

## The Christmas that Almost Wasn't

Timothy White, Project Manager, James W. Sewall Company

This is the story of the year children all snug in their beds almost didn't dream of sugar plums, when holiday cheer didn't spread throughout the land, and when all the Who's in Whoville were almost left with just their songs. All because Santa Claus almost couldn't make his rounds. Only this time it wasn't the Grinch who stole Christmas. It was GIS.

It started one year just after the holiday season when Merry, one of Santa's elves, was relaxing by the pool at Santa's beach-front getaway in the Caribbean. She picked up a magazine and read an article how municipalities, utilities, industry, and governments were all rushing to embrace this new technology which tied databases to maps. Merry was well acquainted with databases; she maintained the list of naughty and nice kids for the entire world. The operations command room back at the North Pole was full of maps. The GIS idea was a natural. Merry couldn't wait to get back to the North Pole to present her ideas at the Monday Managers Meeting.

What Merry didn't know was that at the same time, Bill, Santa's MIS Director, had also read an article on GIS. Bill's article had not painted as rosy a picture of GIS as the one Merry had read. His article talked of delays, cost overruns, and downsizing. Bill was glad that Santa was an old-fashioned kind of guy who still liked his hand inked list of children, and parchment maps of where they lived. The format hadn't

changed for as long as Bill could remember.

At this time of year most Monday Managers Meetings were all the same. Production discussed the difficulty in tooling up to produce the ever more complex toys kids wanted. Transportation discussed plans to utilize new feed for the reindeer. This meeting was different. When it was Merry's turn, she talked about the GIS article and some of the follow-up literature she had read, and all the people she had talked to about GIS. There was little enthusiasm for her idea, and Bill thought to himself, "Oh no here we go..." Santa was intrigued enough, though, to set up a committee to study what GIS could do for them.

At the first meeting, with Merry as the leader, the committee set a goal to have the entire GIS in place for the next Christmas. Months of meetings yielded little progress. Finally, it was decided that they needed objective, outside help. After an exhaustive five minute search of a GIS trade publication, a consultant was chosen, contacted, and hired. Fred's Garage and House of Data had an impressive ad. It talked about fancy equipment and mentioned all the latest buzz words.

More months and meetings passed. It was now too late in the year to move anything into place for this year's flight. The committee pushed its target implementation data to early summer of the following year so test flights could be made, and the

## GIS Steering Committee Approves 2-Year Workplan for GIS

The GIS Steering Committee is a policy making body created by a 1989 Executive Order to guide the development of a statewide GIS. Members are mostly managers from state agencies with representation by federal and local government and the private sector. Through this past summer and fall the Steering Committee revisited its 1990 GIS Strategic Plan to update its goals and then to develop a list of objectives. The objectives were prioritized and the top twenty were formed into a workplan for Fiscal Years 1995-97. Workplan highlights are described below. If you have questions or would like a full copy call Nancy Allen at 624-7847.

Priority #1 is a commitment to keep the Maine Office of GIS open as a viable, up-to-date and available GIS facility. Education is high on the Steering Committee's list of priorities coming in at #3. The types of educational opportunities to be made available and target audiences have been defined and a team is being assembled to pursue this objective. Priorities #7 through #10 satisfy data management and distribution goals which say that data requested from the Office of GIS will be well-documented, of high quality, and readily accessible. The Maine GIS User Group was not forgotten in all this. Priority #11 is to continue to support the User Group in the form of staff time, printing and mailing costs. □

## Editor's Column

Tim Case

This edition of Maine Coordinates marks the opening of a second year of Maine GIS User Group activities. We have held several sessions including presentations at University of Maine, a poster session at Office of GIS, and a digital orthoquad (DOQ) demonstration by USGS. We have also formed a steering group (see the list below) and created this newsletter. While these pages that reluctantly grew to eight this time are a good source for information it is the meetings that count and I encourage you to attend whenever possible. Every time there are new faces and new ideas that each of us carry back to the office.

We are witnessing ever-increasing activity in GIS, and here in Augusta our new governor has already shown enthusiasm for implementing technologies like GIS. The lead 'tale' by Tim White reminds us to keep our humor while working hard. Over the last couple months many people have asked that the Office of GIS newsletter be combined with Maine Coordinates. This is the current thinking, unless people have serious objections, and to promote a cooperative spirit I asked two of OGIS's senior staff to write appropriate pieces. Their focuses are complimentary. You can't do GIS without both an overall plan and technical, creative skills. 9-1-1 Enhanced is the new BIG program that will push GIS into many areas of the state. With new remote sensing options and better software functionality, raster GIS is becoming an increasingly important methodology to understand. Enjoy our fellow member's efforts! Cheers.

