS_DATE	GPS_DATE	Date	0	0	8	Yes
DATAFILE	DATAFILE	DATAFILE	String	0	0	20	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
MAX_PDOP	MAX_PDOP	MAX_PDOP	Double	0	0	8	Yes
MAX_HDOP	MAX_HDOP	MAX_HDOP	Double	0	0	8	Yes
Avg_Vert_P	Avg_Vert_P	Avg_Vert_P	Double	0	0	8	Yes
Avg_Horz_P	Avg_Horz_P	Avg_Horz_P	Double	0	0	8	Yes

Worst_Vert	Worst_Vert	Worst_Vert	Double	0	0	8	Yes
Worst_Horz	Worst_Horz	Worst_Horz	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
CORR_TYPE	CORR_TYPE	CORR_TYPE	String	0	0	36	Yes
RCVR_TYPE	RCVR_TYPE	RCVR_TYPE	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	254	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Site_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_Site_Boundary_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WACA_Arc_Site_Datums							
Alias		**Geometry:**Point					

		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
COMMENT	COMMENT	COMMENT	String	0	0	50	Yes
SiteName	SiteName	SiteName	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes

Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
RuleID		RuleID	Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
X	X	X	Double	0	0	8	Yes
Y	Y	Y	Double	0	0	8	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Site_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_Site_Datums_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
ASMIS	No	No	ASMIS_ID				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WACA_Arc_Site_Line							

Alias		**Geometry:**Polyline					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes

Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Avg_Vert_P	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Avg_Horz_P	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
Shape_Length0	Shape_Length	Shape_Length	Double	0	0	8	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Site_Type					
Recorder_I		Recorder_I					
RuleID		WACA_Arc_Site_Line_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_Feature_Line							
Alias		**Geometry:**Polyline					

		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Feature_Nu	Feature_Nu	SubSite_ID	Double	0	0	8	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	32	Yes
Datafile	Datafile	Datafile2	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes

Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Avg_Vert_P	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Avg_Horz_P	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
Shape_Length0	Shape_Length	Shape_Length	Double	0	0	8	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WACA10000	-					
Site_Type		Feature_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_Feature_Line_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_Feature_Point							
Alias		**Geometry:**Point					

		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Feature_Nu	Feature_Nu	Feature_Nu	Double	0	0	8	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes

Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WUPA00000	-					
Site_Type		Feature_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_Feature_Point_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_Feature_Polygon							
Alias		**Geometry:**Polygon					
		Average Number of Points:0					
		Has M: No					

Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	Yes
Feature_Nu	Feature_Nu	Feature_Nu	Double	0	0	8	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comment	String	0	0	50	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
GPS_Time	GPS_Time	GPS_Time	String	0	0	10	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes

GPS_Week	GPS_Week	GPS_Week	Integer	0	0	4	Yes
GPS_Second	GPS_Second	GPS_Second	Double	0	0	8	Yes
GPS_Height	GPS_Height	GPS_Height	Double	0	0	8	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Std_Dev	Std_Dev	Std_Dev	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WUPA00000	-					
Site_Type		Feature_Type					
Recorder_I		Recorder_I					
GPS_Week	0	-					
RuleID		WUPA_Arc_Feature_Polygon_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				

WUPA_Arc_IO_Point							
Alias		**Geometry:**Point					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
TrackingNo	TrackingNo	TrackingNo	String	0	0	20	Yes
IO_Type	IO_Type	Isolated_O	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comments	Comments	Comments	String	0	0	75	Yes
Datafile	Datafile	Datafile	String	0	0	50	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes

Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
IO_ID	IO_ID	Isolated_F	String	0	0	20	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
IO_Type		IO_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_IO_Point_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_IO_PointAnno							
Alias		**Geometry:**Polygon					

		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**No					
FeatureType	Annotation	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID		OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
FeatureID		FeatureID	Integer	0	0	4	Yes
ZOrder		ZOrder	Integer	0	0	4	Yes
AnnotationClassID		AnnotationClassID	Integer	0	0	4	Yes
Element		Element	Blob	0	0	0	Yes
SymbolID		SymbolID	Integer	0	0	4	Yes
Status		Status	Small Integer	0	0	2	Yes
TextString	TextString	TextString	String	0	0	255	Yes
FontName	FontName	FontName	String	0	0	255	Yes
FontSize	FontSize	FontSize	Double	0	0	8	Yes
Bold		Bold	Small Integer	0	0	2	Yes
Italic		Italic	Small Integer	0	0	2	Yes

