National Park Service

GIS NEWS

Assembled by
Geographic Information Systems Division

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92 NPS/GIS in Review

By Phil Wondra, Chief, GISD

During 1992, the use of geographical information systems (GIS) in parks continued to grow. Over 80 parks now have trained staff using GIS-compatible resources data on hardware and software installed in the park. The use of GIS in the NPS was highlighted throughout the November George Wright Society Conference on Research and Resource Management in Parks and on Public Lands. GIS was integral to many of the session papers; was referenced in several plenary sessions; and was used in several posters including the award winning poster from Colonial National Historical Park. The presenters in the GIS session demonstrated some of the broad range of applications of GIS or uses of the GIS toolbox: selecting lands for stewardship; responding to development threats; cultural resource management; and water resources management. **Continued on Page 2**

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-Don't Be So Sensitive-

Federal Computer Week

The government soon will get some guidance on exactly what constitutes "sensitive" information.

The National Institute of Standards and Technology plans to release a document differentiating classified data and sensitive but unclassified data, a distinction delineated by the Computer Security Act of 1987.

NCSC is responsible for classified data, NIST for sensitive data.

YOUR RESPONSE IS REQUESTED

See *GIS Hardware & Software Survey*, pages 35-36

92 NPS/GIS in Review

Continued from Cover Page

Another indication of the vigor and growth of the GIS program was evidenced by the attendance at the 7th Annual GRASS GIS Users' Conference which was hosted by NPS. GRASS is the NPS recommended GIS software. There were over 300 registered attendees representing 13 Federal agencies, 7 state agencies, 7 foreign countries, 18 universities, the Smithsonian Institution, 2 national laboratories, and industry. There were 49 NPS participants in attendance.

The continued growth of GIS use in the Service has been accelerated by the commitment of emerging programs, such as the Inventory and Monitoring (I&M) Program, to the development of GIS-compatible data and use of GIS. The I&M Program began funding development of a nominal data base for all I&M parks. Funding is being directed toward development of digital base cartographic data (boundary, transportation, hydrography and contour themes) and vegetation data. In addition, use of GIS in park planning activities is expected to increase through support from the newly established GIS Branch at the Denver Service Center.

REMINDER

Eighth Annual GRASS Users' Conference and Exhibition

March 14-18, 1993

See page 18 for details

During the year, the NPS played an active role in the development of a DOI Mapping and GIS Implementation Plan. The Plan is directed toward coordinating mapping and GIS activities among the bureaus to minimize duplication and optimize effectiveness. Activities include development of the DOI Clearinghouse for information on existing and planned spatial data and coordination of each bureaus' programmatic requirements and strategic plans.

In addition, the NPS actively participated in the development of Spatial Data Transfer Standards, metadata standards, and data content standards. These standards will further the ability to share quality data among government agencies, industry and the public. These data management and mapping activities were mandated by the Office of Management and Budget and compliance with the published standards will be required by all Federal agencies.

GISD BITS

GIS NEWS Namechange

It has been brought to our attention that the *GIS News* is not a formal "newsletter", hence the change of name from *GIS Newsletter* to *GIS News*.

Global Positioning Systems Update

By Karl Brown, GISD

Canopy Signal Study Findings

"If you can't see the sky, you probably can't use GPS..."

The traditional limits of GPS data collection have led many parks to plan on off-season data collection, extended range poles for elevating their GPS antenna, and various other methods to utilize their GPS receivers under a tree canopy. The under canopy problem is a combination of signal blockage or weakening, particularly if the canopy is wet, because each twig or conifer needle acts as a miniature antenna.

when wet...each twig or conifer needle acts as a miniature antenna...

In June, 1992, NPS-GISD was represented at the USFS Steering Committee meeting in Bedford, Indiana. The meeting objectives included the discussion of base station locations and points of contact, the status of the Trimble Pathfinder Professional™ procurement contract, and the *establishment of a test bed course under Oak-Hickory full growth canopy conditions.*

1992 Study Locations

June 24 Wayne-Hoosier National Forest; Bedford, Indiana

November 4 Siskiyou National Forest; Medford, Oregon

During the June 23-25 meeting in Indiana, weather varied from broken clouds followed by a thunderstorm on the test day, to driving rain and broken clouds on our departure. The two Trimble Pathfinder Professional™ instruments ran the 7 point, 15 acre course using a polycorder and an MC-V datalogger for comparison. One rover [unknown] utilized the April '92 distribution firmware (chip) that all current units are being shipped with (and upgraded to).

We encountered an average 35% acquisition rate under the 70-100 foot high Oak-Hickory canopy, ranging from quite heavy to relatively thin. Some data points had open side vision areas and others did not. For comparable statistics and positioning confidence, this means a doubling to tripling of residence time on a point (i.e. 10-15 min.), depending on data logging rate.

The Indiana study results are to be published in mid-93 as a USFS Missoula Technical Development Center report by Jasumback and Luepke[1].

In summary, this indicates that some data collection can occur under full foliage, and that *you do not have to wait for leaf drop* to use GPS.

[1] Tony Jasumback, USFS MTDC, and Douglas Luepke, R-8 Photogrammetry.

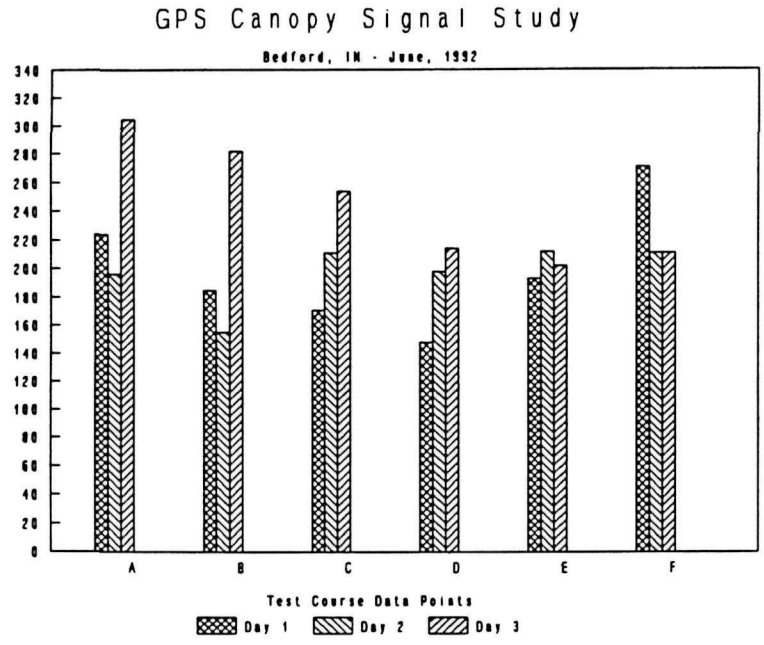


Figure 4 - # of Polycorder Position Records collected over a 3-day sample in Bedford, Indiana. (1 second rate)

Canopy test receiver records data table:

Points	A	B	C	D	E	F
Day 1	224	185	171	148	193	271
Day 2	196	155	211	198	212	211
Day 3	305	282	254	214	202	211

Figure 5 - Polycorder Data Points collected June, 1992 @ GPS Canopy Study Site, Bedford, Indiana.

The Indiana test plots were collected with a 120 position record threshold (GPS area traverse [turning point] standards for USFS); any data sets without this minimum were excluded as shown in Figure 4. Possible weather, constellation, and logging rate interaction may be shown in Figures 1 and 3 for Day 3. The residency time was extended to almost 10 minutes at Points A, B, and C due to the low data logging rates. Canopy factors of density and moisture retention may contribute and or interact with constellation effects, as the study site lost 3D satellite lock late on Day 3.

The 3-day average of 35 Polycorder position records per minute is depicted in Figure 3:

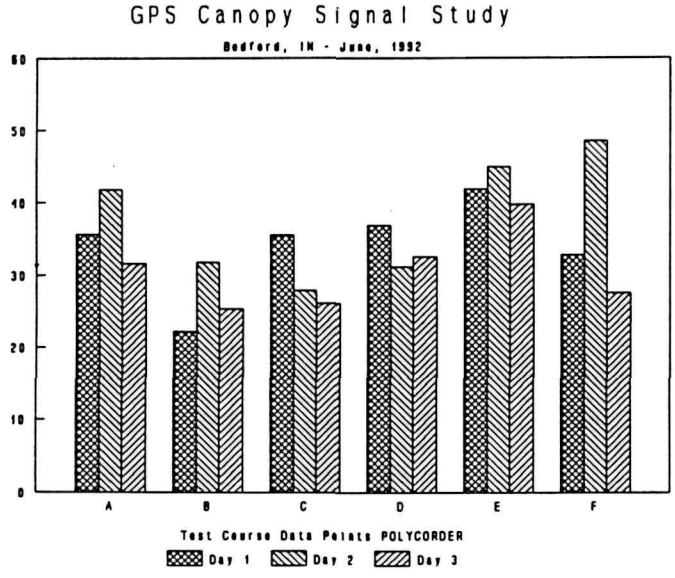


Figure 6 - #records / minute by Polycorder

The comparative 3-day average of 34 MC-V datalogger position records per minute is depicted in Figure 4. The pertinent finding of the study determined the potential for GPS operation under a broadleaf canopy, and a comparison of accuracy with varying distance to the base station. With differential correction, the horizontal positioning errors averaged 3-4 meters for the local temporary base (¼ mile), and 5-6 meters for the Atlanta base (377 miles).

