# The Map Legend

*New Mexico Geographic Information Council, Inc.*

*...reporting on geographic information for and about the Land of Enchantment...*

*Volume 5, Number 1* *Fall 1993*

## Ancient Astronomy Will be Featured Topic at Fall Meeting

Anna Sofaer, President of the Solstice Project, will speak at the afternoon session of the NMGIC Fall Meeting on November 19. She will discuss recent archeological investigations by the Solstice Project into the remains of the ancient Chacoan civilization of northwestern New Mexico. This work is yielding a wealth of evidence that these people extensively commemorated the cycles of the sun and the moon in their construction work. Her talk is entitled, "Cosmographic Expressions of the Ancient Chaco Culture of New Mexico: Buildings, Roads, and Astronomy."

The Solstice Project, a non-profit group based in Washington, DC, was organized in 1978 to study, document, and preserve the remarkable celestial calendar now known as the Sun Dagger, located in Fajada Butte in Chaco Canyon, New Mexico. Anna Sofaer discovered the Sun Dagger in 1977. The site marks, with precise light and shadow patterns, the summer and winter solstices, the spring and fall equinoxes, and the nineteen year cycle of the moon.

The Solstice Project's research efforts on the Sun Dagger site have been presented in several scientific publications. In addition, the Project produced an hour-long documentary film, written by Ms. Sofaer and narrated by Robert Redford, about the site. It was broadcast on PBS and received numerous awards, including the American Film Festival Blue Ribbon Award.

In recent years, the Solstice Project has conducted extensive research on the major Chaco culture constructions throughout the San Juan Basin. The project demonstrated that the ancient network of roads throughout the region were likely symbolic expressions of the culture's cosmology.

Between 1984 and 1989, the Project performed an accurate survey of the culture's major pueblos and ceremonial structures. This study revealed that the large ancient buildings of the area were organized in a complex regional pattern. Most of the buildings are oriented in ways that are significant relative to astronomic occurrences such as the rising or setting of the sun on the equinoxes or solstices or the rising or setting of the moon at its extrema during the nineteen year cycle. In addition to the orientation of individual buildings, the positions of many buildings relative to other buildings also maintain the same astronomical alignments. Anna Sofaer will discuss the methodology of the Solstice Project's survey work as well as the results.

The work of the Solstice Project, which is ongoing, involves a variety of disciplines and participants. People contributing to the efforts have included archeologists, physicists, mathematicians, film makers, remote sensing experts, art historians, computer scientists, surveyors, photographers, and a pueblo ethnographer/poet. Various concepts of geography have played crucial roles in the success of this work. This presentation should prove to be especially interesting to people working in geography-related disciplines.

Anna Sofaer has lectured widely and published her findings and analyses in scientific journals including *Science*, *Archaeoastronomy in the New World*, *Astronomy and Ceremony in the Prehistoric Southwest*, *World Arcaeoastronomy*, and the *Proceedings of the Colloqouio Internazionale Archeologia a Astronomia*.

**NEWS**

**NMGIC Fall Meeting**
**November 19, 1993 - 8:00 am**
**UNM Continuing Ed Conference Center**
**1634 University NE**
**Albuquerque, New Mexico**

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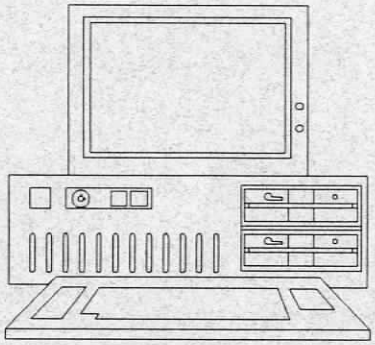

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## *From the President*
## *Richard Friedman*
***September 1993***

It is an honor to be able to address the members of NMGIC as your President. The strength of the organization is that the Executive Board and the membership are truly committed to professional excellence. The leadership has fostered a relaxed atmosphere that has allowed the members to develop professional relationships that are virtually free from destructive competitive rivalries. Our biannual meetings have always been a time when the members have openly exchanged ideas and knowledge about geographic information. Through dedication and foresight the past leaders of this organization have laid a strong foundation for the continued growth of NMGIC. My goal for the next year is to continue in the same direction that our past President, Tom Henderson, has led us.