Underline		Underline	Small Integer	0	0	2	Yes
VerticalAlignment		VerticalAlignment	Small Integer	0	0	2	Yes
HorizontalAlignment		HorizontalAlignment	Small Integer	0	0	2	Yes
XOffset	XOffset	XOffset	Double	0	0	8	Yes
YOffset	YOffset	YOffset	Double	0	0	8	Yes
Angle	Angle	Angle	Double	0	0	8	Yes
FontLeading	FontLeading	FontLeading	Double	0	0	8	Yes
WordSpacing	WordSpacing	WordSpacing	Double	0	0	8	Yes
CharacterWidth	CharacterWidth	CharacterWidth	Double	0	0	8	Yes
CharacterSpacing	CharacterSpacing	CharacterSpacing	Double	0	0	8	Yes
FlipAngle	FlipAngle	FlipAngle	Double	0	0	8	Yes
Override		Override	Integer	0	0	4	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
Status	0	AnnotationStatus					
Bold		BooleanSymbolValue					
Italic		BooleanSymbolValue					
Underline		BooleanSymbolValue					
VerticalAlignment		VerticalAlignment					
HorizontalAlignment		HorizontalAlignment					

Index Name	Ascending	Unique	Fields				
AnnoClassID_Index_120	Yes	No	AnnotationClassID				
FDO_OBJECTID	Yes	Yes	OBJECTID				
GDB_120_FeatureID	Yes	No	FeatureID				
SHAPE_INDEX	Yes	No	SHAPE				
Status_Index_120	Yes	No	Status				
WUPA_Arc_IO_Polygon							
Alias		**Geometry:**Polygon					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
TrackingNo	TrackingNo	TrackingNo	String	0	0	20	Yes
IO_Type	IO_Type	Isolated_O	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No

Comments	Comments	Comments	String	0	0	75	Yes
Datafile	Datafile	Datafile	String	0	0	50	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
IO_ID	IO_ID	Isolated_F	String	0	0	20	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							

IO_Type		IO_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_IO_Polygon_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_Site_Boundary							
Alias		**Geometry:**Polygon					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comments	Comments	Comments	String	0	0	50	Yes

Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Avg_Vert_P	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Avg_Horz_P	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	254	Yes
Src_Date	Src_Date	Src_Date	String	0	0	8	Yes
Area_ID	Area_ID	Area_ID	Integer	0	0	4	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							

ASMIS_ID	WUPA00000	-					
Site_Type		Site_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_Site_Boundary_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_Site_Datum							
Alias		**Geometry:**Point					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No

Comment	Comment	Comments	String	0	0	50	Yes
SiteName	SiteName	SiteName	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes
Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
Src_Date	Src_Date	Src_Date	String	0	0	8	Yes
Source	Source	Source	String	0	0	50	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							

ASMIS_ID	WUPA00000	-					
Site_Type		Site_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_Site_Datum_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
ASMIS	No	No	ASMIS_ID				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
WUPA_Arc_Site_DatumAnno							
Alias		**Geometry:**Polygon					
		Average Number of Points:0					
		Has M: No					
Dataset Type	FeatureClass	**Has Z:**No					
FeatureType	Annotation	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID		OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
FeatureID		FeatureID	Integer	0	0	4	Yes
ZOrder		ZOrder	Integer	0	0	4	Yes
AnnotationClassID		AnnotationClassID	Integer	0	0	4	Yes

Element		Element	Blob	0	0	0	Yes
SymbolID		SymbolID	Integer	0	0	4	Yes
Status		Status	Small Integer	0	0	2	Yes
TextString	TextString	TextString	String	0	0	255	Yes
FontName	FontName	FontName	String	0	0	255	Yes
FontSize	FontSize	FontSize	Double	0	0	8	Yes
Bold		Bold	Small Integer	0	0	2	Yes
Italic		Italic	Small Integer	0	0	2	Yes
Underline		Underline	Small Integer	0	0	2	Yes
VerticalAlignment		VerticalAlignment	Small Integer	0	0	2	Yes
HorizontalAlignment		HorizontalAlignment	Small Integer	0	0	2	Yes
XOffset	XOffset	XOffset	Double	0	0	8	Yes
YOffset	YOffset	YOffset	Double	0	0	8	Yes
Angle	Angle	Angle	Double	0	0	8	Yes
FontLeading	FontLeading	FontLeading	Double	0	0	8	Yes
WordSpacing	WordSpacing	WordSpacing	Double	0	0	8	Yes
CharacterWidth	CharacterWidth	CharacterWidth	Double	0	0	8	Yes
CharacterSpacing	CharacterSpacing	CharacterSpacing	Double	0	0	8	Yes