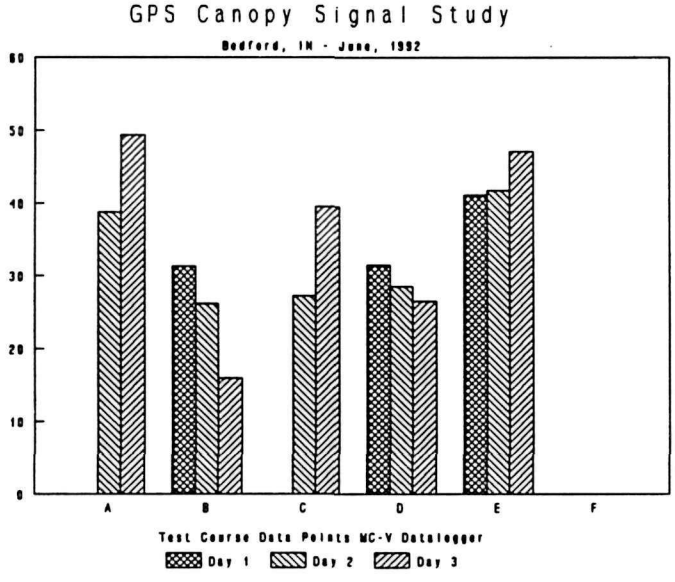
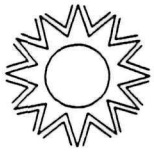


Figure 7 - # Records / minute by MC-V datalogger **(The MC-V datalogger did not visit points A or C on day 1; nor complete point F on all 3 days.)**

GPS Canopy Signal Study Findings - Oregon Coast



The November 3-5 meeting had sun (on the Oregon coast?) on the first day in the Jedediah Smith Redwood groves, and steady rain (of course!) on the second field test day in Winchuck Creek, just north of the California border.

Preliminary results in Oregon indicate that true blockage from tree boles *far exceeds* the canopy effects. Local GPS practices utilize GPS positions obtained as close as possible to a needed location, with traditional methods of bearing and distance used as needed to pinpoint the position of features, archeological sites, etc. The tall coastal canopies still allow GPS use, but *with traditional field techniques commonly needed.*

GISD's task group on GPS

includes Karl Brown, Bruce Powell, Mike Story, and Ralph Root. It continues to recruit a servicewide review team for developing GPS policy and fostering a network for information sharing. Any interested people who can serve as reviewers or have suggestions or questions on the implementation of GPS should call Karl Brown at the GIS Division - WASO detached, Denver @ (303) 969-2590 or by ccMail message (Brown, Karl NP-RMRO).

We would like to thank the following individuals so far for agreeing to serve as technical reviewers and sources of help:

Gordon Anderson, Everglades NP(305) 247-6211
ccMail: Anderson, Gordon
Ron Cornelius, Big South Fork NR(615) 569-9778
ccMail: BISO; Attn: R. Cornelius
Paul Dupasse, Hawaii Volcanoes NP (808) 967-7311
ccMail: HAVO Law Enforcement; Attn: P. Dupasse
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ccMail: Foster, Dan
Mike Gossett, Ozark NSR (314) 323-4236
ccMail: OZAR Res. Mgt.; Attn: M. Gossett
Eric Gdula, Isle Royale NP (906) 487-9080
ccMail: ISRO Res. Mgt.; Attn: E. Gdula
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ccMail: Handly, Paul
Roger Hoffman, Olympic NP(206) 452-4501
ccMail: Hoffman, Roger
John Knoerl, WASO-IRD(202) 343-2239
ccMail: Knoerl, John
Allan Loy, Mesa Verde NP (303) 529-4548
ccMail: Loy, Allan
Joe Meyer, Madison CPSU, Midwest Region(608) 265-3515
ccMail: Meyer, Joe
Tim Smith, Submerged Cult. Res. Unit(505) 988-6710
ccMail: not established yet in Santa Fe, NM
Sarah Wynn, Rocky Mtn Regional Office(303) 969-2653
ccMail: Wynn, Sarah

Current work underway with the review team members includes writing the GPS section of the upcoming GIS Sourcebook, and exploring the cross-vendor capabilities of rovers and base stations using the RINEX data format (e.g. Magellan rover data corrected through a Trimble base station, or Trimble rover data corrected with a RINEX file from an Ashtech base station). The team is also assembling suggested readings for GPS users, and is generating a composite of recommended field procedures for obtaining 2-5 meter accuracy. Our other pressing Sourcebook topic is to develop a GIS compatibility chart for various GPS receivers, including the ease of downloading corrected data files to various GISs.

So where is all this going? To facilitate a network, a GPS user inventory and an improved Park GPS equipment inventory could provide focused points of contact for new users. An expanded GISD GPS data

Continued on next page

base could compile and match specific hardware types to questions from new users, and other agencies. Spending scarce dollars on cooperative efforts and buying data would meet more of a Park's immediate needs, rather than buying duplicative hardware. A mass-buy of rovers through interagency agreements would stretch these dollars further. GISD continues to seek interagency opportunities to leverage your limited dollars.

Federal Geodetic Control Subcommittee [of FGDC]

coordination has increased, and now includes the 'resource grade' GPS receivers and user community. The subcommittee also formed a 'Fixed Reference Working Group' that sponsored the EPA GPS base station inventory of 1992. Your Regional GIS Coordinator has an available digital copy of the EPA base station list.

The FGCS Methodology Working Group has agreed to address the testing of resource grade receivers, probably utilizing member agency input to compile the testing documentation. The Methodology Working Group would serve as a clearinghouse, as it cannot possibly test the variety of resource grade units available.

> The Federal Geodetic Control Subcommittee finally agreed to include 'resource grade' GPS receivers...and to coordinate base station development...

Preliminary Base Station Traits Discussed by FGCS

The Fixed Reference Working Group of the Federal Geodetic Control Subcommittee will meet this spring to propose the definition of a base station, and to recommend the hardware configuration and methods of base station file transfer between agencies. The Working Group will also propose a recommended configuration for base stations to support both resource grade and other GPS user groups. Twelve channel units have been suggested as a choice to support the survey and resource grade users. To accomplish an open system of data access, the base could probably utilize a bulletin board distribution system like Mesa Verde NP's. Cross vendor compatibility will involve RINEX data transfer unless a newer industry standard emerges. GISD will represent the NPS to discuss these station characteristics, and to voice our uses and needs. Any comments or questions on base station locations or possible configurations should be addressed to your Regional GIS Coordinator or to the GISD Task Group Members listed in this news item earlier. For more information, call Karl Brown at GISD (303) 969-2590.

FY 93 Federal Interagency GPS Procurement

The FY 92 USFS/BLM contract with Trimble has expired. The USFS will continue to buy through GSA for FY93, as their projected needs are not large enough to pursue an interagency contract. Until demand increases, the USFS will buy off the GSA schedule, and expects BLM to do the same. The GSA contract number is #GSOOF7373A; duration 12/1/91 through 11/30/95. The GSA contract prices are $12,834 for the polycorder option, and $13,754 for the CMT-MC-V datalogger option. The GIS Division will continue to pursue interagency interest in a mass-buy for FY 94-5.

Trimble on Sale

Trimble has had the Pathfinder Professional on sale since December, for 180 days, ending in June, 1993. These GSA sale prices are the best rates for this product currently. *This is the best current Trimble option for FY 93.*

Pathfinder Professional™	Part Number	Price
with Polycorder	16851-00	$ 7,500
with CMT-MC-V	16851-10	$10,500

-GPS Data Processing-

By Nancy Thowardson

If you wish to run the pfinder software for Trimble Pathfinder GPSs (data processing and differential correction) on a 386 machine or lower, you will want to use a machine with a math coprocessor (486s have built-in math coprocessors). We found that running the software without a math coprocessor was excruciatingly slow. If you do not know whether you have a math coprocessor on your computer, you can check your original order form or use one of several programs available which report the status of your computer (there is a Norton utility which does this, for example).

