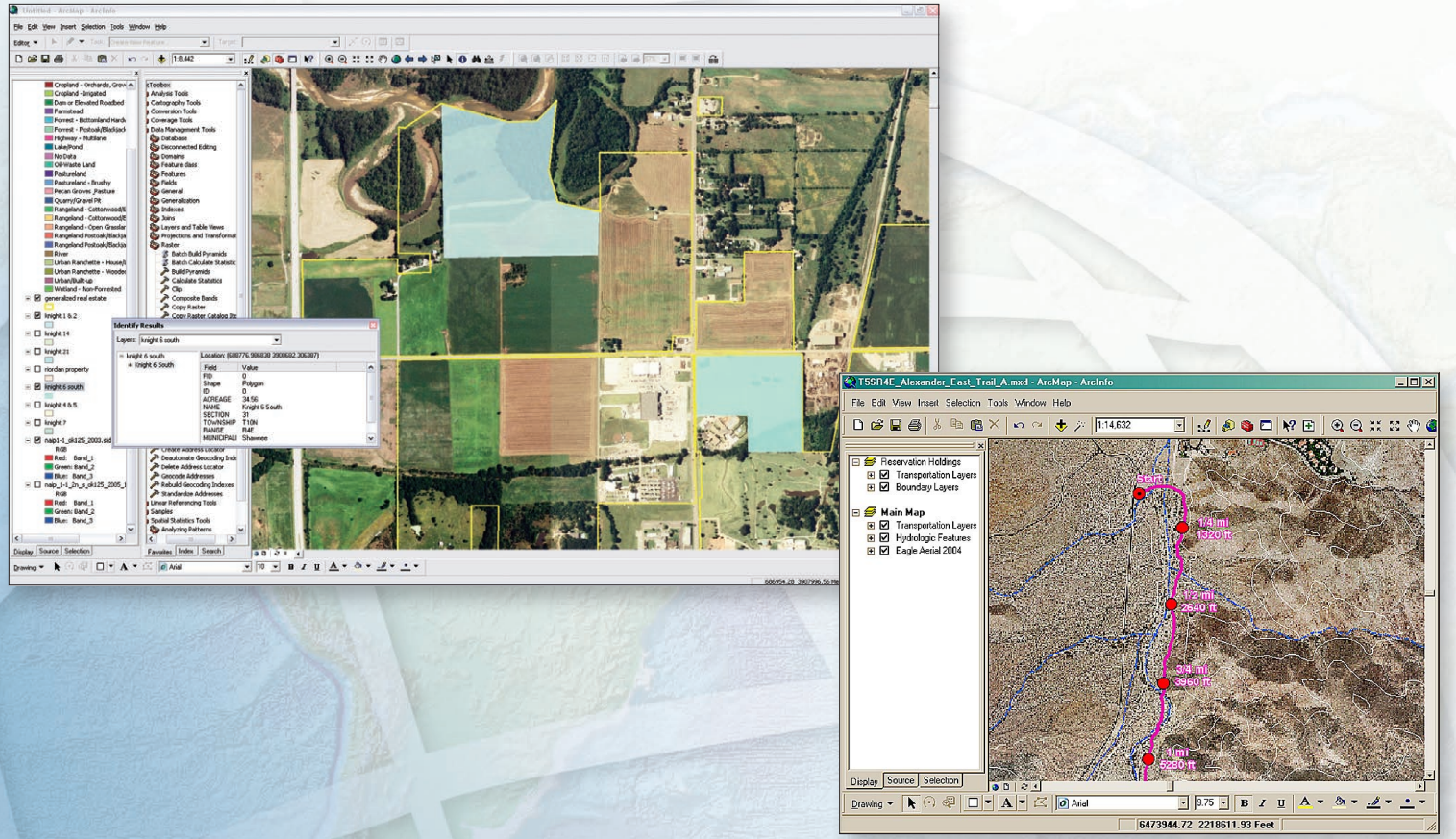
GIS Best Practices

Tribal GIS



July 2009

ESRI

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What Is GIS?

Making decisions based on geography is basic to human thinking. Where shall we go, what will it be like, and what shall we do when we get there are applied to the simple event of going to the store or to the major event of launching a bathysphere into the ocean's depths. By understanding geography and people's relationship to location, we can make informed decisions about the way we live on our planet. A geographic information system (GIS) is a technological tool for comprehending geography and making intelligent decisions.

GIS organizes geographic data so that a person reading a map can select data necessary for a specific project or task. A thematic map has a table of contents that allows the reader to add layers of information to a basemap of real-world locations. For example, a social analyst might use the basemap of Eugene, Oregon, and select datasets from the U.S. Census Bureau to add data layers to a map that shows residents' education levels, ages, and employment status. With an ability to combine a variety of datasets in an infinite number of ways, GIS is a useful tool for nearly every field of knowledge from archaeology to zoology.

A good GIS program is able to process geographic data from a variety of sources and integrate it into a map project. Many countries have an abundance of geographic data for analysis, and governments often make GIS datasets publicly available. Map file databases often come included with GIS packages; others can be obtained from both commercial vendors and government agencies. Some data is gathered in the field by global positioning units that attach a location coordinate (latitude and longitude) to a feature such as a pump station.

GIS maps are interactive. On the computer screen, map users can scan a GIS map in any direction, zoom in or out, and change the nature of the information contained in the map. They can choose whether to see the roads, how many roads to see, and how roads should be depicted. Then they can select what other items they wish to view alongside these roads such as storm drains, gas lines, rare plants, or hospitals. Some GIS programs are designed to perform sophisticated calculations for tracking storms or predicting erosion patterns. GIS applications can be embedded into common activities such as verifying an address.