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Article contributions are encouraged. Editors reserve the right to edit for length. Send materials in WP5.1 or ASCII format to: Tim Case, Maine Natural Areas Program, DECD, SHS #130, Augusta, ME 04333.

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Questions relating to group activities should be directed to: Nancy Allen, BIS, SHS #145, Augusta, ME 04333, (207) 624-7847,  
Internet: isnalle@state.me.us

## Summary of the November 18, 1994 Meeting

The GIS User Group met in the State Office Building with over 35 members in attendance, including many new members from across the state. In a session facilitated by Stacy Fontaine of Central Maine Power, three panelists described their experiences with GIS implementation and fielded questions afterwards. Thanks for all the effort guys, and good luck with your projects!

Three Panelists: Dave Carr, Portland Water District  
Ray Johnson, Bangor Hydro-Electric Co.  
Frank Fiori, Town of Topsham.

The second half of the meeting was a group discussion on what questions an organization should ask as it considers the feasibility of GIS. The group generated a number of good questions. If you are considering a GIS we hope you find this list of questions useful.

### 1. Suitability Considerations

Can a GIS improve your organization?

Do you currently use geographic information? How often?

What do you wish you could do with GIS? What jobs do you find redundant or slow?

What do you want to achieve and can you achieve that with GIS?

What do similar organizations use?

What software abilities do you need? Does the software have to be specialized?

### 2. Selling GIS to management

Cultivate an executive champion

Think about what quick benefits might be realized from a GIS

Can you use volunteers to acquire or convert data, etc.?

Can you get people from colleges to help you?

Can revenues be derived from data?

Do a cost/benefit analysis - include unquantifiable benefits

### 3. User Considerations

Who will use the GIS? What are their backgrounds, levels of computer literacy, interests?

Where are users located?

Are there outside entities you need to share data with?

### 4. Data Considerations

What data will you need?

What data exist? in what format? Consider the transferability of data.

What accuracy would you need?

What are the costs of collecting new data?

What standards are needed for accurate data capture?

How will you integrate your non-GIS databases?

How will you keep your data up to date?

Do you need to be able to process images? How will imagery be acquired and paid for?

Consider any legal issues - such as ownership of data

Which NAD to use? or projection system?

### 5. Implementation Considerations

Should you use a consultant to plan your GIS?

What systems exist in your organization? Does the GIS need to "talk" to the existing systems?

Is there capability and capacity to use existing hardware/software for GIS?

Should current methods change to incorporate GIS? How will the changes be managed?

Who will be in charge of the GIS?

How will you assign tasks between departments? Who owns/maintains data?

What schedule will you set up for implementation?

What expertise exists in the organization?

What will it take to make your users computer literate?

How will you maintain historical information?

## STATEWIDE ADDRESSING PROJECT BEGINS

by Dan Walters, Office of GIS

### Introduction

In 1988, Maine voters approved a \$3.2M bond issue to provide funding for initial system design and development of an address database for statewide 9-1-1 Enhanced service. Since that time, the Maine Department of Public Safety (MDPS) and Maine's 9-1-1 Enhanced Council have been focusing on the overall design of the 9-1-1 enhanced system. In support of the Council's efforts, the Legislature authorized a \$0.02 per month surcharge on all telephones to fund three positions at MDPS to complete the design of the 9-1-1 Enhanced system.

In August of 1994, the Maine Office of GIS (OGIS) agreed to assist the Department of Public Safety in the development of the address database. Specifically, OGIS has agreed to work with vendors to choose addressing methods applicable to and by all Maine towns, establish services to support these methods, provide ongoing support to towns concerning addressing, and ensure that the current digital road coverage is updated with the new address information.