We need to continue to reach out to the New Mexicans who use geographic information in different and unique ways. The diversity of our membership has always been one of our strengths that we need to continue to build on. On October 29 we will be sponsoring a workshop for New Mexico realtors titled "Using Geographic Information Systems in the Real Estate Industry." John Peterson, our workshop coordinator, has been working very hard with the Realtors Association of New Mexico to make this workshop a success. John has arranged for Gil Castle, one of the foremost experts on GIS in real estate, to give the workshop. He was also able to get the workshop curriculum approved for continuing education credit by the Board of Directors of the Realtors Association of New Mexico. Thanks to John's efforts, this should be a very successful outreach program for NMGIC.

The guest speakers and user exhibits at our fall meeting on November 19 will provide the attendees with a unique mixture of research on prehistoric astronomy and cutting edge GPS technology. Anna Sofaer will be with us to talk about recent research on Prehistoric Astronomy in the Four Corners area. Randy Meyer will give a talk on GPS technology, where the technology is today, and where it will be in the future. Our users exhibit will highlight the integration of GIS and GPS to help reduce the cost and increase the accuracy of GIS data collection.

I hope that during the year I am able to serve NMGIC as well as my predecessors did. I am looking forward to the challenge of continuing the fine tradition of professional growth and camaraderie that makes NMGIC so unique.

## *GIS and GPS Committees Hold Joint Meeting*

The Geographic Information Systems (GIS) Committee and the Global Positioning Systems (GPS) Committee of NMGIC held a joint meeting on Wednesday, August 25, 1993. The topic of the meeting was the powerful union of GIS and GPS technologies. About 45 people attended this afternoon gathering at the New Mexico Engineering Research Institute in Albuquerque.

The program consisted of presentations by Mike Zeiler, GIS Committee Chair and Bill Stone, GPS Committee Chair. In addition, Rich Friedman, NMGIC President, gave an impromptu talk about some of his recent work.

Mike Zeiler discussed his and his associates' experiences in using GPS and GIS in their work with rural utility companies. He described the field procedures that utilize differential GPS techniques in conjunction with a laser rangefinder to position various utility features. In addition to determining the position of various features, the field operator is able to input feature attributes into a laptop computer. Back in the office, software is executed to perform the differential GPS corrections, thereby improving the positional accuracy considerably. The positional and attribute data are then transferred to a workstation where ARC/INFO is used to create a temporary point, which is used for quality control. From this point, permanent database editing is performed, system maps can be created, and various analyses performed. This scheme of work can be used to track utility inventories from installation all the way through their lives to retirement.

Bill Stone reported on the system status of GPS. With four GPS satellite launches already in 1993, there are now 24 usable GPS satellites (3 block-I and 21 block-II versions). This constellation essentially provides worldwide around-the-clock coverage to GPS users. Examples of the output from GPS planning software were shown to illustrate the available coverage.

Bill also discussed a GPS experiment he performed earlier this year. The experiment was designed to investigate the level of positional accuracy that could be attained by using data from a handheld GPS receiver that were differentially corrected by data collected at a permanent GPS station. Test data were collected over baselines ranging from 25 km to 450 km. Positional errors ranged from 1.0 to 7.2 m,

**Continued on page 4**

## GIS and GPS... (continued from page 3)

in the horizontal component, and from 0.1 to 15.2 m, in the vertical component. Horizontal errors were strongly correlated with baseline length. An analysis of autonomous (non-corrected) data from the handheld receiver illustrated the importance of performing differential corrections for more stringent accuracy applications.

Rich Friedman discussed very recent work done in conjunction with the Navajo Nation's archeological efforts to study Anasazi culture outlier sites. He showed digital aerial imagery (scanned photography) of an archeological site and discussed the use of GPS data for improving the georeferencing accuracy of such imagery. He also talked about using GPS to find features of interest in the field that had been identified in the imagery. Rich's discussion provided an excellent example of the powerful integration of GPS and GIS.

The presentations were followed by a discussion of various GIS/GPS concerns. Given the good response to this meeting, we anticipate organizing similar activities in the future. Any comments about such meetings would be appreciated and can be addressed to the Committee chairs or Executive Board members.

