Geographic Information Systems

Computer technology enables us to analyze the volumes of information that would otherwise be difficult to comprehend. Through geographic information systems (GIS) and other databases, the park's Spatial Analysis Center is compiling an information management system that park staff and the public can use to interpret and link many kinds of data, providing an ecosystem view of Yellowstone's resources. In 1998, the staff included one full-time geographer/GIS Specialist and two seasonal GIS technicians. Improving the park's GIS and data management capabilities has been difficult due to the small staff and the competition for their services—often for much better pay—in the private sector.

Hardware and software. Now that ARC/INFO, which is the NPS standard for GIS software, can be run on Windows NT, Yellowstone is shifting from Sun Unix workstations to a PC-based network that will enable trained staff to make maps, query data, and create their own data sets. By 1998, the Spatial Analysis Center staff were networking with other park users and training them in applications of ArcView, a powerful and user-friendly GIS software operating on seven workstations.

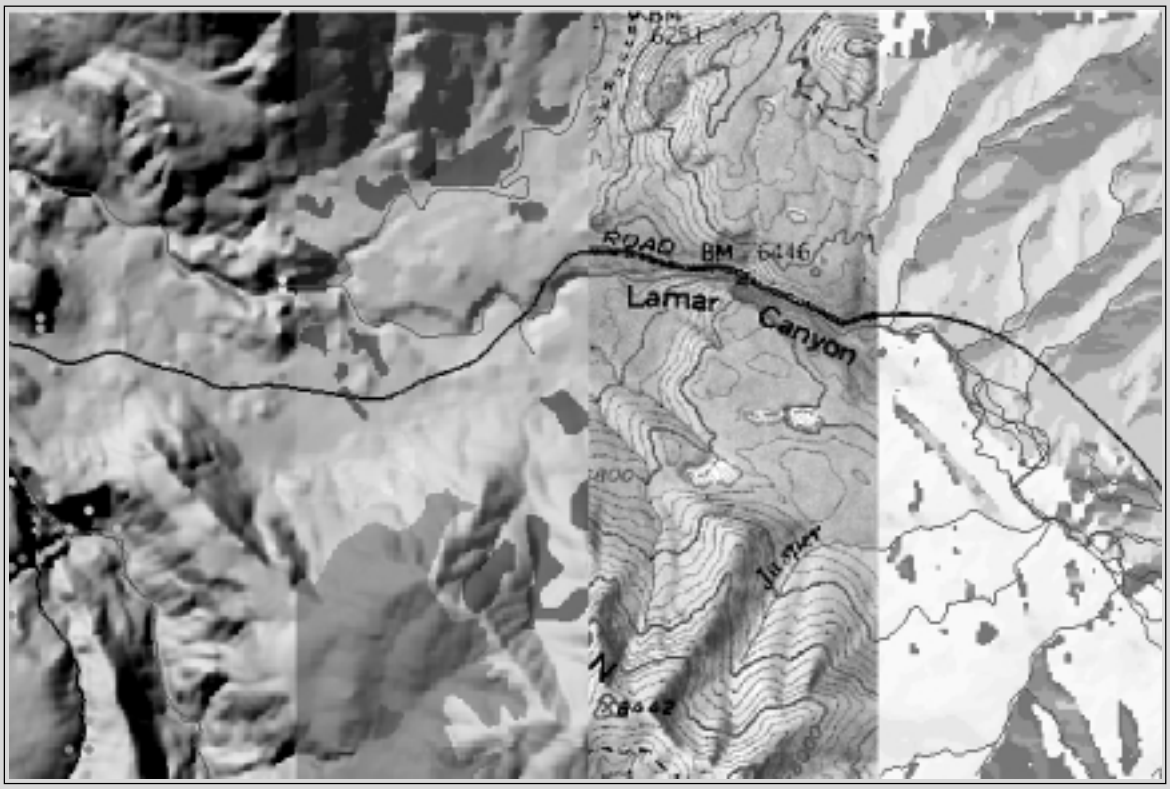
Data sets are still stored on hard drives connected to the Sun Unix system. Yellowstone has purchased a CD-recorder that can be used to create CDs and distribute park data sets to external users. The Environmental Systems Research Institute has donated web server software that will provide access to GIS data to anyone in the park with access to the park Intranet. Montana State University has provided valuable advice and personnel to assist in developing and applying GIS technology to projects such as Yellowstone's soil and landforms surveys and archaeological site mapping. A new partnership, begun with the Idaho National Energy & Environmental Lab (INEEL) in 1998, holds great promise for helping the park expand its GIS and data management capabilities.