### 9-1-1 versus 9-1-1 Enhanced

9-1-1 is a single telephone number that provides common access to all emergency services. At present only half of Maine's citizens have access to 9-1-1 Basic service. 9-1-1 Basic service is provided by telephone equipment which routes an emergency call to a call answering center. Specially-trained personnel at the center then contact the appropriate law enforcement, fire, and emergency medical services

to respond to the call. With 9-1-1 Basic service, dispatchers depend solely on callers being able to provide their location. Sometimes, the caller is hysterical, becomes unconscious, does not speak English, hangs up, or is unfamiliar with the location, such as an out-of-state visitor might be. In these cases, 9-1-1 Basic service is of little help to the caller or dispatcher.

With new developments in technology and proper addressing, 9-1-1 Basic can now be expanded to 9-1-1 Enhanced. 9-1-1 Enhanced service automatically displays a caller's location on a computer screen at the call answering center.

*With over 500 towns involved and a three to four year deadline, the assistance package must be comprehensive, yet simple to use.*

Also displayed is the caller's telephone number which can be automatically redialed if the line is disconnected. To fully implement 9-1-1 Enhanced service, all telephone numbers must be linked to a physical address. A physical address being a permanent, unique address that clearly identifies where a property is physically located. Such addresses exist only in the downtown sections of many Maine towns, if at all. Even in areas where physical addresses exist there are problems, such as streets may have similar sounding names or numbers may be out of sequence. To realize the full benefits of 9-1-1 Enhanced, most towns in Maine will have to

undertake a town-wide addressing project.

### Pilot Project

Several months ago, OGIS began working on an addressing pilot project involving Lincoln County and the towns of New Gloucester, Standish, Yarmouth, and Winslow. The purpose of the project is to test different methods for using digital base maps to standardize addresses. The pilot project is being undertaken to prepare for statewide addressing and the implementation of statewide 9-1-1 Enhanced by 1997. Although addressing is not mandatory, indications are that most towns want to upgrade their town addressing systems to take full advantage of 9-1-1 Enhanced service.

The goals of the pilot project are two fold. First, OGIS is fine tuning a program which will provide direct technical assistance to towns undertaking addressing projects. An addressing guidebook has been published (the cover is shown on page 4), GIS routines have been developed to produce customized hardcopy maps, and a network of regional coordination groups is being established as part of this program. No direct funding is available for town addressing and most of the work will be done by town staff and volunteers. With over 500 towns involved and a three to four year deadline, the assistance package must be comprehensive, yet simple to use. The process must also be designed to ensure that consistent, verifiable address information is produced.

As a second goal, OGIS is exploring methods to ensure that resulting statewide road network including names and address ranges is fully automated and stored in the state's GIS repository. This will significantly enhance the current statewide road coverage and pave the way for sophisticated GIS analyses

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such as routing, resource allocation and address matching. The overall initiative involves many organizations including the U.S. Post Office, U.S. Bureau of Census, Maine Dept. of Transportation and many private GIS vendors. OGIS is also discussing options for funding, data sharing and in kind services with utilities and various service providers across Maine. Many of these groups stand to benefit significantly from improved statewide addressing.

Communities involved in the pilot project are playing a large role in the addressing project. First, OGIS sends them a map displaying the town's road network and names. The maps are a combination of spatial and attribute information conflated from the TIGER line files to the standard 1:24,000-scale USGS topographic maps. The towns inspect the maps to make sure that all private and public roads serving two or more dwellings are present. In this process they provide information on missing roads and mark roads to be eliminated (e.g., forest roads). The towns also eliminate duplicated or similar-sounding road names and name unnamed roads. Once this information is compiled on the map, it is sent back to OGIS where the missing roads are mapped using GPS and road names are updated.

Once this phase is complete, new maps are produced for the towns at tax map scale. Using appropriate road frontage intervals and address system origins provided by the town, GIS routines are used to print maps with new addresses as well as the cumulative distance for each unique road name. This information is also stored in the 1:24,000-scale road coverage. The TIGER line attribute scheme is used to assure compatibility with other systems. For two of the pilot towns, dwelling locations and other pertinent information are being collected with

GPS. The GPS data are also included on the final maps for these towns.

The final phase involves the assignment of new addresses to the dwellings. To do this the towns associate new addresses with dwellings using the GIS maps, tax maps, and distance measurements. Where GPS has been used, the distance measurements are not necessary. A list of new and old addresses and occupants are generated and sent to OGIS to be related to the GIS road coverage. In return, the towns are sent final maps depicting their new town addressing system.