From routinely performing work-related tasks to scientifically exploring the complexities of our world, GIS gives people the geographic advantage to become more productive, more aware, and more responsive citizens of planet Earth.

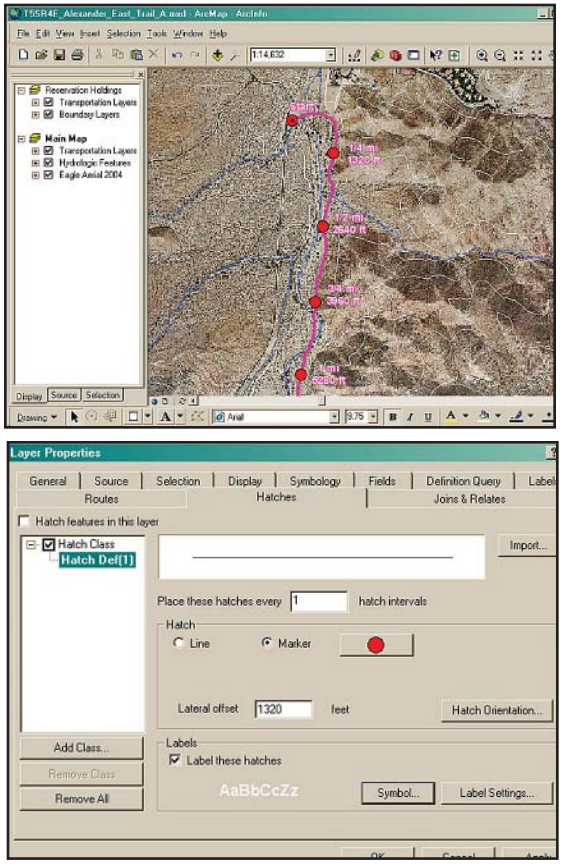
The Role of Tribal GIS in the Protection and Promotion of the Canyons

The Agua Caliente Indian Reservation of Riverside County, California

By Sheila Gehani, GIS Manager, Agua Caliente Band of Cahuilla Indians

The Agua Caliente Indian Reservation takes pride in its lands. Tahquitz Canyon, California, is listed in the National Register of Historic Places. The Indian Canyons contain the largest naturally occurring stand of California fan palms in the United States. All the tribal land canyons contain important biological and hydrological resources, sensitive plant and animal species, and are of cultural and historic importance to the Agua Caliente Tribe. GIS is put to many uses by the tribe in managing tribal lands and supporting programs.

The Agua Caliente Indian Reservation is a 32,000-acre checkerboard reservation located in Riverside County, approximately 100 miles east of Los Angeles. The western/southwestern half of the reservation lies within the rugged Santa Rosa and San Jacinto Mountains National Monument, and the eastern half lies within the Palm Springs metropolitan area. The canyons under tribal jurisdiction are Tahquitz Canyon, the Indian Canyons, and parts of Chino Canyon. Tahquitz Canyon and the Indian Canyons are ranger managed and open to the public with admission.



Tribal GIS map shows the beginning and end of a planned reconnaissance route along East Alexander trail with one-quarter-mile markers.

The tribal GIS team provides support to tribal planners, scientists, technicians, and consultants performing research and conducting projects in the canyons and also to canyon crews doing inventory and maintenance work. In addition, the tribal GIS team prepares maps and guides for visitors to the canyons.

In 1998, based on need and at the tribe's request, the Bureau of Land Management (BLM) conducted a survey of the Indian Canyons to locate and/or recover monumentation. In surveying, *monumentation* refers to the practice of marking down horizontal and vertical control points with permanent structures. Once surveyed, these monuments can be used for further surveying and the alignment of land parcel boundaries and infrastructure.

BLM used historic descriptive records and calculations to find the Public Land Survey System corner and quarter-corner monuments and markings. Canyon crews assisted with the foot surveys over rugged terrain. GPS coordinates were collected, and data was transferred to tribal GIS. With the resurveyed coordinates, tribal GIS has been able to refine reservation and property boundaries in areas where sparse development does not warrant county and local governments undertaking this task.

Each summer, tribal rangers conduct condition surveys and maintenance inspection of trails. Tribal GIS staff members use ArcGIS Desktop software (ArcView and ArcInfo) to provide rangers with trail maps annotated at intervals where inspections are conducted.

Tribal consultants and academic researchers have surveyed and continue to survey the riparian areas of the canyons and identify vegetation communities and wildlife species that reside within these communities. On conclusion of these surveys, the tribal GIS becomes the repository of the survey location data and reports.

"Having the GIS as a repository for species data from annual field surveys," states Margaret Park, director of planning for the Agua Caliente Band of Cahuilla Indians, "is helping us create a strong set of baseline data about the endangered species that call the canyons home."

Tribal GIS is responsible for integrating this data within an ArcSDE software-managed geodatabase system and associating spatial and tabular datasets. Tribal GIS staff members provide the Planning and Development Department with maps, tables, and charts.

To comply with the mandates of the National Fire Policy and Plan, the tribe is in the process of establishing a fire management plan for the reservation. The canyons' maintenance crew regularly surveys the trails and surrounding environment for litter and stressed vegetation. Tribal rangers use ArcPad to collect data with handheld GPS receivers. High-resolution aerial imagery provides the backdrop for rangers to annotate fuels, debris, and invasive species tagged for mitigation or removal. The data is brought back to the GIS crew that prepares the maps and reports for management review. Park says, "The ability to accurately track our progress in removing fire fuels and invasive species makes our grant-reporting tasks quicker and easier."

Tahquitz Canyon waterfall.