Data about data. Federal law requires the park to meet specified data management standards, but the small staff cannot keep up with the park's backlog of information kept in many old formats. In 1997, the staff initiated a major project to develop "metadata"—a catalog of existing resource data sets—in order to make the information available to more park staff and outside researchers in the near future. Similar efforts are underway to organize and make accessible the high volume of research, inventory, and monitoring data that exist about Yellowstone's natural and cultural resources.

Mapping Yellowstone

Examples of the many layers now included in the park's GIS data base

Animal mortality along roads
Bedrock geology (1:125,000)
Campsites (1:62,500)
Cultural sites inventory (partial)
Developed areas (1:125,000)
Digital elevation models
Digital orthophoto quarter quads
Digital raster graphics (topo maps)
Elk winter range
Fire history
Geologic faults
Grizzly bear habitat
Landforms (1:62,500)
Non-native plants along highways
Park roads and buldings
Park and Gallatin NF trails (1:62,500)
Precipitation (1:125,000)
Seismic epicenters
Rare animal sightings (1880 to present)
Relief map (1:24,000)
Soils (1:62,500)
Thermal areas (1:24,000)
USGS topographic maps
Vegetation cover types (1:62,500)
Watersheds (1:250,000)
Yellowstone caldera boundary
Yellowstone Lake bathymetry



Park staff have used global positioning systems (GPS) to create: more accurate roads and trails data layers, organized data for road reconstruction projects, analyses of exotic plant dispersal, geothermal mapping, and responds to Freedom of Information Act requests. Spatial analysts have also assisted other park staff in database creation, winter visitor use management for greater Yellowstone, lake trout habitat identification, and wolf location analysis. Resource specialists and managers from both in and outside the park increasingly use GIS images for reports, publications, and presentations, and to answer complex questions about interconnected resource issues.

Program Needs

• STAFFING. A larger staff is needed to develop additional data layers, update existing layers, and provide more training and assistance for park staff and other researchers.

• EQUIPMENT. Hardware and software programs should be regularly upgraded to incorporate new technology. Additional GPS units and work stations are needed to serve more users.

GEOGRAPHIC INFORMATION SYSTEMS

STEWARDSHIP GOALS

Professional GIS staff maintain up-to-date information about park resources and develop spatial displays, maps, ecological models, and planning tools for park staff and the public.

Data on all former, existing, and future research and resource management projects is available through a centralized database system.

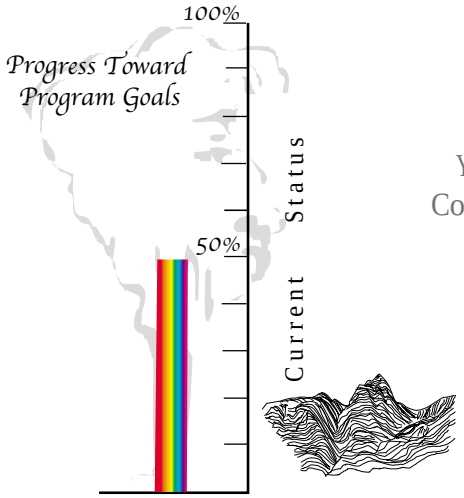
Park staff from each division have convenient access to global positioning systems, desktop GIS, and other tools for database retrieval, spatial analysis, and mapping.

CURRENT STATE OF RESOURCES/PROGRAMS

A functioning GIS provides park staff and visiting researchers with limited data and spatial analysis, but trained staff are too few; funding and staff have not kept pace with the demand for products and services.

A major effort to catalog existing data sets has begun, but historic records are dispersed in many locations and formats.

Desktop mapping, spatial analysis, and access to databases is not yet available to most users due to hardware, software, and networking limitations.



1998 FUNDING AND STAFF

Recurring Funds	
Yellowstone N.P. Base Budget	$ 121,000
Cost Recovery/Special Use Fees	
Non Recurring Funds	
One-time Projects	33,200
Staff	2.9 FTE

The human resources and funding necessary to professionally and effectively manage the park to stewardship levels will be identified in the park business plan.