#### **Summary**

Once the pilot project is complete and the information is

analyzed, and the activities of utilities, other agencies and service providers are understood, OGIS will be making final recommendations to the 9-1-1 Enhanced Council. This will require a complete review and update of the addressing guidebook to include a menu of addressing options ranging from a basic approach to more sophisticated techniques using GPS technology. Once the Council approves the overall concept, the Office of GIS will proactively make basic services available to all towns with a 1997 deadline in mind. □

For further information on 9-1-1 Enhanced GIS you can contact Dan Walters at 287-3897.

Handbook cover reduced

## USING ARC/INFO GRID AND GRAPH TOOLS TO DISPLAY COASTLINE CHANGE DATA

Bill Duffy, Programmer Analyst, Maine Office of Geographic Information Systems

People who collect detailed mapping data over large areas are often forced to choose between two compromises. The first is to use very large scale maps that capture the detail but are limited to showing only a small area at a time. The second is to simplify or summarize the data and display this less detailed data on a smaller scale map. This was the problem facing Steve Dickson and Joe Kelley of the Maine Geological Survey when they contacted me last spring.

Steve and Joe have been using computerized photogrammetry techniques to measure changes in coastline position along Maine's coast. The data, collected from sets of 1953 and 1991 aerial photographs, capture changes in the seaward edge of dune vegetation as small as 3 feet.

*Topology gives us no information on what is happening in the 'empty space' around an arc or outside a polygon*

These data were to be displayed on a series of maps with a scale of 1:4800 (1 inch = 400 feet). As a result, many of the small changes measured would be difficult to see.

### Displaying Data With Graphs

I quickly realized that the best way to display the detail recorded in these data was to use the GRAPH commands in the Arc/Info ARCPLOT module. The GRAPHLINE command, for example, uses two fields from an attribute table as the X and Y coordinates of a line graph. To display

the attributes, the user specifies a GRAPH EXTENT which sets the length of each axis in page units (usually inches). By specifying a large value for one axis with respect to the other, the data displayed can be stretched to make subtle changes visible. On this graph, I wanted to use the length of the coastline as the Y-axis and the change in coastline positions between 1953 and 1991 as the X-axis. The tricky question was how to get this change information from two coastline arcs.

### Raster To The Rescue

In most vector based GIS software, like ARC/INFO, arcs and polygons have topology, i.e., they have information attached to them which record their beginning and end points, and left and right sides (for arcs) or their inside and outside (for polygons). Topology makes it possible to assign addresses to a street arc or to find how many addresses there are within a town polygon. However, topology gives us no information on what is happening in the 'empty space' around an arc or outside a polygon. Information is only recorded for the coordinates that form the arc or polygon. To get information about the space around an arc or outside a polygon we need a raster based GIS. In a raster based system information is not tied to specific features like arcs or polygons. Instead, all data is referenced to a fixed location or cell whose size is defined by the user. Individual cells can be coded with values just as arcs or polygons are, however there is no 'empty space' in a raster cover, all cells contain at least the coordinates of their location. Because of this, we can move anywhere in a raster coverage and get information such

as 'How far am I from the nearest cell coded as 1953?' And this was precisely the question I needed to ask.

### Grids, Grids, And More Grids

GRID, Arc/Info's raster based GIS module, allows a user to convert data from arcs and polygon coverages to raster data and back again. It contains commands for many types of raster based processing such as filtering and smoothing elevation data, distance calculations, and image processing and analysis (e.g., with satellite imagery). Using GRID, I was able to convert the 1953 and 1991 coastlines to raster coverages with a one meter cell size. In the resulting coverage, cells which fell at the position of the 1953 or 1991 coastline were coded as 1953 and 1991, respectively. Then, using a series of GRID commands, I assigned the distance to the nearest 1953 cell to each of the 1991 cells. I then converted these cells back to an arc coverage. The resulting arc contained the change in coastline position between 1953 and 1991 (the X-axis information) for each segment of its length (the Y-axis information). I could now produce a graph showing both the obvious and subtle changes in coastline position in 38 years.