See Pages 29-30, "Rover Base Station Trade Desired by PRWI"

-New "C" Programs from GISD-

Submitted by Bruce Powell, GISD

GISD receives requests to produce programs for specific applications relating to GRASS. Such a program was recently produced that will create a GRASS "dig_ascii" file that consists of polygons of concentric circles around a central point. The "C" program is called **circle.c**. Its intended use was to produce a GRASS vector file consisting of 1 or more concentric circles around the central point used by the GRASS program "r.los". The GRASS vector file produced can likewise produce "crosshairs" over the central point as well. These concentric circles were intended to provide a better perspective of distance for GRASS raster files produced by the "r.los" program. Once the GRASS "dig_ascii" file is created, you convert the ascii vector file to a binary vector file by executing the GRASS command "v.in.ascii". Next run "v.support" on the new binary vector file and then to display the vector file use "d.vect". The final GRASS vector file was intended to overlay the raster file produced by the "r.los" program. To compile the "C" program **circle.c** use the following command:

cc circle.c -o circle -lm

Continued on page 9

To obtain the "usage" for the **circle** program simply type: **circle** and you will receive the following information on your screen:

```
Usage:
  circle Northing Easting radius output-filename [number-of-circles] [-ch]
Examples:
  circle  1234567.89 123456.78 100.0 new_file
  circle  1234567.89 123456.78 100.0 new_file 8
  circle  1234567.89 123456.78 100.0 new_file -ch
  circle  1234567.89 123456.78 100.0 new_file 8 -ch
Definitions of Arguments:
  "Northing" is North UTM coordinate of the central point.
  "Easting" is East UTM coordinate of the central point.
  "radius" is radius (in meters) of the circle(s) from central point.
  "output-filename" is the GRASS "dig_ascii" file that is created.
  "number-of-circles" (optional) is the number of
    circles out from the central point.
    (default is one circle).
  "-ch" (optional) indicates whether "cross-hairs"
    are produced through the central point.
    (default is no cross-hairs).
```

To obtain a copy of **circle.c**, contact: Bruce Powell, GISD, 303 969-2590

-Digital Orthophoto Quads (DOQs)-

Submitted by Mike Story, GISD

Digital orthophoto quads (DOQs) from the USGS are a new product that will become more available in the near future. These data are derived from aerial photography (typically NAPP or NHAP) and are scan digitized at either 25 μm. or 50 μm. resulting in spatial resolutions of 1 and 2 meters respectively. The scanned data are rectified to a UTM projection using ground control points and digital elevation models (for removing displacement due to the terrain). The result is a digital orthophoto quad.

The National Park Service is participating in a study with the USGS to evaluate these new products for selected quads in ten park units. To date (1/27/93) the GISD has received thirty quarter quad products covering Petroglyph National Monument, Grant Kohrs Ranch National Historic Site, and the Mammoth Hot Springs area of Yellowstone National Park. Channel Islands, Wilsons Creek, Morristown, Saratoga, Denali, NCR-The MAll, and Yosemite are the remaining units that will

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DOQs Continued

be included in the DOQ study. The data will be subjected to a variety of applications at the GISD, Regional Offices, and individual parks. The results and experiences will be reported to the USGS and used to further refine the DOQ product.

DOQs are provided in two basic formats: full quad and quarter quad. The quarter quad files represent 1 meter spatial resolution data and cover an area that is actually larger than a quarter of a USGS 7.5 minute quad. Therefore, if you display adjacent quarter quads, there will be some overlap. The quarter quads are arranged and labeled as follows: 1 = NE, 2 = NW, 3 = SW, 4 = SE. The full quad files represent 2 meter spatial resolution data and cover an area that is slightly larger than a full 7.5 minute quad. However, one can special order full quads with quarter quad resolution (i.e. one meter spatial resolution and radiometrically normalized).

Tic marks for the corners of the quads, referenced to NAD27 and NAD83 are imbedded in the imagery. The marks for NAD83 are solid and the marks for NAD27 are broken. The UTM coordinates and line/sample coordinates for these points are included in the header data.

The DOQs may be entered directly into GRASS (or any other GIS that supports raster data) for analysis. The GISD has developed specific instructions for entering these data into GRASS and enhancing the imagery for display.

A couple of points need to be made about the quality of the data. Each quarter quad is created as an individual data set and is therefore subjected to contrast stretching without reference to neighboring data sets. Although this maximizes the contrast within each data set, it may also result in radiometric differences between neighboring data sets (i.e., adjacent imagery may appear lighter or darker). The DOQ quarter quads have been produced to comply with National Map Accuracy Standards (NMAS) for 1:12,000 scale products and the DOQ full quad data comply with the NMAS for 1:24,000 scale products. The NMAS state that 90% of the well defined points that are checked, will have locational errors not exceeding 33.3333 feet (approximately 10 pixels @ 1 meter resolution) for the 1:12,000 scale products and 40 feet (approximately 6 pixels @ 2 meter resolution) for 1:24,000 scale products. Since features as small as 1 - 2 meters (1 - 2 pixels) may be interpreted from these data, it is tempting to use these data for very detailed analysis. Caution should be used in detailed analysis where the features being interpreted are smaller than the implied spatial accuracy because of the potential locational error.

Although these data are relatively new, they are based upon existing photography that may be 10 years old. (The photo acquisition date and the original film type (Black and White or CIR) are included in the header data.)

Potential uses of these data include: backdrops for other raster or vector data, data development through direct interpretation and screen digitizing of features, and updating existing gis data through display overlays and screen digitizing.

Continued next page

Advantages of DOQs

- Exceptional detail compared to other digital imagery.
- Data are provided in a known and common projection (no rectification is necessary).
- Data meet National Map Accuracy Standards.
- Data may be enhanced via image processing methods.

For more details or additional information contact Mike Story at the Data and Applications Branch of GISD-WASO (303)969-2590.

Disadvantages of DOQs

- Data require a great deal of storage space (40Mb - 50Mb / quarter quad).
- Matching the radiometry (brightness and contrast) of adjacent imagery may be difficult.

GISD Gives GIS Course to Natural Resources Management Trainees

Submitted by Gary Waggoner, GISD

The GIS Division staff was heavily involved in preparing and presenting a week-long introductory course on GIS to the NPS Natural Resources Management Trainees during the first week of February. Presentations were given on a breadth of subjects including Hardware and Software Configurations in the NPS, GIS Data Characteristics, Data Standards, Metadata and Archiving, GIS Policy and Guidelines, Coordination and Liaison, Sources of Funding for GIS, etc. Demonstrations were presented on Image Analysis, Georeferencing and Digital Orthophoto Quads, Preparation of Resource Data for Digitizing and Topographic Data Analysis, Photointerpretation and Transfer, as well as software demos on GRASS, IDRISI and Atlas GIS. Jan van Wagtendonk (YOSE), Bill Paleck (NOCA), Mike Reynolds (CURE), Chip Jenkins (SAMO), George McKay (YELL) and Dick Williams (DSC) all gave some of their respective experiences with GIS in the field. Karl Brown (GISD) and Tim Smith (Submerged Cultural Resources) presented a half day GPS Awareness session with some field data collection (GPS points) which were later differentially processed and input into a small digital orthophoto data base. There was an extensive presentation and discussion on GIS Park Planning strategies. The students also took a trip to the USGS National Mapping Lab here in Denver and received an introduction into the production of DEMs and DLGs as well as an orientation to the local Earth Science Information Center.

The course was very well received by the 25 attendees. These Resource Management Specialists are the future of the Service and are very interested and excited about the use of GIS in the Service. You will no doubt be seeing and hearing more from these folks.

-IDRISI NEWS ITEMS-

Submitted by Nancy Thowardson, GISD

IDRISI and Video Cards

If you are planning to run IDRISI and want to use full SuperVGA capabilities (256 colors and 1024 x 768 resolution--a must for multi-spectral data display and analysis), you need to have a video card that is either true IBM 8514/A architecture or has a driver to emulate 8514/A. You also need a full megabyte of video memory, over and above any other memory on your computer. Usually, when you boot your computer, one of the pieces of information that appears on the screen is the amount of video memory you have. The manufacturer of your video card should be able to tell you whether or not it can fulfill the 8514/A requirement (ask, "Can my video card emulate true IBM 8514/A graphics?"). If it cannot you can purchase a new video card and install it. There are plenty of video cards from which to choose--the IDRISI support staff recommends the Swan Palette Plus which you can order from:

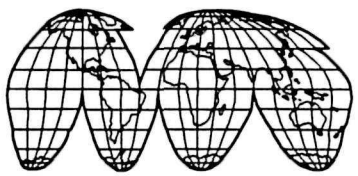
Swan Technologies
3705 Research Drive
St. College, PA 16801
Attn. David Leventhal
1-800-468-4044

GSA Contract #GS00K92AGS6096
Price: $119.60

Be sure to specify SuperVGA and 1 megabyte of video RAM. Contact Nancy Thorwardson via ccmail (by name) or telephone--303-969-2598 if you have questions or comments.

Data Transfer from GRASS to IDRISI

There is a new IDRISI program (GRASSIDR) for converting GRASS raster files to IDRISI format and IDRISI to GRASS. The module is in beta version--the conversion method for single byte binary data works smoothly; however the conversion of ASCII integer files has a few problems. We are in the process of testing and reporting problems to the IDRISI programming staff. If you would like a copy of the program for beta testing, please contact Nancy Thorwardson via ccmail (by name) or telephone--303-969-2598.