FlipAngle	FlipAngle	FlipAngle	Double	0	0	8	Yes
Override		Override	Integer	0	0	4	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
SHAPE_Area		SHAPE_Area	Double	0	0	8	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
Status	0	AnnotationStatus					
Bold		BooleanSymbolValue					
Italic		BooleanSymbolValue					
Underline		BooleanSymbolValue					
VerticalAlignment		VerticalAlignment					
HorizontalAlignment		HorizontalAlignment					
Index Name	**Ascending**	**Unique**	**Fields**				
AnnoClassID_Index_122	Yes	No	AnnotationClassID				
FDO_OBJECTID	Yes	Yes	OBJECTID				
GDB_122_FeatureID	Yes	No	FeatureID				
SHAPE_INDEX	Yes	No	SHAPE				
Status_Index_122	Yes	No	Status				
WUPA_Arc_Site_Line							
Alias		**Geometry:**Polyline					
		Average Number of Points:0					

		Has M: No					
Dataset Type	FeatureClass	**Has Z:**Yes					
FeatureType	Simple	**Grid Size:**0.0093113295245841211					
Field Name	**Alias Name**	**Model Name**	**Type**	**Precn.**	**Scale**	**Length**	**Null**
OBJECTID	OBJECTID	OBJECTID	OID	0	0	4	No
SHAPE		SHAPE	Geometry	0	0	0	Yes
ASMIS_ID	ASMIS_ID	ASMIS_ID	String	0	0	10	No
Site_Type	Site_Type	Site_Type	String	0	0	50	No
Recorder_I	Recorder_I	Recorder_I	String	0	0	3	No
Comment	Comment	Comments	String	0	0	50	Yes
Feat_Name	Feat_Name	Feat_Name	String	0	0	50	Yes
Datafile	Datafile	Datafile	String	0	0	20	Yes
GPS_Date	GPS_Date	GPS_Date	Date	0	0	8	Yes
Northing	Northing	Northing	Double	0	0	8	Yes
Easting	Easting	Easting	Double	0	0	8	Yes
Est_Accuracy	Est_Accuracy	Est_Accuracy	Double	0	0	8	Yes
Worst_Est_Accuracy	Worst_Est_Accuracy	Worst_Est_Accuracy	Double	0	0	8	Yes
Max_PDOP	Max_PDOP	Max_PDOP	Single	0	0	4	Yes
Max_HDOP	Max_HDOP	Max_HDOP	Single	0	0	4	Yes
Vert_Prec	Vert_Prec	Vert_Prec	Double	0	0	8	Yes

Horz_Prec	Horz_Prec	Horz_Prec	Double	0	0	8	Yes
Unfilt_Pos	Unfilt_Pos	Unfilt_Pos	Double	0	0	8	Yes
Filt_Pos	Filt_Pos	Filt_Pos	Double	0	0	8	Yes
Corr_Type	Corr_Type	Corr_Type	String	0	0	36	Yes
Rcvr_Type	Rcvr_Type	Rcvr_Type	String	0	0	36	Yes
GIS_Notes	GIS_Notes	GIS_Notes	String	0	0	100	Yes
SHAPE_Length		SHAPE_Length	Double	0	0	8	Yes
RuleID			Integer	0	0	4	Yes
Override		Override	Blob	0	0	0	Yes
Subtype Name	**Default Value**	**Domain**					
ObjectClass							
ASMIS_ID	WUPA00000	-					
Site_Type		Site_Type					
Recorder_I		Recorder_I					
RuleID		WUPA_Arc_Site_Line_Rep_Rules					
Index Name	**Ascending**	**Unique**	**Fields**				
FDO_OBJECTID	Yes	Yes	OBJECTID				
SHAPE_INDEX	Yes	Yes	SHAPE				
Relationships							
Name	**Origin**	**Destination**	**Attributed**		**Composite**		**Rules**
Anno_27_120	WUPA_Arc_IO_Point	WUPA_Arc_IO_PointAn	No		Yes		No