Six streams in the canyons are gauged for water quality and quantity monitoring. These springs, along with others, are visited and sampled biannually. Changes in vegetation and trail conditions that could impact water quality are also monitored. Tribal GIS staff members work closely with the tribe's hydrogeologist and environmental technician to provide aerial images and maps showing riparian features. Arc Hydro was used to reconstruct intermittent stream channels from a detailed digital elevation model (DEM) of the canyons. Stream gradients were calculated along stream intervals in riparian areas. This information provides input to flow and channel roughness calculation models and verifies gauging instrument output.

Twenty-five sensitive species of wildlife either migrate through or reside in the canyons. Tribal rangers and field technicians record sightings, nests, tracks, audible clues, and even the

presence of predatory animals and birds to determine the presence of a particular species. Academic and environmental consultants regularly survey wildlife. On conclusion of these surveys, data and reports are received by the Planning and Development Department. The data and information are stored in the geospatial database. Species observations and habitat data collected by the California Department of Fish and Game, consultants to the county, and local agencies are also included in the database.

The tribe has adopted a habitat conservation plan and established the Indian Canyons Heritage Park and Tahquitz Canyon Wetland Conservation Area and plans for their protection and management. In rugged terrain, where accessibility is limited, tribal GIS staff members have been able to use high-resolution aerial imagery and a five-foot DEM to provide tribal planners with slope, viewshed, density, area of effect, and other models, data, and maps to aid in their day-to-day planning activities. Future activities for habitat protection could include real-time tracking of collared species with ArcGIS Tracking Analyst.

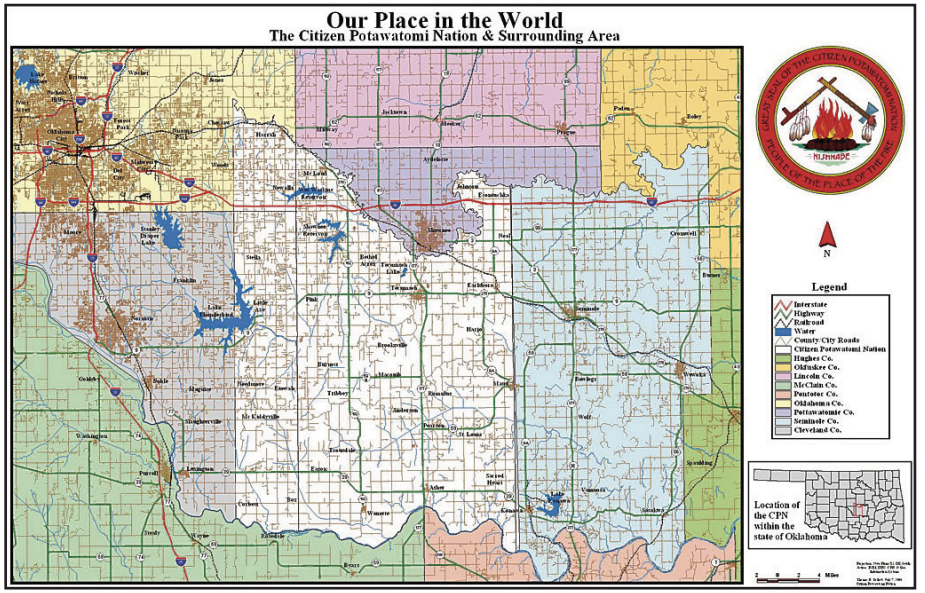
GIS has a role to play in a detailed vegetation analysis planned for the future. Analysis of remotely sensed multispectral/hyperspectral imagery is being considered.

(Reprinted from the Summer 2006 issue of *ArcNews Online* magazine; also appeared in the Winter 2006 *Environmental Observer* newsletter)

Our Place in the World

The Citizen Potawatomi Nation

Retaining sovereignty can be a challenge for tribal governments. Although tribes once held contiguous land bases, over time these holdings have often been reduced to a checkerboard jurisdiction. This is the situation that the numerous Native American tribes and Indian Nations within the state of Oklahoma face.



The Citizen Potawatomi Nation, a federally recognized Native American tribe headquartered in Shawnee, Oklahoma, has incorporated GIS into its governmental structure and services.

The state of Oklahoma, with a greater population of Native Americans per capita than any other state in the United States, is currently home to 38 different tribal governments. Formerly known as Indian Native American Tribes, it does not have a true reservation system, although it has a federally recognized reservation, the Osage Nation Reservation, headquartered in Pawhuska (also known as Osage County). With that exception, Traditional Jurisdictional Areas (TJAs) have pretty much become just another political boundary that crosses borders with school districts, municipal boundaries, and the like and are important only to the tribe or tribes that originally inhabited the area.

To get a firm grasp on their holdings and the world they now share, the Citizen Potawatomi Nation (CPN) has incorporated the use of GIS into its government structure and services. The CPN is a federally recognized Native American tribe headquartered in Shawnee, Oklahoma.

The legal description of its TJA defines an area spanning from "North of the Canadian River, South of the North Canadian River, East of the Indian Meridian & West of the Seminole County Line." Originally, this area encompassed 900 square miles. However, through time and various government processes, the land actually owned and/or controlled by the tribe has been greatly reduced and has developed a checkerboard design. The author has used GIS to display all governmental components on a single platform. This has given the tribal leadership a better understanding of the tribe's holdings and allowed for more detailed tribal development and planning.

Hello, my name is Thomas Tollett, and I am the GIS analyst for the CPN located in Shawnee, Oklahoma. Through the use of ESRI's GIS software, we are able to collect data from a wide range of sources and display it on a single platform—something, until now, this tribe had been unable to do. Almost every tribal department receives information from a separate federal entity, and it seems that each federal office uses a different format for information dissemination.