-NPS GIS Communications-

Submitted by Leslie Manfull, GISD

Telephone you may call the GIS Division at (303) 969-2590. The FAX is (303)969-2822.

Correspondence the address for the GISD is: PO Box 25287, Denver, CO 80225-0287. All formal requests for technical assistance should be routed through the Regional GIS Coordinator before contacting GISD.

GIS NEWS this is a quarterly update on NPS GIS activities, including training, hardware, software, data, policy, and regional news summaries. To submit news from your office, contact your Regional GIS Coordinator or Donna Mahoney, GISD.

GIS Bulletin Board this is on the NPS cc:Mail system and open to all NPS employees that have access to cc:Mail. It was recently created and hopefully it will become an active forum for all GIS users that have problems, questions, or information worth sharing or asking for help on. Contact the Regional cc:Mail Hub Coordinator or park cc:Mail Post Office Administrator to have GIS Bulletin Board included in your cc:Mail address. To post a message to the GIS bulletin board use the address to person option and choose #GIS BB; to read the bulletin board look under bulletin board/folders.

cc:Mail the GISD maintains addresses for each staff person in the division, so you can communicate with anyone at GISD.

GRASS User's List a few NPS sites have limited access to the GRASS Users List, which is more or less an electronic mail system for GRASS users. This requires a dedicated phone line and a modem in order to establish a UNIX to UNIX Communications Protocol (UUCP) with GISD. Call Peter Strong, GISD for assistance, if you want to set up a UUCP and access the GRASS User's List via GISD. To subscribe to this the GRASS Users List service via GISD you would call: grassu-request@moon.cecer.army. mil and send the following command:

> SUB: (fill in your name)
>
> Once you are a subscriber, you can send notes to others on the mailing list by addressing them: grass-list@moon.cecer.army.mil
>
> The HELP command will introduce you to the list manager software.

Internet a diverse group of linked data networks in more than 100 countries and used by governments, universities and the private sector. It is currently under study by a NPS Internet ad-hoc working group with respect to large scale connectivity (possibly via Denver), a standard NPS addressing scheme, and licensing. It is used by the Air Quality Division (Denver), CPSUs, and NPS libraries. Arrangements or access to Internet may be available to you through CPSUs or other neighboring agencies that you cooperate with locally. Another interim step to Internet implementation may be an Internet gateway for cc:Mail which could begin in 1993. As DOI goes forward with spatial data clearinghouse and archiving plans, the need for NPS access to Internet is clearly identified.

The Internet, on page 15 provides additional information on Internet.

GRASS software, manuals and documentation, and source code are available over Internet ftp **moon.cecer.army.mil**, login as anonymous. Your user id must be used a password. Press the ? key for a list of commands that are used in ftp.

Other ftps that may be of interest to GIS users are as follows:

archie.ans.net database of software available on Internet

charon.gd.usgs.gov MAPGEN and coordinate conversion programs

postgres.berkeley.edu Postgres(RDBMS)

kiawe.soest.hawaii.edu Generic Mapping Tools

aurelie.soest.hawaii.edu AVHRR images

spectrum.xerox.com USGS DLG, DEM, DTM, TIGER map data

ncgia.ucsb.edu NCGIA publications, DEMs, and much more

nssdc.gfsc.nasa.gov NASA Master Directory (Metadata for Earth and Atmospheric Sciences). Login as user NSSDC.

csn.org The Computer Oriented Geological Society check under the COGS directory for programs and other information.

Please contact Peter Strong, GISD for later updates of the ad-hoc NPS Internet working group and information on how you might access Internet. Peter can also send you a copy of **Zen and the Art of Internet - A Beginner's Guide** by Brendan P. Kehoe, First Edition 1992.

The Internet: An Introductory Overview

Jane Weaver, ITC

The Internet describes a conglomeration of interconnected data networks in more than 100 countries with a number of users estimated at more than three million. Government, universities, and the private sector currently access the networks using a wide variety of different services and interfaces.

The Internet grew out of a backbone (a backbone is a network that links other networks) developed by the Defense Advanced Research Projects Agency (ARPA) in the late 1960's called the "ARPANET." Policies developed for the ARPANET that limit use of the backbone network to research and education, while not strictly enforced, still exist. The current Internet backbone is managed by a non-profit partnership comprised of the IBM Corporation, the MCI Communications corporation, and Merit Network, Inc.

The backbone of the Internet uses the Transaction Control Protocol/Internet Protocol (TCP/IP), which allows addressing and transport of data. Data is routed through host computers that store and then forward the data to other hosts in the path to its final destination.

The Internet has become a de facto standard in widearea networking because it is the only method widely used to link a variety of dissimilar services. It is viewed by some as a prototype for a world-wide public network. Electronic mail (email) is the most frequently used service, while bulletin boards, file transfer, and databases are also popular. Email may be sent by users directly connected to the Internet or by users subscribing to a growing number of commercial email providers that offer Internet connectivity, including CompuServe, MCI, U.S. Sprint, and many others.

Internet access to commercial on-line systems is increasing, and more feature-rich protocols for email are being tested for wide use (the Simple Mail Transfer Protocol (SMTP) is still the most prevalent). A standard for information retrieval called the"Wide Area Information Server" (WAIS) is now available with hundreds of databases of interest to researchers and students (see the April 1992 issue of Information Systems Developments for more information on WAIS).

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The Internet

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File transfers, enabled by the file transfer protocol (ftp) and terminal emulation (the ability system), provided by a component called "telnet, " are available to those directly connected to the Internet. Some systems will allow those limited to mail access (and therefore unable to directly issue system commands) to send specific messages to obtain data from Internet computers.

A user must know the intended recipient's address in order to send mail or requests for information. Since the Internet is not a centralized system, there is no one place a user can turn to obtain a directory of all users or all services. Suffixes included in the user's address identify the type of his or her organization. For example, "gov" denotes a government user, "edu" indicates a student or researcher at a university, and "com" identifies a commercial user.

Several Internet-related services are worth mentioning, Archie, a service provided by McGill University in Montreal, Canada, stores information on hundreds of systems accessible through the Internet. UUNET Communications Services, in Falls Church, Virginia, also offers a wealth of information abut data available on the Internet. The California Education and Research Federation produces a comic book to educated prospective users on Internet terminology.

Viruses and other malicious software are a serious threat to computers attached to the Internet. Vigilance in access control is recommended, especially where user access is through dial-in links. Caller identification for locations with dial-in access and use of virus detection software by those using Internet resources may alleviate some problems.

Use of complicated Unix or DEC VMS commands are frequently required to gain access o Internet resources. A variety of interface programs available on some systems simplify the cryptic technical commands required to navigate through Internet systems. Many of these limit the way the user can tap into the resources, however.

The Internet is evolving towards the National Research and Education Network (NREN), which is a high speed backbone envisioned as a data "interstate highway" and capable of carrying much larger volumes of data of a variety of types.

Several DOI bureaus have purchased equipment to link directly into the Internet system through leased telephone lines. Other DOI users subscribe to services allowing Internet access. If you are interested in connecting to the Internet, please contact the Information Technology Center at 202-208-4750. If enough interest is shown, access may be provided for the Main Interior Building.

** The above article appeared in the Fall issue of MICROscope, a quarterly publication of the Department of the Interior, Office of Information Resources Management, Information Technology Center. To have your name added to their mailing list write: DOI Information Technology Center, Main Interior Bldg., MS 5312, Washington, D.C. 20240

Training Announcements

Employee Development Opportunity
from the
WASO Employee Development Office

Introduction to GIS
North Carolina Central University
May 17-21, 1993

This 40 hour introductory course is designed for NPS personnel who have little or no GIS experience but who are currently planning or will be working on a GIS in the near future. The course has no prerequisites, although computer experience would be helpful. Participants will be exposed to GRASS, the NPS standard GIS software, and other commercially available GIS software packages such as Erdas, ARC-Info, and EPPL7. (This is not a GRASS training course.) The class is 40% lecture and 60% hands on. The class is limited to 10 because of the individualized hands on sessions.

The objective of this training is to familiarize NPS personnel with the basics of GIS operation. Upon completion attendees will have a basic understanding of GIS software, hardware, and data bases, and applications. They will know how to acquire data, how to input data, and how to produce useful analytical maps and data. Attendees will gain an understanding of GIS costs, benefits, and how it can be used to address resource preservation and protection.

Courses Topics include:
What is GIS?
Overview of GIS in the NPS
The NPS GIS Sourcebook
Data - types, vector/raster, sources
Data bases - accuracy, scale, resolution
NPS Nominal Data Bases
Computer operating systems DOS/UNIX
Hardware and Software
Data base construction, map prep & digitizing
    Projections, Datums, Accuracy Standards
Applications: Natural, Cultural, & Planning
    Bandelier National Monument
    Great Basin National Park
    Use of relational data bases
Data output, cartographic representation
What is remote sensing?
Aerial Photo Interpretation

Participants: NPS employees who have little or no experience with GIS but will soon be working on an existing GIS or are in a park or office which will acquire a GIS in the near future.