*continued on page six*

### FOR SALE:

(This section is open to members wishing to sell or trade GIS-related equipment)

Texas Instruments 8-pen plotter. 1-2 years old. 40x66 Calcomp digitizing board. Make an offer! Gerry Barnes. Passamaquoddy Forestry Dept. (796-5234)

### **The Final Map**

The resulting map and graph are shown ( left ) The solid arc represents the position of the 1991 coastline position at Camp Ellis in Saco, Maine. North is up and a portion of the large jetty, built to stabilize the mouth of the Saco River, is shown at the south end of the beach. The 1953 coastline position is shown as a dashed line. The graph shows the extent of erosion which has taken place over 38 years. Most of the beach shows a net loss of material. The two major areas of accretion are due to seawall construction made in an attempt delay the retreat of the shoreline near houses. The building footprints, shown in dark gray, were digitized prior to 1991 and since then three buildings have been destroyed during winter storms. The techniques developed to document and display the coastline changes shown on this map will be used to create a series of Erosion Hazard Maps for the Maine Geological Survey for the coast of Maine. □

### **New England URISA is active again**

The New England chapter of the Urban and Regional Information Systems Association is an interdisciplinary society of professionals with special interests in the effective application of information technologies and the integration of urban and regional data for decision-making.

In the past six months NE URISA has taken several steps to revive chapter activities. The board of directors is revived and two newsletters has been published. Sessions on data visualization and scanning/image processing have also been held. NE URISA is trying to make events more accessible by holding them in different locations around New England. In the next six months two brown bag lunch events are planned where people will be invited to visit with the staff of an existing GIS facility.

To find out more about URISA call their Washington D.C. offices at (202) 289-1685.

Bill's map

## Christmas GIS

*continued from page one*

system improved. Rumors were rampant around Santa's workshops that the project was in trouble, over budget and way behind in schedule. Skepticism turned to distrust of the technology.

Then one foggy winter day, Santa came to say. "Use that GIS just right - then we'll make our rounds tonight." Then all the reindeer (and elves) loved it, as they shouted out with glee, Geographic Information Systems, you'll go down in history.

While written entirely for humor, I hope that you can see some of the pitfalls and problems that can beset a GIS implementation. With that, I leave you with a Merry GIS to all and to all a good project. ☐

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### Current User Group steering members:

If you would like to help plan group activities please call Nancy Allen at 624-7847.

- Nancy Allen
  - Linda Alverson
  - Tim Case
  - Judy Colby-George
  - Stacey Fontaine
  - Jon Giles
  - Tim White
- 

user distribution map

Where do Maine GIS Users work? Ask a GIS! This map highlights towns where one or more of our more than 150 members

If you know of other people or organizations in Maine that would like to receive Maine Coordinates enclose their title, names, and addresses with the card below.

**PLEASE CUT HERE AND RETURN by FEBRUARY 20th**

**YES** \_\_\_\_\_ people from our organization plan to attend the February 28th meeting.

**LUNCH**  
\_\_\_\_\_ people will come to lunch afterwards.

**SESSION PREFERENCE**  
\_\_\_\_\_ people would prefer A: Data  
\_\_\_\_\_ people would prefer B: GIS Operations

**NO** We are no longer interested in the GIS User Group. Please remove our name from your mailing list.

NANCY ALLEN  
BIS  
SHS 145  
Augusta, ME 04333

**Meeting of the Maine GIS User Group  
Tuesday February 28, 1995  
10am - 12:30pm  
Augusta DOT Conference Room  
Lunch will follow for those interested.**

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**Agenda for February 28th Meeting**

**I. Poster Session - Welcome with cider and doughnuts  
IF YOU CAN BRING A POSTER CONTACT TIM CASE AT 624-6828**

**II. Announcements and other business**

**III. Life Cycles of a GIS**

Phase Two: System Analysis / User Needs Assessment  
Discussion lead by Dan Boss (Great Northern Paper)  
and Bob Marvinney (Maine Geological Survey)

**IV. Facilitated Breakout Sessions**

**INDICATE PREFERENCE ON CARD**

**A. Data: Quality vs. Quantity (Jon Giles, City of Portland)**

**B. GIS Operations: Centralized vs. Distributed (Tim White, J.W. Sewall Co.)**

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**Directions:** Take Interstate 95 to Exit 30. From the exit take Western Avenue (Route 202) east. Travel straight through 6 lights then take first right on rotary onto State Street. Take State Street one light then turn left onto Capitol Street. The DOT building will be on your left at the bottom of the hill. Park where possible. Conference room is on the first floor.

Please make any address changes below. Pass this update to a friend!

Maine GIS User Group  
c/o Nancy Allen  
BIS  
SHS #145  
Augusta, ME 04333