		no					
Anno_30_122	WUPA_Arc_Site_Datum	WUPA_Arc_Site_Datum Anno	No		Yes		No
Anno_27_120							
Composite	Yes						
Cardinality	One To Many						
Notification	Forward						
Attributed	No						
	Origin	**Destination**					
ObjectClass	WUPA_Arc_IO_Point	WUPA_Arc_IO_PointAn no					
Key	OBJECTID (*Origin Primary Key*)	FeatureID (*Origin Foreign Key*)					
Labels	WUPA_Arc_IO_Point	WUPA_Arc_IO_PointAn no					
Anno_30_122							
Composite	Yes						
Cardinality	One To Many						
Notification	Forward						
Attributed	No						
	Origin	**Destination**					
ObjectClass	WUPA_Arc_Site_Datum	WUPA_Arc_Site_Datum Anno					

Key	OBJECTID (*Origin Primary Key*)	FeatureID (*Origin Foreign Key*)					
Labels	WUPA_Arc_Site_Datum	WUPA_Arc_Site_Datum Anno					
Spatial References							
Dimension	**Minimum**	**Precision**					
SUCR							
X	-5120900	10000					
Y	-9998100						
M	-100000	10000					
Z	-100000	10000					
Coordinate System Description							

PROJCS["NAD_1983_UTM_Zone_12N"] GEOGCS["GCS_North_American_1983"] DATUM["D_North_American_1983"] SPHEROID["GRS_1980",6378137.0,298.257222101] PRIMEM["Greenwich",0.0] UNIT["Degree",0.0174532925199433] PROJECTION["Transverse_Mercator"] PARAMETER["False_Easting",500000.0] PARAMETER["False_Northing",0.0] PARAMETER["Central_Meridian",-111.0] PARAMETER["Scale_Factor",0.9996] PARAMETER["Latitude_Of_Origin",0.0] UNIT["Meter",1.0] VERTCS["NAD_1983"] DATUM["D_North_American_1983"] SPHEROID["GRS_1980",6378137.0,298.257222101] PARAMETER["Vertical_Shift",0.0] PARAMETER["Direction",1.0] UNIT["Meter",1.0]							
WACA							
X	-5120900	10000					
Y	-9998100						
M	-100000	10000					
Z	-100000	10000					

Coordinate System Description							
PROJCS["NAD_1983_UTM_Zone_12N"] GEOGCS["GCS_North_American_1983"] DATUM["D_North_American_1983"] SPHEROID["GRS_1980",6378137.0,298.257222101] PRIMEM["Greenwich",0.0] UNIT["Degree",0.0174532925199433] PROJECTION["Transverse_Mercator"] PARAMETER["False_Easting",500000.0] PARAMETER["False_Northing",0.0] PARAMETER["Central_Meridian",-111.0] PARAMETER["Scale_Factor",0.9996] PARAMETER["Latitude_Of_Origin",0.0] UNIT["Meter",1.0] VERTCS["NAD_1983"] DATUM["D_North_American_1983"] SPHEROID["GRS_1980",6378137.0,298.257222101] PARAMETER["Vertical_Shift",0.0] PARAMETER["Direction",1.0] UNIT["Meter",1.0]							
WUPA							
X	-5120900	10000					
Y	-9998100						
M	-100000	10000					

Z	-100000	10000					
Coordinate System Description							
PROJCS["NAD_1983_UTM_Zone_12N"] GEOGCS["GCS_North_American_1983"] DATUM["D_North_American_1983"] SPHEROID["GRS_1980",6378137.0,298.257222101] PRIMEM["Greenwich",0.0] UNIT["Degree",0.0174532925199433] PROJECTION["Transverse_Mercator"] PARAMETER["False_Easting",500000.0] PARAMETER["False_Northing",0.0] PARAMETER["Central_Meridian",-11.0] PARAMETER["Scale_Factor",0.9996] PARAMETER["Latitude_Of_Origin",0.0] UNIT["Meter",1.0] VERTCS["NAD_1983"] DATUM["D_North_American_1983"] SPHEROID["GRS_1980",6378137.0,298.257222101] PARAMETER["Vertical_Shift",0.0] PARAMETER["Direction",1.0] UNIT["Meter",1.0]							
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