Program Code: 1935

Title Code: Introduction GIS

Location: Durham, North Carolina

Funding: Benefitting account for travel costs only. No tuition.

Note: Each participant will be responsible for his/her own travel arrangements and reservations.

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Introduction to GIS
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Further information on availability of dormitory rooms and local transportation will be provided later to participants.

Application: One page nomination forms must arrive in regional/center priority order, at WASO EDD no later than April 1, 1993.

Coordinators: Leslie Manfull, GISD (303)969-2964 and Bill Walker, EDD (202)523-5291

GPS Training Opportunities

are increasing, with John Knoerl's group in Cultural Resources planning one per Region. The University of Montana continuing education courses will be held May 18-20; May 25-27; June 8-10; and June 15-17, 1993. Cost is $450.00 per participant; contact U. of M. at (406) 243-4623 for advance registration (required). Your Regional GIS Coordinator can suggest other sessions or alternatives. Many regions have set up multiple day sessions in house, and through Cooperative Park Study Units at Universities with great success. Two recent 'in house' sessions were at Joshua Tree in California, and at Prince William Forest Park in Virginia. Dr. Jerry Freilich (JOTR), and Paul Handly (NCR) set them up, respectively, and can make training suggestions and recommendations. The University of Wisconsin at Madison will offer an introductory GPS course April 5-8, 1993 for $825.00 (!). Call 1(800) 462-0876 or Fax (608) 263-3160 for information. Finally, a 1993 GPS Course brochure is available from a commercial training vendor called NAVTECH Seminars at 1(800) 628-0885; Fax (703) 931-0503.

SHORT NOTICE

8TH ANNUAL GRASS GIS USER'S CONFERENCE MARCH 14-18, 1993

The 8th Annual GRASS Users' Conference, which will focus on the theme, "Open GIS: The Integration of Application Resources with GRASS," will be hosted March 14-18, 1993 by the U.S. Geological Survey, Soil Conservation Service, and Federal Bureau of Investigation. This GRASS user community annual conference will be attended by participants from the private and public sector, including universities, Department of Interior bureaus, the Soil Conservation Service and the Army Corps of Engineers. The NPS is a major supporter and user of GRASS GIS software and takes an active role in directing software development and applications. GRASS is the recommended GIS software for the Service.

The conference will include general plenary sessions, the presentation of professional papers, poster sessions, and workshops. Topics for papers and posters include: Environmental Planning and Compliance Applications; Natural Resources Management Applications; Monitoring Change - Imagery and GIS; and Water Resources Applications. Examples of workshop topics are: Introduction to GRASS (Part I and II); Introduction to the Global Positioning System; Data Base Management and GRASS; Techniques of GRASS Application to Geographic Problems; and GRASS Interfaces to Soils Databases.

REGIONAL BITS

-Alaska Region-

Submitted by George Dickison

The Alaska Regional Office GIS Branch is accelerating the production of landcover maps. The Gates of the Arctic map covering 7.5 million acres is nearing completion. The analysis of such a large area which encompasses 2600 meters in topographic relief has been a challenge. Sample areas are being selected now for an accuracy assessment to be completed this summer. Also scheduled for completion this summer are Bering Land Bridge National Preserve (2.8 million acres) and Kobuk Valley National Park (1.7 million acres).

We have installed an evaluation copy of ARC/INFO and are examining its utility as a supplement to GRASS capabilities. We are presently using the software for cartographic production on the Versatec electrostatic plotter, and will soon expand our evaluation to other potential uses. We also will be evaluating the use of ArcView and ArcCAD. We would be interested in hearing if others have used ARC/INFO and GRASS in a production environment.

FirePro has funded the acquisition of PC based GIS hardware and software to be housed in an Alaskan Park. We plan to build a prototype database and application in the Regional Office before soliciting proposals from those interested in having the system located in a park.

We have two new Sun workstations on our network supporting other programs. One is in support of the proposed Beringian Heritage Park where modelling for archaeological site distribution will take place. The other is for FirePro database development and analysis.

Last month we had an electrical surge that fried a workstation and all the transceivers on the network. After some wild scrambling and scheming we had a temporary network up and running in two days, with a more permanent solution following a week later. The silver lining was that we were able to rewire the network with twisted pair and junk the old thicknet for not much more money than it would have cost to just replace the transceivers.

Lastly, we have received Cost Share-Challenge Grant funds to work with the University of Alaska in modelling the distribution of arctic-steppe (a rare plant community) with changing global climate. We will use a climate model, terrain, and other pertinent data to predict the occurrence of arctic-steppe under varying climatic regimes. This will then be used to refine our landcover mapping for Yukon-Charlie Rivers National Preserve.

-Mid-Atlantic Region-

Regional Technical Support for GIS in the Mid-Atlantic Region

By Hugh Devine
Mid-Atlantic GIS RTSC, North Carolina State University
(919) 515-3682

The Mid-Atlantic Region has developed a novel approach to initially supporting its GIS operations. Two Regional Technical Support Centers (RTSCs), one at the CPSU at Penn State University and one at the College of Forest Resources at North Carolina State University, have been set up to assist the MARO parks. The two school division is primarily based on interests, capabilities, and needs of both of the university units and the parks. But there is a purposefully designed overlap in the services provided by each RTSC.

The Penn State group is to develop and support primarily the GRASS operations of the larger natural resource parks (e.g. Shenandoah, Delaware Water Gap, Assateague, etc.). The N.C. State unit is to focus on the DOS applications which currently dominate the region's culturally based parks (e.g. Colonial, Petersburg, Richmond, etc.). The first step in the development of the operating procedures for the RTSCs was a regionwide meeting of selected parks in Raleigh, NC this summer. At this meeting the parks currently active in GIS described their ambitions which were collated into a "wish list". Then, during the Fall, the RTSC directors, the Regional GIS Coordinator (Patti Dienna), and the Regional Chief Scientist (John Karish) met and constructed a prioritized work plan for the year.

The plan is centered on three major activities. These are:

1. Technical assistance to parks with on-going GIS programs. This group includes Delaware Water Gap, Shenandoah, Assateague, Colonial, Richmond, and Petersburg.

2. Initial development of GIS implementation plans at several parks including Appomattox, Valley Forge, Gettysburg, and Hopewell Furnace.

3. Design of new procedures for specialized GIS tasks such as cultural resource GIS programs, operational guidelines for GPS, and overall map information needs for system planning.

The activities are listed in priority order and responsibilities for their implementation is shared in varying degrees among the RTSCs.

Mid-Atlantic Region Continued:

By placing its RTSCs at universities with GIS research programs, the region has available a diverse set of program expertise (GRASS, Arc/Info, ATLAS*GIS, Auto\CAD, ERDAS, etc.) and access to considerable experience with varied GIS applications. Highlights of the program to date include: 1) SAGIS data base conversions at Shenandoah and Delaware Water Gap, 2) Arc/Info data exchange procedures and archeological data base development at Colonial, 3) initial system planning and implementation at Petersburg, Gettysburg, and Valley Forge, 4) Auto/CAD data base conversion at Hopewell Furnace, and 5) preliminary development of several automated procedures for GIS planning and need assessment. This is the first year of operation, so one of the major activities of the program will be to log the amount of time and types of service provided and this in itself should provide a significant contribution to Park Service GIS.

One quick note of already realized success concerns the two planning meetings. The first, with the parks, identified several mutual problems and possible solutions (e.g. SAGIS data conversion procedures, training for part time GIS operation, cultural resource data collection and entry, etc.). This opportunity to lay out GIS activity and difficulties opened a communication that had not previously existed and paved the way for cooperative program development. The second meeting, with the regional GIS staff, was a lively exchange of perceptions of park needs and multiple approaches to GIS. The objective setting and the development of the activity list for the two units was an educational process and, when combined with the record keeping mentioned, it provides a rich experience base upon which future plans will be developed.

-Southeast Region-

Submitted by Neal G. Guse, Clemson CPSU

Efforts are still underway to re-establish the regional GIS function at Clemson University CPSU. Negotiations with Clemson University for space, telephone and office furniture have taken place although no firm move-in date has been agreed to yet. Recruitment to replace the former incumbent, Joe Meyer, has been hampered due to the Servicewide freeze on filling central office positions.

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-Midwest Region-

Geographic Information Systems Applications at Indiana Dunes National Lakeshore

By Eddie L. Childers, GIS Specialist and Randy L. Knutson, Resource Management Specialist

The Geographic Information Systems (GIS) at Indiana Dunes has become a multi-divisional tool for land management throughout the national lakeshore. Consequently, many of the national lakeshore's staff depend on the GIS for help with many of their work assignments.