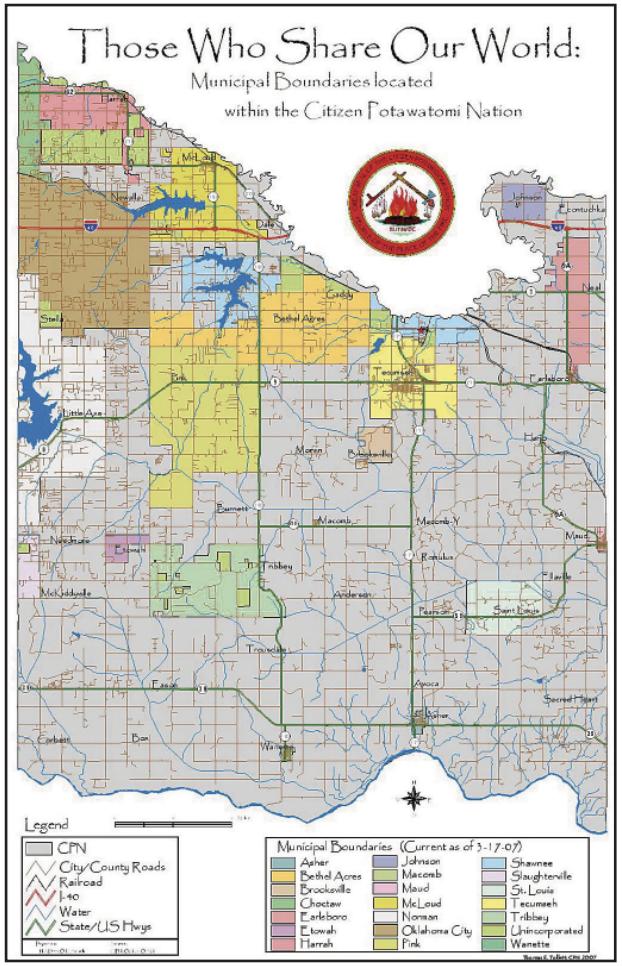
A History of the CPN

Before I begin describing the ways the CPN is using GIS, I would like to give you a brief history of the tribe. The Potawatomi are among the wave of Algonquian-speaking people who occupied the Great Lakes region from prehistoric times through the early 1800s. Oral traditions explain that the ancient Potawatomi people were once part of an immense group that had traveled down the eastern shores of North America along the Atlantic Ocean. This large group—the Chippewa (Ojibwa), the Ottawa (Odawa), and the Potawatomi—all constituted a single tribe.

The larger group later split at Georgian Bay, Ontario, Canada, and went their separate ways. Through early historic records, it has been confirmed that the Potawatomi were living in Michigan and had established an autonomous tribal identity at least 500 years ago. Scholars have debated the origin and translation of the word Potawatomi for many years. Nevertheless, the Potawatomi people firmly believe that the Chippewa applied the term to them, meaning "the people of the fire," because the Potawatomi retained the original council fire once shared by all three tribes.

The CPN Reservation is located in central Oklahoma, between the North Canadian River and Canadian River, covering sections of three Oklahoma counties (Pottawatomie, Cleveland, and Oklahoma). The original reservation area was established by direct purchase of the CPN—the tribe was not merely assigned a land base. Headquartered in Shawnee, Oklahoma, the CPN is one of seven Potawatomi tribes or bands, and members are located in every state in the union and five foreign countries. The tribe obtained federal recognition in 1938 under the Thomas-Rogers Oklahoma Indian Welfare Act.

I was hired by the CPN in October 2003 as a GIS and environmental specialist. Previously, the tribe had employed a series of drafters and CAD operators to handle mapping responsibilities but had recently discovered GIS and wanted to move in that direction. Being fresh out of college, my only real-world experience had been a yearlong internship during my senior year. This was a great opportunity for me—just the kind of challenge I was looking for. I was very excited to get started actually designing, developing, and maintaining a tribal GIS from the ground up.



The author began developing maps to illustrate the location, shape, and size of the CPN in relation to the surrounding local, state, and county governments.

For the first couple of months, I went through the existing data that the tribe had received from contractors, government offices, and intertribal organizations as well as searched for new sources of geospatial data. It is difficult for American Indian tribes and nations to establish jurisdiction across their TJAs, but most of the basic geospatial information needed is available from various state departments and agencies. Transportation systems (e.g., roads, railroads, and bridges), political boundaries (e.g., House of

Representatives, Senate, and county commissioner districts), public school districts, municipal boundaries, and a variety of other information that a tribal government might find desirable are readily available if one knows where to look.

After collecting the data on a state or county level, all a GIS person has to do is to extract the information that is relevant to the tribal boundary. After my data mining exercises, I created a list of the data I had found and circulated it among the tribal departments. This gave other departments a chance to better understand what I was doing and what could be accomplished with GIS in addition to letting me gain more insight on what kinds of information I was lacking and might find useful to have on hand.

At first, I began developing maps to illustrate the location, shape, and size of the CPN in relation to the local, state, and county governments around our geographic area. Some of the other maps had been made previously by different federal and intertribal groups, but none I found matched the legal description of the CPN that I had found on a copy of the original treaty. Soon I was receiving requests for more specific maps and questions on the functionality and possibility of projects from different tribal departments.

One of the ongoing projects is mapping and creating a geodatabase for all tribal trust and fee-simple land parcels.