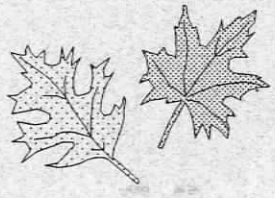
*Bill Stone, GPS Committee Chairman*

# *Ever Heard of Prescription Farming?*

The concept of prescription farming is to vary the application rates of pesticides, nutrients, and irrigation from point to point within a field, usually by soil type or fertility.

GIS is used to supply digital soils data, Landsat imagery, automate fertility and pesticide recommendations, and keep historical records of inputs and yields. Custom applicator rigs that vary rates of herbicides and fertilizers are equipped with GPS units with real time differential correction. Application rates vary with location of soils and their fertility based on soil tests. Yield data collection is also automated within the field by means of a yield monitor mounted on the combine coupled with GPS-provided position information.

*Jessie Rossbach, Soil Conservation Service*



# *Catalog of GIS Data in New Mexico*

The New Mexico Resource Geographic Information System (RGIS) Program has published the first edition of the *Catalog of Digital Geographic Data*. The catalog contains file descriptions for over 100 files residing in the RGIS Resource Library. Sections of the catalog include **Resource Data**, **Socioeconomic Data**, and **Decennial Census Data**. Updates and additions to the catalog are made on a quarterly basis. Catalogs are available from the RGIS Clearinghouse at $40.00 each. For more information, contact Amy Budge, RGIS Clearinghouse, Earth Data Analysis Center, University of New Mexico, 2500 Yale SE, Suite 100, Albuquerque, NM 87131-6031. Calls should be made to (505) 277-3622; FAXes should be sent to (505) 277-3614.

# *Introduction to ARC/INFO Classes*

A series of one week classes on the *Introduction to ARC/INFO* have been held at the Earth Data Analysis Center (EDAC). Sponsored by the General Services Department/Information Systems Division and hosted by EDAC, the classes are certified and conducted by Environmental Systems Research Institute (ESRI) staff. These classes are intensive, hands-on sessions in which participants learn the basics of ARC/INFO and its applications. Classes are limited to 10 participants. Cost is $1000 per person. For information on future classes, contact Ann Gibson, GSD/ISD at 827-2046 in Santa Fe.

**Reminder!**

1994 Membership Dues are Payable by **January 1, 1994**.
See Enclosed Form.

# A SPECIAL THANKS . . . TO THE 1993 CORPORATE MEMBERS

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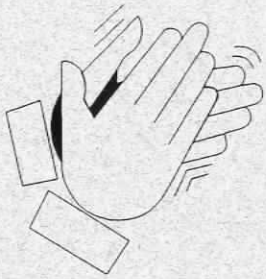

## *Job Opportunities*

*The Map Legend* will feature a "Job Board" in each issue in which job opportunities can be announced. Please submit information to Heather Rex.

**Calendar**

October 14-15, 1993. Realtors Association of New Mexico Annual Convention, Albuquerque Convention Center, Albuquerque, NM. Contact: Marta Nystom, PO Box 4190, Santa Fe, NM 87502. FAX: (505) 983-8809.

October 20-22, 1993. 1993 Southwest ARC/INFO User Group Conference, Jackson Hole, Wyoming. Contact: Nancy McCann, State Engineers Office, Herschler Building, Cheyenne, WY 82002.

October 29, 1993. Using GIS in the Real Estate Industry Workshop, UNM Continuing Education Conference Center, 1634 University NE, Albuquerque, NM; conducted by Gil Castle, sponsored by NMGIC, RANM, and SHMF. Contact: John Peterson, NMERI, UNM, Albuquerque, NM 87106. (505) 272-7295.

November 2-4, 1993. GIS/LIS '93, conference and exposition, Minneapolis Convention Center, Minneapolis, MN. Contact: GIS/LIS '93, 5410 Grosvenor Lane, Suite 100, Bethesda, MD 20814-2122. (301) 493-0200.