Indiana Dunes management has requested information that required reorganization of the Reservation of Use (ROU) data theme. ROU's are inholdings which are still occupied by private individuals. Indiana Dunes' ROUs will revert to the national lakeshore within the next 20 years. Management's request required that the ROU data theme be reorganized by year of expiration. Plotting ROU's by year provides a visual representation of their location and expiration date. This data will enable planning for removal of power lines and some roads, restoration of the ROU sites to presettlement conditions, and returning the area to the original presettlement hydrology. The data will also help management efficiently administer funds and direct manpower to restore the national lakeshore's natural ecosystems.

The recently approved Fire Management Plan (FMP) required a fire prevention analysis. This analysis required that the spatial relationship of many factors be considered. This evaluation consisted of three main components: hazard assessment, risk assessment, and value assessment. The hazard assessment consisted of reclassing the vegetation theme into fire fuel models. The hazard assessment was determined using the fire fuel models with regard to slope and aspect. The risk assessment was determined by considering fire frequency and human access. Human access is defined as proximity to roads, trails, railroad tracks, and houses. The value assessment was determined by considering critical habitats and their various responses to fire. Then, all three assessments were combined into a composite overlay, which will be used to guide fire prevention activities. Also, the fire fuel models theme is used in planning prescribed burns in conjunction with the DOS based program BEHAVE. Changes in environmental conditions are entered into BEHAVE which generates valuable fire behavior predictions.

Another ongoing project focuses on the endangered Karner blue butterfly. Listed as an endangered species on December 14, 1992, by the U.S. Fish and Wildlife Service, the national lakeshore's Karner blue butterfly population appears to be the third largest in the world. Karner blue butterfly population areas in the national lakeshore were entered into the GIS following the 1992 summer survey. Preliminary analyses run on population locations indicate that this species prefers black-oak savanna and south-west facing slopes. Future management of the endangered Karner blue butterfly will be assisted by further GIS evaluation.

Indiana Dunes National Lakeshore Continued:

These are just a few of the more recent GIS projects at Indiana Dunes National Lakeshore. Many more GIS projects are currently underway or planned for the near future. The database will continue to be updated to broaden the number of GIS users. We plan to continue to integrate GIS into all facets of the national lakeshore and make GIS available to all divisions.

GIS Program at Isle Royale

By Eric Gdula

There have been several accomplishments with the GIS program at ISRO since the past GIS newsletter. The following is a brief summary of the last two projects.

The first project involved using the GIS to locate those areas in the park where archaic archeology sites might be found. Archaic archeology sites are the oldest archeology sites on the Island. These sites depict the first sign of man on the Island. The location of these sites is highly correlated to the old shore line of Lake Superior. Because Isle Royale is rebounding following the retreat of the last glacial period, the old shore line can be estimated using present day elevations. A re-classification of the DEM enabled us to establish an archaic zone around the Island. This arachic zone, to date, is the best estimate of the old shoreline.

The second project is a prediction model for all other potential archeology sites. This project differs from the above project in that it encompasses many different layers other than just elevation. Archaic sites are a special type of archeology site; they are extremely correlated to the old shore line. Other archeology sites on Isle Royale are not so restricted by the old shore line.

A comprehensive analysis was done on a selected group of existing archeology sites to determine what conditions these sites are found on. Many factors including slope, aspect, soil type, distance to Lake Superior, distances to existing archeology sites, and distance to prehistoric mine locations were examined. Thus far we have found that slope, aspect, and distance to Lake Superior are the determining factors for where archeology sites are found.

The end result of this project will be a map that has a nominal rating system on the probability of finding an archeology site. The rating system will be on the nature of extremely high, high, moderate, low, and extremely low probability of finding an archeology site.

Both of these projects were jointly done by the Cultural Resource Management Specialist, Elizabeth Amberg, and myself. It is our intention to field check the "results" of these two studies this summer. I'll pass the results along in a future newsletter.

-GAP Analysis-

Submitted by Joe Meyer

GAP analysis, or just plane GAP (it is not an acronym), is getting underway in the upper Midwest. Planning efforts led by the US Fish and Wildlife Service for the states of Minnesota, Wisconsin and Michigan are beginning with seed funding this FY. Personnel from VOYA, ISRO, SACN and the Regional GIS Coordinator attended a GAP workshop in January.

The general goal of GAP is to maintain biodiversity. A specific goal is to prevent species from becoming threatened or endangered by protecting adequate, diverse communities. GAP itself is a tool to maintain biodiversity. The ultimate result of GAP is to identify land to be protected in order to maintain biodiversity. However, very little land has been acquired as a result of GAP.

GAP requires three basic GIS themes (vegetation, land protection and ownership and species distribution). After these themes have been developed, GAP analysis determines what areas that should be protected (perhaps acquired by state Department of Natural Resources) in addition to those already protected (such as NPS lands).

GAP analysis began in the western states. Although a few northeastern states are currently "doing the GAP", the large, heavily fragmented states of the upper midwest pose a different problem fop GAP analysis. The emphasis of GAP may change from protecting or acquiring land to improving land management. GAP is a three year project with USFWS contributing about $300k; various state and federal agencies may provide funding or in-kind contributions to tailor the results of GAP to their needs (e.g., a vegetation map with finer resolution and a more meaningful classification scheme).

What is the NPS role in GAP? Certainly, NPS is not looking for more land to manage. Through GAP, GIS data themes will be developed for NPS lands and for adjacent lands. Although the resolution required by GAP is coarse (100 hectare), by participating in GAP, NPS will have access to data used to develop the themes (e.g., satellite imagery for the three states). In some cases, the coarse data will be useful to park managers (adjacent land ownership and vegetation). An intangible benefit to NPS is working closely with the GIS community in the states, developing working relationships with the state and federal agencies involved in GIS and "owning" GIS data. The NPS contribution to the GAP process is exhaustive species list for (most) parks in the three states to aid in developing species distribution themes, and ground-truthing for vegetation themes.

-GIS at Voyageurs National Park-

By Samuel Lammie

One applied GIS project from Voyageurs National Park of potential interest to GIS users is an effort to monitor wildlife activity and snowmobile encroachments in 17 wildlife protection zones throughout the park. The wildlife protection zones comprise approximately 7.6% of the park's water-based acreage (83,789 acres or approximately 40% of the park). These zones were established in response to a biological opinion submitted by the U.S. Fish and Wildlife Service on the Park's Wilderness Recommendation. The U.S. Fish and Wildlife Service required that those 17 areas be closed to motorized vehicles as "reasonable and prudent measures ...to minimize harm to the gray wolf."

GRASS and the relational microcomputer database Microsoft Access are being utilized to track wildlife activity and snowmobile encroachments in the wildlife protection zones. A biological technician has been given the task of digitizing the wildlife tracks and snowmobile encroachments as recorded on 1:50000 scale maps by the Park's pilot. In addition to the spatial data, the biological technician has the responsibility to record pertinent data from aerial and ground monitor forms in to Microsoft Access. This dual approach utilizing both spatial and non-spatial data and given a unique coding scheme, allows the user to analyze the survey data from various perspectives all the while retaining a spatial reference to the attribute data.

Current attempts to make the data "usable" include prototyping a script within GRASS to facilitate "visualizing" wildlife activity and snowmobile encroachments over space and through time in conjunction with the production of weekly tabular reports. These tabular reports are given to the Resource Management Specialist coordinating the project.

Note that the selection of Microsoft Access as the relational database of choice, is based on several criteria. First, Microsoft Access can be used as a front end to dBase. Records can be exported and imported in various versions of dBase. Secondly, Access has the capability to have objects, graphics or other binary data in fields. Thirdly, Access runs under the graphical environment of Microsoft Windows. This capability will allow data to be interchanged between programs. As of yet, only the first capability has been tapped.

Please contact Sam Lammie @ 218-283-9821 for further information.

-North Atlantic Region-

Submitted by Nigel Shaw

The North Atlantic Region (NAR) is working with the University of Rhode Island (URI) on distribution of GPS base station data. URI is testing continuous data collection at their base station site in Kingston, R.I. and makes this data available on Internet. The NARO GIS office has an Internet connection at Boston University and can download data with ease. Tests are continuing with Minute Man NHP serving as the test site for GPS data collection procedures. Processing is done at the RTSC in the Regional Office.

Roosevelt-Vanderbilt NHS (ROVA) continues on the implementation path. The hardware and software (IDRISI and Atlas GIS) are installed, kudos to Dave Hayes, ROVA park biologist. Data development continues apace for the park. Anticipated applications for ROVA include identifying viewsheds over the Hudson River and hazard and specimen tree management. Existing data includes hydrography, elevation, sample vegetation, roads, park boundaries, and locations of existing and proposed structures in the park and across the river. ROVA is also using digital trail maps in their interpretive material.

Saratoga NHP (SARA) completed their hardware upgrade, kudos to Jim Schaberl who is glad to be rid of the 386i! Thanks to Fletch for the cool monitor. One of several ongoing applications at SARA is in support of the second phase of the Cultural Landscape Planning process. The work is being performed at Rutgers University. GRASS map layers of historic scanned photography and landownership are used in conjunction with historic tax, genealogy and probate records to derive and make digital versions of historic landuse patterns from three different eras: 1777 (time of battle); 1850; and 1927.