CPN GIS Applications

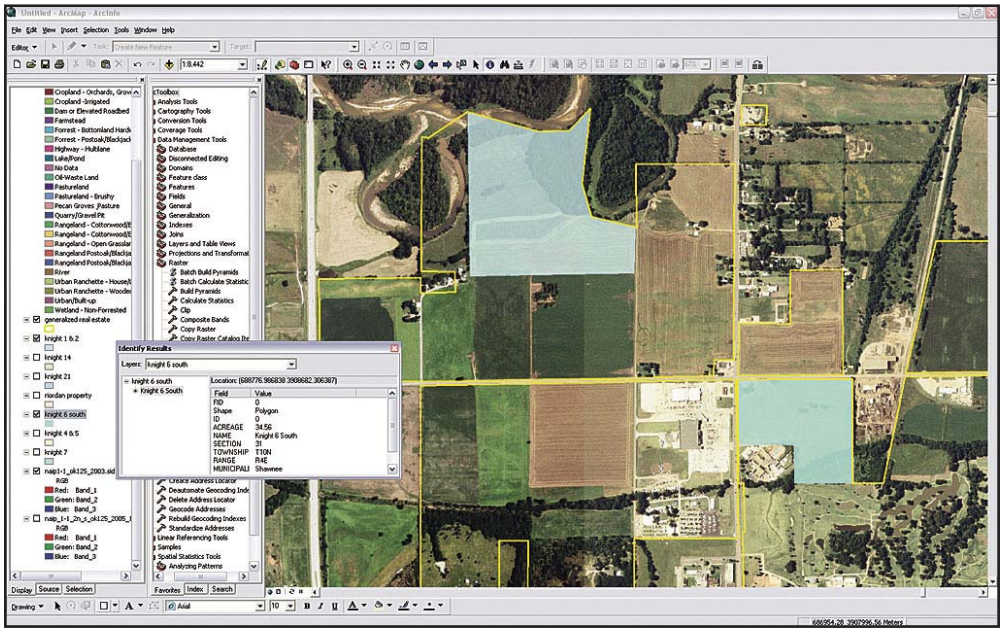
To date, I have worked with a number of our tribal departments on geospatial projects and have several more projects in the works. A brief synopsis of the GIS work being done or slated for the near future within some of the CPN departments and services follows.

CPN Office of Environmental Protection

- Created and continues developing the GIS database for the CPN
- Location of sampling sites, environmental hazards, site reconnaissance/planning
- Redistricting of the Oklahoma Tribal Conservation Advisory Council (OTCAC), an intertribal organization, to facilitate greater understanding and easier travel among its members
- Works with an intertribal water quality task force to map watersheds and tribal boundaries in Oklahoma in order to develop a Water Advisory Board to assist tribes in their pursuit to gain Treatment as a State status from the federal government

Real Estate Services

Mapping and geodatabase creation of all tribal trust and fee-simple land parcels is ongoing. Development of this data will also aid numerous other tribal entities. For example, it will help the CPN Tribal Police Department establish jurisdiction; aid the CPN Emergency Management Department in disaster mitigation, planning, and recovery; and assist the tribal leadership in planning and development for the tribe's future.



GIS has given the tribal leadership a better understanding of the tribe's holdings and allowed for more detailed tribal development and planning.

Indian Reservation Roads Program	Inventory creation, development, and management of the roads included in the Indian Reservation Roads Program.
Office of Self-Governance	Creation of a series of maps and aerial photos to better convey the tribe's location, size, and impact area to assist in the grant application process.
CPN's Cultural Heritage Department	Maintenance of geospatial data in relation to the original individual allotments, creation of Tribal Family Allotment maps for the membership, and creation of maps and aerial photos to facilitate and accompany cultural/historical research.

There are numerous ways a Native American tribe can benefit from the use of GIS. I hope that this article has given you greater insight into how the CPN is using ESRI's GIS technology and given you a few ideas on how to incorporate GIS into your government.

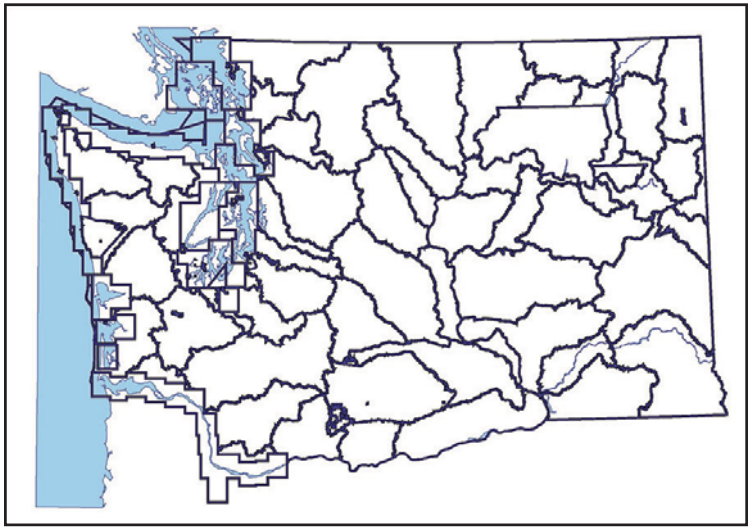
(Reprinted from the April–June 2007 issue of *ArcUser* magazine)

Protecting Archaeological Resources During an Oil Spill in Washington State

Using GIS to Ensure Effective Communication and Protection

There are 29 federally recognized tribes resident in Washington State, as well as a rich history of cultural sites located along coastal shorelines and rivers. Therefore, any oil spill has the potential to damage and contaminate archaeological sites associated with these areas.