November 17-19, 1993. GIS in Banking, GIS World, Inc., Training Division, 155 E. Boardwalk Drive #250, Ft. Collins, CO 80525. (303) 223-4848

November 19, 1993. NMGIC, Inc. Fall Meeting, UNM Continuing Education Conference Center, 1634 University NE, Albuquerque, NM. Contact: Amy Budge, EDAC, University of New Mexico, 2500 Yale Boulevard SE, Suite 100, Albuquerque, NM 87131-6031. (505) 277-3622.

## *Issues Vary at the Western States Geographic Names Conference*

The interface between technology and geographic names was one of the issues discussed at the Western States Geographic Names Conference (WSGNC) in El Paso September 8-12, 1993.

"We use technology, but technology also uses us," said one speaker. Its unique capabilities and constraints influence the questions we ask and the forms the projects take. Because the cultural-historical information accessed through names does not lend itself well to digital representation, it often gets left out of GISs and other technological models of the landscape."

Other topics at the conference included:

The future of the Geographic Names Information System (GNIS). USGS predicts that this national database of geographic names—including locations, quadrangle names, variants, and bibliographic references for each name—will be completed by the year 2000 for all states including Alaska. But what then? Numerous people spoke of the need to maintain and update the database on a state-by-state basis lest the data become out of date and of diminishing value to users, such as those building GISs.

CD-ROM. The long-awaited CD ROM of GNIS for the entire U.S., current as of April, 1993, was demonstrated at the conference. The software that comes with the CD ROM is easy to use, and searches and sorting of the data are very fast. Furthermore, the results can be exported to a variety of media. As soon as documentation has been completed, the CD ROM will be released for sale to the public, likely through ESIC (Earth Science Information Center) offices, before the end of 1993, at a cost of $57.

Standardized data fields. The Place Name Survey of the U.S. met during the conference to finalize plans for standardizing data fields to be used by researchers of geographic names. Many of these data fields will be the same as those used by GNIS.

Diacritical marks in Native American names. The U.S. Board on Geographic Names (USBGN) again grappled with the issue of two of its policies apparently in conflict with each other: 1) discouraging the use of diacritical marks in names, and 2) encouraging the preservation and use of Native American names, which frequently include diacritical marks. Proponents of diacritical marks point out that omitting the marks usually alters the meaning of the name. Opponents say virtually all map users, including most Native Americans, are unfamiliar with the diacritical marks, which thus do not serve as reliable guides to pronunciation and in fact inhibit acceptance of Native American names. No easy resolution of this issue is in sight.

Commemorative names. Again, these were like burdocks to the USBGN as individuals and groups continue to use the naming process to honor persons of whom they are fond. While not disallowing commemorative names, the USBGN nonetheless reminded people that numerous other avenues exist such as scholarships, memorial funds, plaques, etc.

New Mexico items. Acting upon two New Mexico items on their dockets, the USBGN approved recognizing the name Waldo Mesa, long in local usage, for a finger mesa between Cerrillos and Madrid, and approved changing the name Cañada Bonito to Cañada Bonita, to make the gender of the generic and specific agree.

*Bob Julyan, Geographic Names Committee Chair*

## *Randy Meyer to Speak at Fall Meeting*

Randy Meyer of Trimble Navigation, Inc. will speak at the morning session of the NMGIC Fall Meeting. His talk will focus on using resource grade GPS to locate, automate, and upgrade GIS databases.

Randy Meyer was educated in Land Surveying at the State University of New York and worked as a land surveyor for six years before getting into surveying instrumentation and GPS. He has been with Trimble Navigation for three years and is currently responsible for sales and support of Trimble Surveying and Mapping products in a 5 state region including New Mexico. His main focus at Trimble is the integration of GPS into GIS and mapping applications.

## *GIS Makes Its Debut at 38th Annual State Water Conference*

At the annual State Water Conference in Carlsbad, attendees saw the debut of GIS displayed as a tool for assisting, at a regional and statewide level, water resource planning and conflict resolution. This was the first time that GIS had been incorporated into a conference agenda which gave the attendees their first exposure to GIS and its potential. This conference's theme was *Addressing Water Issues Through Conflict Resolution*.