Under the able direction of Dave Duran, GISD, Cape Cod NS (CACO) has installed the new OS, GRASS upgrade, additional memory, CD drive, and x_cdplayer. CACO's database will be greatly enhanced for the GMP and daily park management with the addition of the landownership data layer, soils, and a new vegetation map. These are all due in over the next several months. Current park applications include an examination of fire effects on landscape change and hazardous fuels mapping.

Acadia NP (ACAD) is working with the National Center for Geographic Information Analysis (NCGIA) branch at the University of Maine, Orono (UMO) on their GIS implementation. ACAD is currently running PC Arc/Info and the staff awaits the return of their GIS technician. The Carriage Road restoration project underway at ACAD includes a GIS component. GIS will be used to identify and compare current and historic vistas from the Carriage Roads and to determine the significant historic and natural features that occur within the vistas.

Frederick Law Olmsted NHS (FRLA) is completing the data input on their custom designed database schema. The completed version will have entries corresponding with the digitally surveyed landscape for use by the horticultural staff.

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North Atlantic Region
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Minute Man NHP (MIMA) received the new vegetation map, habitat maps for threatened species, and several additional digital layers depicting rock walls and other formations that indicate field patterns from the colonial period. These data, developed by the University of Rhode Island, will be used in phase 2 of the project to restore the historic landscape of MIMA by introducing working farms, the University of Massachusetts, Amherst is doing both the GIS work and the Cultural Landscape Report.

Saint-Gaudens NHS (SAGA) is hoping to incorporate GIS planning into the Inventory and Monitoring Plan now under development.

The Estuarine Resources project for the large coastal parks in the NAR will be generating all maps in digital form for the parks involved. The project is now sponsoring a series of workshops for the cooperators to detail the types of data expected and methods of data collection and documentation. GIS compatible maps and analysis of the data are one component of this project.

-National Capital Region-

Submitted by Paul Handly

GPS/GIS SIGN INVENTORY

The digital sign inventory of the Monumental Core was recently completed. Sign locations and attributes were collected in the field using a Trimble Pathfinder Professional. Overall accuracy was well within our requirements. The GPS data was exported to ARC/INFO, GRASS , and GENERIC DBASE. We used DBASEIII+ to generate ATLAS*GIS point files and their relational databases(Attribute Files).

National Audubon Society Bird Census

The RTSC is helping the National Audubon Society develop a systematic bird census of Washington, DC. The GIS was used to identify a systematic sampling grid. GRASS 's *v.mkgrid* was used to generate a 500 meter grid which was then piped into *v.out.ascii* and then piped into *v.to.sites* to generate UTM coordinates for each of the 1000+ sampling sites. The GRASS sites file was then exported to a DBASE. The new DBASE file includes the X and Y coordinates and a site descriptor. This file will form the backbone of the National Autobahn Societies database on annual bird census results. By including UTM coordinates for each site in the original database, we ensure that the bird census data will be immediately available for use in GIS.

GPS Training at Prince William Forest Park

RTSC staff conducted three days of GPS training for 30 park, region and IRD staff. Areas covered were introduction to GPS,

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GPS Training at Prince William
Continued from page 27

equipment, software, downloading to GRASS and ATLAS*GIS and extensive field work. We used six Trimble Pathfinder Professionals, a Trimble Base Station and one Trimble Basic. We were able to digitize approximately 15 miles of roads, seven miles of trails, a newly discovered easter hemlock stand and numerous CCC cabin camps that are on the National Register of Historic Places.

The RTSC staff are well versed in the use of GPS and are willing to conduct GPS training for travel and per diem, especially if it's at a nice park, preferably out west.

Compact Disk Interactive Multimedia Visitor Information Stations (Pilot Project)

The RTSC is part of a group working on a touch screen interactive multimedia visitor information station. These stations will allow a visitor to ask questions by touching the screen of the computer for interpretation, information to both parks and museums and provide directions to facilities. Our responsibility is to provide digital maps and aerial photography to be incorporated into the system. Visitors will be able to access the information in English, Spanish, German and Japanese. The project management is through the Harpers Ferry Center. The Division of Interpretation at NCR is in charge of producing the CDs for the pilot project. If you are interested in further information, please contact Patrick Gregerson at 202-619-7277.

GPS at the Center For Urban Ecology

John Hadidian and the staff of the wildlife lab used Trimble GPS equipment to map the location of vegetation plots designed to monitor deer browse in Catoctin Mountain Park, Rock Creek Park and Prince William Forest Park. They are also using GPS to map areas important to their on-going raccoon tracking projects.

Jim Sherald and the staff of the plant pathology / pest management lab are using GPS/GIS to map locations of dogwood anthracnose monitoring plots in Prince William Forest Park. In conjunction with Prince William's GIS person, Marie Frias, they are also mapping stands of hemlock. The mapping of the hemlock stands is essential to the on going effort to monitor wooly adelgid and its threat to hemlocks in the parks.

The National Capital Region has largely come on-line during the last year. What follows is a brief list of hardware and software at each of the 13 parks within the region.

PARK	GRASS ON SUN SPARCS	ATLAS* GIS	AutoCad or Related CADD	GPS	EXTENT OF DATABASE	STAFF LEVEL
ANTI	XXXX	XXXX			EXTENSIVE	
CATO		XXXX		XXXX	USGS DLG/DEM ONLY	NONE
CHOH					USGS DLG/DEM ONLY	NONE
HAFE	XXXX		XXXX	XXXX	EXTENSIVE	1/2 FTE
MANA		XXXX		XXXX	EXTENSIVE	NONE
NACC	XXXX	XXXX			EXTENSIVE	1 FTE
NACE					USGS DLG/DEM ONLY	NONE
PRWI	XXXX			XXXX	EXTENSIVE	1/2 FTE
ROCR		XXXX			EXTENSIVE	1/2 FTE
WOTR		XXXX			EXTENSIVE	1/2 FTE
GWMP		XXXX	XXXX	XXXX	EXTENSIVE	1/2 FTE
GRBE					USGS DLG/DEM ONLY	NONE
MONO					EXTENSIVE	NONE

All park's have a base data set comprised of USGS 1:24000 DLG and DEM data. Park's with databases noted as extensive have data sets which include larger scale data as well.

Rover for Base Station Trade Desired by PRWI

Submitted by Karl Brown, GISD

Prince William Forest Park owns two Ashtech 12 channel Ranger GPS Receivers. One serves as a base station, and they are interested in trading the other for a rover.

As far as a trade is concerned, they are most interested in receiving in return a Trimble Pathfinder Professional, the desired approach chosen by their Administrative Officers. The on sale cost of the desired rover until June 1993 is $10,500. As a comparison, they invested about $24K for the two Ashtech receivers in 1991.

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Rover for Base Station Trade
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For further details and operational questions contact:

Marie Frias
National Park Service
Prince William Forest Park
PO Box 209
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Ashtech, Inc. 1(800) 229-2400

PRWI Application Background ASHTECH GPS Ranger Receiver

By Marie Frias

Ashtech GPS Ranger Features

* 12 channel C/A code tracking
* Position accuracy
  - 25-10 meter (SA depending) stand alone
  - 1-3 meter (SA depending) post-differential processing
* Kinematic/marine antenna weatherized
* Receiver weatherized
* Internal memory storage: 1 record per second for up to 20 hours or 72,000 records/positions
* Multiple file storage
* Navigation with up to 99 waypoint entries
* Audible alarm at low power
* 2 RS-232 port at 115,000 Baud maximum and data cable
* 3 meter antenna cable
* Battery and charger 110/220 VAC
* External power cable

The Ranger Receiver is a GPS unit capable of producing point positions with 1-3 meter accuracy depending on SA (selective availability), a PDOP of $<=4$ and differential post-processing with another unit of equal capability and with units of geodetic grade. For National Park Service applications requiring 1-5 meter accuracy, geographic GIS mapping can be accomplished with differential post-processing. A single Ranger non-differentially processed provides an accuracy of 25-100 meters accuracy (pending SA), which is typically the accuracy used for some navigation.

The Ranger, a dedicated twelve channel C/A code receiver, coupled with a comparable field GPS unit of choice, such as Trimble, Magellan, etc. is a solid base station. A base station on site, especially at a remote park unit allows an operator the freedom and mobility to work within the park unit without relying on another remote base station data source. Because the Ashtech Ranger is a twelve channel unit, as a base, it will be able to provide maximum satellite coverage for multiple field units. Water and dust-proof cables, connectors, antenna and receiver frame allow the unit to be used in various terrains and weather. However, with an extended antenna coaxial cable, the user may establish a permanent indoor data logger.