During an emergency response to such an oil spill, an effective response requires accurate information and clear communications. To meet this criteria, the Washington State Department of Archaeology and Historic Preservation (DAHP) and its GIS consultant, GeoEngineers, Inc., have created a GIS application that provides the Oil Spill Incident Command Structure current data on archaeological site locations during an oil spill. This application was developed for the Washington State Department of Ecology Oil Spill Response Program and includes contact information for notifying concerned tribal government cultural staff. This Oil Spill Tribal Contact tool provides quick and easy access to current tribal contact names for geographic regions.



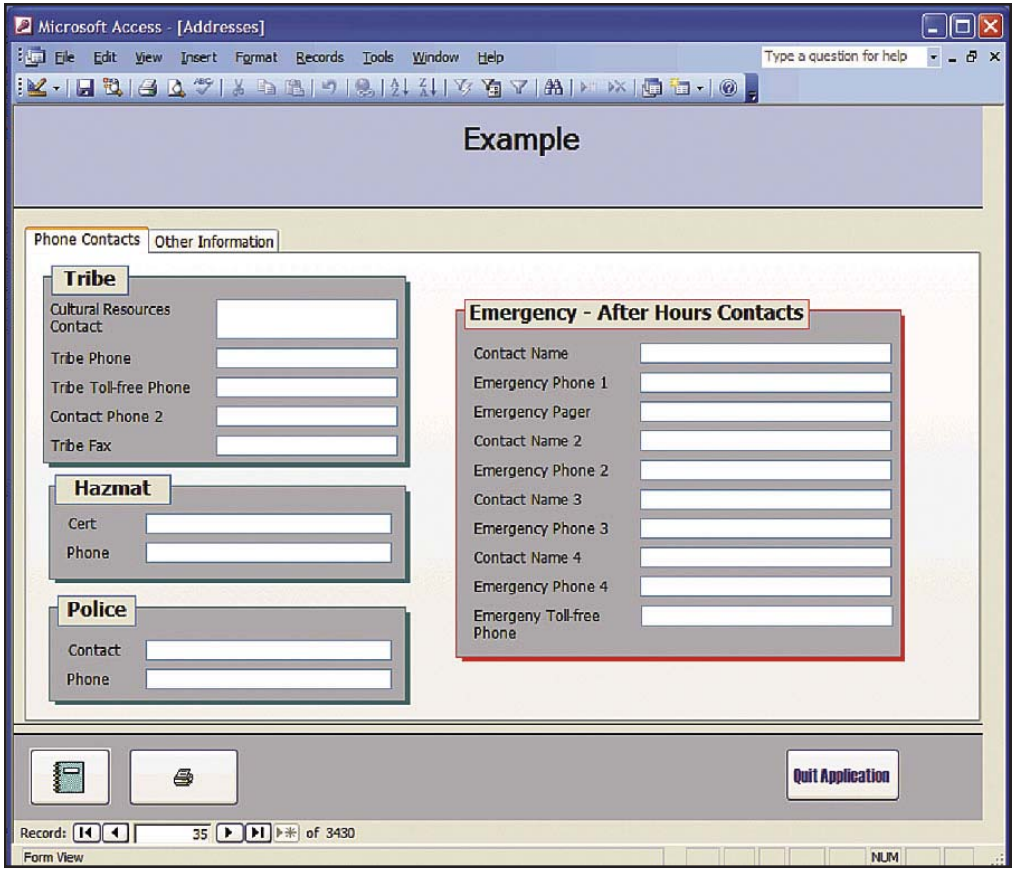
Base GIS layer incorporating oil spill geographic response plan and watershed areas with tribal contact areas.

During a recent spill event, the ecology responders were able to quickly identify the tribes of concern by using the application. By clicking on a map at the location of an oil spill, a list of federally recognized tribes was generated on the fly through an associated database. Dr. Allyson Brooks, State Historic Preservation officer and director of DAHP, states, "Our ability to protect these unique and special places in Washington is directly related to the speed with which we can get information to the tribes and other decision makers and first responders on the scene. By providing current data in spatial and tabular format, GIS helps us accomplish that mission."

DAHP uses a combination of ArcView and ArcInfo for digitizing and maintaining archaeology site locations. As part of DAHP's GIS initiative, more than 19,000 archaeological sites have been mapped in GIS and attributed with information regarding site type (e.g., burials, petroglyphs). Each site is mapped within a geodatabase and linked to a scanned image of the original documentation regarding the discovery of the site. This data is available to DAHP staff via a customized ArcGIS Desktop interface. It is not subject to public disclosure; however, data sharing is possible with governmental agencies through memorandums of understanding. In this way, DAHP is able to share this information with the Washington Department of Ecology for protection of these valuable resources during oil spill events.

With funding from the state's Coastal Protection Fund and the assistance of the Tribal Historic Preservation Offices and cultural staff of the 29 tribes, DAHP created a series of specific GIS layers for each tribal government reflecting its geographic area of interest, its reservation lands, and watersheds for which each tribe's cultural department wanted notification when a spill occurred.

In many parts of the state, multiple tribes require notification. Also along the Columbia and Snake rivers, tribes now resident in Oregon and Idaho have an interest and require notification. The GIS application has a database table identifying any archaeological site potentially at risk and the specific cultural staff contact with phone number, an after-hours emergency number, and details on any staff who have hazmat training. These screens were created for ease of use during an emergency and allow for quick printing of contact sheets. Also, since names and phone numbers frequently change, the table was created to allow for ease of updating.



An example of the tribal contact information presentation.