**Continued on page 7**

## *The Use of Geographic Information in Real Estate*

On October 29, 1993, the Realtors Association of New Mexico (RANM) and the New Mexico Geographic Information Council will sponsor an exciting one day workshop on Using Geographic Information Systems in the Real Estate Industry. NMGIC is the largest council dealing with computer based mapping issues in the state and we are happy to work with RANM members to keep them on the competitive edge. NMGIC, whose aim is to serve as a forum for information exchange, enjoys a solid network of members representing all levels of government and the private sector. GIS is a powerful tool that can be used in real estate to link mapped information on a screen to databases such as multi-listing services, R. R. Donnally information, Census demographics, etc., for easy querying and problem solving.

The course will be taught by Mr. Gilbert Castle, CEO of Castle Consulting, based in San Francisco, CA. Mr. Castle has, among many accomplishments, acted in the capacity of Regional Director for the real estate consulting division of Deloitte & Touche, a Big Six accounting firm officed in San Francisco, and has authored and given numerous presentations and workshops on GIS and its ability to be a serious and competitive tool for the real estate industry. The course will cover an introduction to GIS, a discussion of the relevance of GIS to the real estate industry, case studies, computer and software requirements, software demonstrations, organizational issues, and how to get started. Cost for this six-credit course will be $70 and will convene in the auditorium of the UNM Continuing Education Center Building at 8:30 am, October 29. For a taste of what the course will cover, visit booth #11 in the exhibit hall at the state convention held on October 14 and 15. A flyer/ registration form will be mailed for preregistration or for more information, call Ronda Dahl (RANM) 800-224-2282 or John Peterson (NMGIC) 272-7295.

## *The NM GAP Analysis Project*

**What is GAP?** Gap Analysis provides a quick overview of the distribution and conservation status of several components of biodiversity. It seeks to identify gaps (i.e. vegetation types and species that are not represented in the network of biodiversity management areas) that may be filled through establishment of new reserves or changes in land management practices. Gap Analysis uses the distribution of actual vegetation types (mapped from satellite imagery) and vertebrate species as indicators of, or surrogates for, biodiversity. Digital map overlays in a GIS are used to identify individual species, species-rich areas, and vegetation types that are unrepresented or underrepresented in existing biodiversity management areas. Not a substitute for a detailed biological inventory, Gap Analysis organizes existing survey information to identify areas of high biodiversity before they are further degraded. It functions as a preliminary step to the more detailed studies needed to establish actual boundaries for potential biodiversity management areas. We hypothesized that Gap Analysis, by focusing on higher levels of biological organization, will be both cheaper and more likely to succeed than conservation programs focused on single species or populations. (From *Gap Analysis: A Geographic Approach To Protection of Biological Diversity*, Wildlife Monographs, Jan '93).

The New Mexico GAP Organization, organized and coordinated by the Cooperative Fish and Wildlife Service Research Unit, involves a growing number of cooperators. The coordination structure includes **Production Groups**, **Data Review and Verification Groups**, and **Work Groups** advising on methodology and process. Groups actually producing or manipulating data include Natural Heritage Program TNC, Geography Department NMSU, NMERI UNM, Fish & Wildlife Cooperative Research Unit NMSU, and student projects at UNM and NMSU.

For information on NMGAP, contact: Patrick Crist, NM Cooperative Fish and Wildlife Research Unit, NM State University, PO Box 30003, Dept 4901, Las Cruces, NM 88003-0003. Phone: (505) 646-6303, FAX: (505) 646-5975, E-MAIL: pcrist@nmsu.edu.

### GIS Makes Debut... (continued from page 6)

NMERI's presentation, *Statewide Water Resource Plan Information System (SWRPIS)*, demonstrated their work with the NM Interstate Stream Commission and contributing federal agencies on the design and implementation of a GIS application concerning water resources. As water resource issues in New Mexico continue to gain attention, information on administrative districts, existing tabular data, and past and present project reporting are being realized as valuable assets to State water planners. Historically, water resource information pertaining to the same geographic region would be distributed between several federal or state agencies—never pooled as a collective inventory for general access. The SWRPIS GIS application (using ARC/INFO rev. 6.1) brings useful information together for better access to all New Mexicans. As with many issues, the contribution of GIS to real world solutions continues to have a positive impact in New Mexico.