The Ranger receiver has similar capabilities as most other GPS units. The raw data can be interfaced with raw data of other GPS units for differential post-processing through a Rinex data exchange format included in the software package. Users have the option of importing raw data of another GPS receiver into Ashtech software for post-processing and the option of exporting Ashtech data to other GPS software packages for post-processing. **Continued next page**

PRWI Application Continued:

The Ranger may also serve as a roving field unit for mapping purposes and navigation. Several very useful screens permit the field technician to graphically visualize satellites for the actual field location and plan for best satellite tracking at the site.

Software Packages

All software support programs are designed operate on a standard PC using MSDOS or comparable computer. A math co-processor greatly speeds up post-processing and a graphics board such as VGA, EGA, etc for Mission Planning is required.

* Multi-site Mission Planning software
* Differential Post-processing support software (RINEX conversion capability)
* GIS - CAD plot and display software - UTM, State Plane, Lat/Long
* Almanac downloading and storage
* Barcoder feature attribute program

Optional Features

The Ranger may be upgraded at the factory to include the following features and capabilities:

* Geodetic survey
* Dual frequency
* Real-Time Differential capabilities and data outputs
* Event timer for photogrammetry option
* Antenna assemblies for land, marine and airborne applications
* Expanded internal memory up to 120,000 positions
* Integration with vehicle tracking system

-Pacific Northwest Region-

Submitted by Craig Dalby

The first meeting of the Regional GIS Steering Committee was held on December 17. The issue of setting funding priorities for GIS projects within the Region received the most attention. However, there were disagreements which arose following the meeting, and this issue will have to be discussed further. The next meeting was scheduled for February 23-24, but has been postponed due to unforeseen circumstances until March. Any advice from other Regions on determining criteria for funding priorities would be welcome. Meanwhile, the Regional GIS Coordinator, Craig Dalby, will continue working on a draft of an updated Regional GIS plan.

Craig will be attending the GIS '93 convention in Vancouver, BC February 16-18. He will also meet with representatives from the British Columbian government to explore options for data sharing.

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Pacific Northwest Continued:

Mt. Rainier NP and PNRO will soon be obtaining ARC/INFO. PNRO will also be obtaining peripheral hardware for its Sun workstation. The Region will soon be choosing whether to standardize on 4mm or 8mm cartridge tapes. Although 4mm is the NPS standard, most other agencies in the Pacific Northwest have opted for the 8mm format.

Roger Hoffman at Olympic NP is investigating the possibilities for networking PC's to his Sun using Novell and/or NFS. Please contact Roger at (206) 452-4501 for more information.

-Western Region-

Submitted by Joe Coho

The following significant activities have taken place in Western Region GIS:

*Joe Coho will be travelling to Channel Islands NP and Santa Monica Mountains NRA the week of March 1. He will be installing Channel Island NP's GIS hardware. At Santa Monica Mountains NRA, he will be reviewing progress to date and suggesting next steps in implementing their GIS

*Lassen Volcanic NP and Cabrillo NM have submitted a draft GIS Plans for review and comments. In January, Joe Coho visited Cabrillo to help the staff refine their GIS plan.

*George Turnbull and Joe Coho visited the Cooperative Park Study Unit at University of Arizona (CPSU UA) the week of February 9 to evaluate GIS efforts to date. It was concluded that there is a substantial backlog of GIS work to be accomplished in the Southern Arizona parks and that the University of Arizona has significant practical GIS expertise to bring to bear on developing GIS databases for these parks. The report recommends that most attention be focused on preparing GIS Plans and developing "nominal" GIS databases for these parks.

*Joe Coho made a presentation to the Western Region Scientists meeting in San Diego on January 28, 1993, where he outlined future directions for the Western region GIS program.

*We continue to work toward providing INTERNET connectivity for our GIS users. We hope the first hurdle of developing a consistent NPS addressing structure is resolved shortly.

*A GIS bulletin board has been established on CCMAIL for Western Region. We hope this will facilitate the exchange of GIS information and questions in the Region. If anyone has questions regarding the use of or access to the Western Region GIS bulletin board, please contact Joe Coho. We still intend to establish modem connections between various GIS Workstations in the Region via UUCP so that we can remotely troubleshot system problems and quickly share software upgrades.

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DENVER SERVICE CENTER

Mississippi National River and Recreation Area

Submitted by Miki Stuebe, Denver Service Center, Central Team Planning

The Mississippi National River and Recreation Area (MNRRA) was added to the national park system in 1988 to "protect, preserve, and enhance the significant values" within a 72-mile, 53,700 acre river corridor traversing the Saint Paul-Minneapolis metropolitan area. The Denver Service Center, Central Team Planning staff has been working with park staff and a 22-member commission representing state, federal, and local interests to develop a Comprehensive Management Plan (CMP) for the area.

An extensive GRASS GIS database has been developed by the Denver Service Center Central Team for use in the planning process. Map layers include the park boundary, municipal boundaries, municipal zoning, land use, land cover, elevation, existing and proposed parks and trails, river access sites, cultural resources, wetlands, floodplains, threatened and endangered species, barge terminals, barge fleeting (parking) areas, and the navigable river channel. A few of the ways the GIS has been used during the course of the CMP planning effort are described below.

Areas within the park boundary which are expected to undergo conversion from non-urban to urban uses were identified by overlaying proposed (zoned) land use with existing land use. Such "non-urban lands zoned for urban uses" were then overlaid with floodplains, wetlands, steep slopes, threatened and endangered species, and cultural resources to identify areas where future development might affect sensitive natural or cultural resources unless measures are taken to protect them.

Potential open space opportunities were identified. First, map layers of land cover, parks, and the MNRRA boundary were overlaid. Large areas of forested or shrubby lands within the MNRRA boundary which are not currently parks or proposed for parks were located. The GIS was then used to determine which municipality these lands lie within. Potential open space acquisition opportunities were then refined with input from affected municipalities.

Areas along the river with significant interpretive potential were identified by looking for "clusters" of interesting resources having good access. To do this, cultural resources were overlaid with special plant communities, threatened and endangered species, barge terminal and fleeting areas, parks, trails, roads, and river access sites.

Continued on next page

Mississippi National River Continued:

Once possible CMP actions or policies were outlined, the GIS was used to locate and measure which lands or resources they would affect. For example, consideration of land use regulations (such as a prohibition against developing the river bluff slope and bluff top) included using the GIS to locate and measure these lands. Interpretive facility placement and open space acquisition opportunities were considered with respect to potential natural resource, cultural resource, and economic impacts so that measures to avoid adverse impacts and take advantage of positive impacts could be taken.

The GIS is also proving useful for preparation of the CMP document. GIS maps were plotted for inclusion in the draft CMP document. For the final document, GIS files will be imported to AUTOCAD, where they will be edited and plotted in document-ready form.

Soon the GIS workstation and database will be transferred to the park. The park will keep the database up to date, and make it available to others involved in planning or resource management in the area. The GIS will also be used to monitor corridor resources and the success of the Comprehensive Management Plan over time.

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-Spring Issue of GIS NEWS-

The next issue of GIS NEWS will be distributed May 15, 1993. Please submit articles through your Regional GIS Coordinator to Donna Mahoney via cc:Mail in Wordperfect format, using a single, simple font. For inclusion in the May 15 issue, articles must be received no later than May 1, 1993.

GIS Hardware and Software Survey

For a variety of reasons (including responding to your inquiries), we at GISD need to maintain a database of NPS hardware and software used (predominantly) for GIS purposes. Please complete the following form for each piece of GIS-related hardware and software that you have, and cc:mail, fax (303-969-2822), or mail the forms to us (GIS, P.O. Box 25287, NPS, Denver, CO 80225-0287). Fill in the top of the form (items 1, 2, 3) once and the rest of the form for each piece of GIS-related hardware and software that you have.

-- Harvey Fleet

1. NPS unit (up to four characters; e.g., MEVE, SERO, MWAC, UNM, UID) _____

2. Region (A, PNW, W, SW, RM, MW, SE, NC, NA, MA) _____

3. Organizational unit (up to 20 characters; e.g., Resource Management, Research, Planning) _____

HARDWARE (repeat for each item)

Hardware type (two characters [01-13]: computer--01; monitor--02; text printer--03; plotter (raster or vector)--04; tape device--05; removable disk system--06); non-removable disk system--07; CD player/reader--08; digitizing tablet--09; scanner--10; slide maker (film recorder)--11; UPS (uninterruptible power supply)--12; other--13

_____

Hardware name and model no. (up to 40 characters)

_____

Fiscal year acquired (19__) _____

Purchase cost of hardware (up to 5 numeric characters) _____

Estimated per cent of the time hardware item is used for GIS (e.g., 75) _____

Annual maintenance cost (up to 4 numeric characters) _____

Total cost of repairs since purchase (up to 4 numeric characters) . . . . . _____

SOFTWARE (repeat for each item)

Software name (up to 10 characters) _____

Operating system under which software is running (on your system; up to 10 characters; e.g., SunOS, Windows, DOS, Macintosh, OS/2)

_____

Fiscal year acquired (19__) _____

Purchase cost of software (up to 5 numeric characters) _____

Annual maintenance cost (up to 4 numeric characters) _____