(Reprinted from the Spring 2006 issue of *ArcNews* magazine)

Empowering the Organization

Integrating GIS data management, collection, and analysis activities for all users

By Ed Durbeck and Quentin Lalio, Pueblo of Zuni

ArcGIS software provides users of all GIS skill levels with access to nearly the entire range of GIS functionality. However, the ability to utilize this functionality depends equally on users having direct access to required GIS data and the means to collect or update spatial data in the field. When data access and spatial data collection are available throughout an entire organization, all GIS users can actively participate in the management, collection, and analysis of geographic information.

The GIS department of the Pueblo of Zuni, a Native American tribe located in western New Mexico, is charged with developing and maintaining GIS databases and software in support of a variety of management activities related to agriculture, archaeology, cultural, range, restoration, water, and wildlife.

As part of its GIS implementation strategy, the GIS department wants to empower all staff members working in these land management areas who use geographic information with both data access and collection capabilities. To accomplish this objective, the department designed and implemented an integrated GIS system architecture that features customized GIS data storage structures and standardized GIS data collection procedures.

Together, these components create a workflow process that lets all system users utilize the spatial data and GIS functionality required to accomplish

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tasks ranging from simple mapmaking to multistage GIS data analysis. The architecture's overall structure is divided among components residing on the user side and GIS server. The GIS server is further delineated by applying a set of data management concepts and considering the needs of the organization.

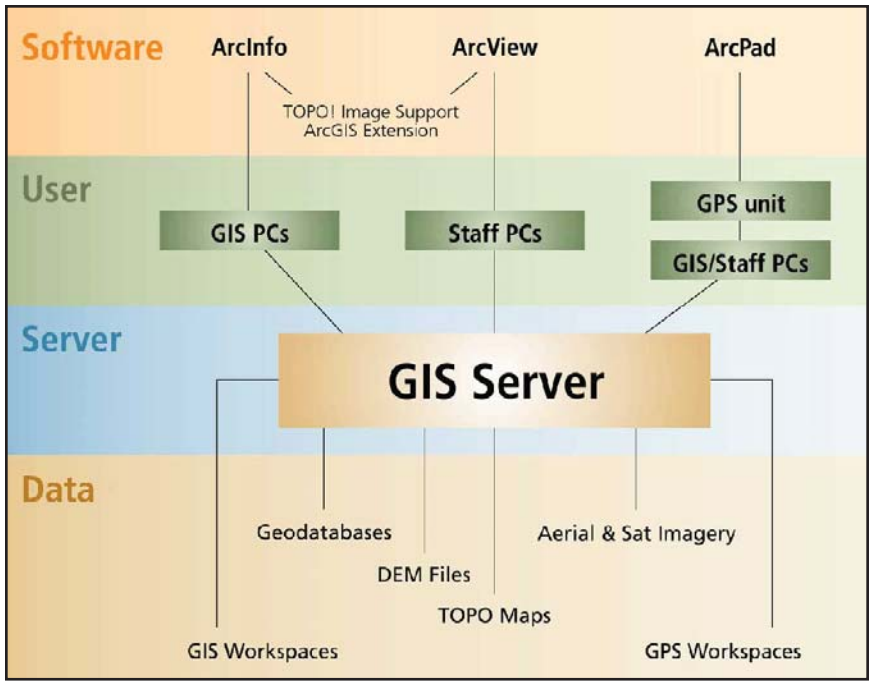
Making Data Accessible

The foundation of the GIS system architecture is a single server that stores all GIS data and is accessible to all system users via an office intranet. This configuration allows all users to map a network drive to a folder in the root directory of the GIS server and use ArcCatalog to create a connection to the data. Having all GIS and GIS-related data stored in subfolders of this mapped folder creates a common access path.

With this common path, all users can share all map document files created in ArcMap because the GIS data is accessed from the server. In addition, if all users use the same logical drive letter to define the network drive that connects to the GIS data, all map document files can also be shared among all users even if these files are not saved using the Store Relative Path Names option.

The system architecture was further developed by arranging GIS and GIS-related data on the server. Data is initially classified as either permanent or temporary. Permanent data has been subjected to quality assurance/quality control (QA/QC) to ensure all required standards and specifications have been met and that the data will be available to all system users. Data classified as temporary is either being generated and developed or utilized only by a specific user or group of users for a specific project and/or limited time. While permanent data can be stored in a single, unique set of folders and subfolders, temporary data requires that a set of folders and subfolders for the storage be assigned to the user or group of users.

Permanent data is initially delineated by type. At the first level of subfolders below the mapped folder in the root directory of the GIS server, each type of data is stored in a separate folder. Permanent data is divided into five major types—personal geodatabases, aerial imagery, satellite imagery, digital elevation model (DEM) files, and topographic background maps. The Pueblo of Zuni also owns a small amount of land located in Arizona so separate geodatabases have been developed for New Mexico and Arizona lands. The topographic maps are generated using the ArcGIS TOPO! Image Support extension and are placed elsewhere on the GIS server. These maps can also be shared among all users by defining a separate network drive to the folder where TOPO! stores the maps it generates within ArcMap.



Zuni GIS system architecture.

Developing Data

Temporary data is initially delineated by purpose, either for GIS (spatial data analysis) or GPS (spatial data collection) work activities. These folders are referred to as Workspaces and are further delineated by assigning each department and program within the tribal government an individual workspace folder under both the GIS and GPS categories. Workspaces for GIS contain temporary data—primarily geodatabases and imagery files. Separate GPS workspaces give all users access to the ArcPad application and the ArcPad toolbar in ArcMap used for collecting and/or upgrading spatial data in the field.

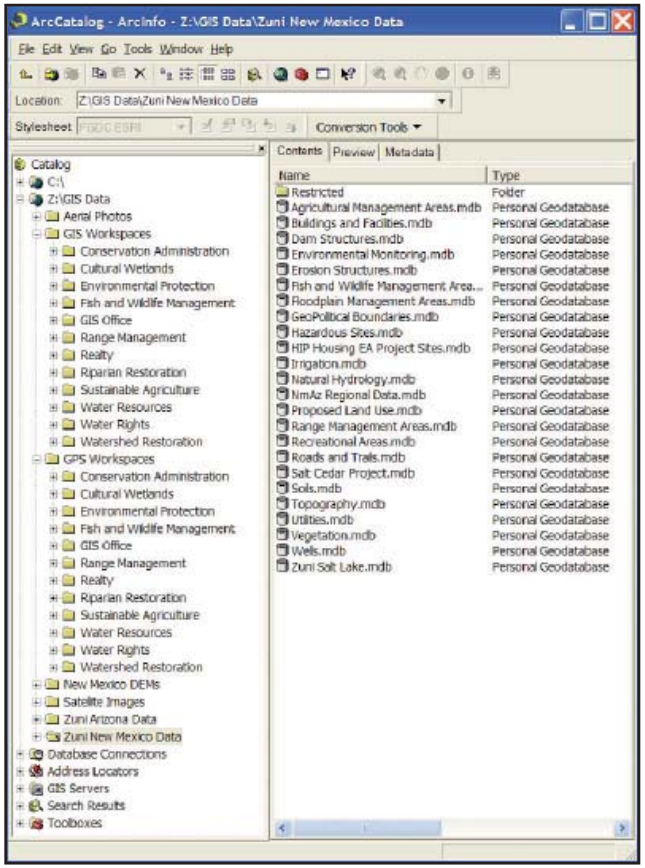
In this scenario, geodatabase feature classes are taken from a user's GIS Workspace folder and converted to shapefile format via the ArcPad Toolbar within ArcMap. These shapefiles, saved in the user's GPS Workspace folder, can be uploaded to a GPS unit running ArcPad. After data is collected in the field, this process is reversed to populate the original geodatabase feature classes with newly collected spatial and attribute data. Separating GPS from GIS data avoids duplicating and confusing data while making spatial data collection accessible to all users.

With the workflow, all users can contribute to the archive of permanent data. Collected spatial data is initially stored in a user's GIS Workspace folder as temporary data. If this data is collected to expand or update the archive of permanent data, the organization's GIS staff can QA/QC the collected data, and upon verification that the data is valid and meets all required standards and specifications, it can be copied and placed in the appropriate permanent data folder and can become available to all system users (dependent on any permission restrictions).

Customizing Access

While this GIS system architecture provides all users with access to spatial data and GIS functionality, this access can be customized and/or restricted. GIS personnel will obviously require complete access to all data (i.e., read/write permission to all folders) and to total GIS functionality (i.e., an ArcInfo license). Staff from other departments will normally require less than complete data access and total GIS functionality. In these cases, data access can be restricted by using the Windows Sharing and Security folder property along with the individual user names within the domain being used within the office intranet.

For example, limited-access users would be granted reading and writing permissions to their own GIS Workspace and GPS Workspace folders while being granted only reading permission to all the folders containing permanent data. This eliminates the possibility of personnel other than GIS staff altering or otherwise corrupting the permanent GIS data. In addition, both reading and writing permission can be denied to any individual folder containing data that is not meant to be shared among all users (i.e., restricted or classified data).



The foundation of the GIS system architecture is a single server that stores all GIS data. The folder hierarchy for GIS and GIS-related data storage is displayed in ArcCatalog.

Regarding GIS functionality, users other than GIS staff may only require ArcView licenses. At the Pueblo of Zuni, each GIS staff member has an ArcInfo license while the rest of the tribal staff share five floating ArcView licenses.

Accommodating Change

This architecture can also be easily modified, expanded, or scaled as needs change. Adding or removing software, users, servers, or data does not alter the existing structure. A set of guidelines for making changes to the system architecture ensures that the system's inherent functionality is maintained.

For example, ArcIMS, along with Web server software and a servlet engine, was added to the GIS server. ArcIMS uses GIS data already stored in the server to create both image and feature services. Because ArcIMS requires only a Web browser to view GIS data and perform simple mapmaking activities, these services are used to give staff members who do not have ArcGIS installed on their PCs access to GIS data.

The GIS system architecture gives all GIS users the tools for undertaking a wide range of GIS activities. It serves the needs of both beginning and advanced users equally well. For users with limited GIS skills, this system helps them learn new skills more easily because both spatial data and GIS functionality are easily accessed.

At the Pueblo of Zuni, this system has motivated non-GIS staff to learn and subsequently apply GIS techniques to their work in areas such as riparian restoration, range management, and sustainable agriculture. This, in turn, has rapidly accelerated the growth of the archive of spatial data as more individuals are participating in the process of data collection. In addition, GIS staff members spend less time on simple, repetitive tasks and can devote more time to pursuing advanced GIS work activities such as developing complex analytical methodologies and creating customized software tools that address the specific GIS needs of the pueblo community.

(Reprinted from the October–December 2006 issue of *ArcUser* magazine)

Since 1969, ESRI has been giving customers around the world the power to think and plan geographically. The market leader in geographic information system (GIS) solutions, ESRI software is used in more than 300,000 organizations worldwide including each of the 200 largest cities in the United States, most national governments, more than two-thirds of Fortune 500 companies, and more than 5,000 colleges and universities. ESRI applications, running on more than one million desktops and thousands of Web and enterprise servers, provide the backbone for the world's mapping and spatial analysis. ESRI is the only vendor that provides complete technical solutions for desktop, mobile, server, and Internet platforms. Visit us at www.esri.com.

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