THE SUMMIT

News From and For The Washington GIS Community

WAURISA

The Washington State Chapter of
The Urban & Regional Information Systems Association

SUMMER 2007 **WWW.WAURISA.ORG** **ISSUE 8**

First Annual Dick Thomas Award Prize Winning Presentation

USING GIS TO HELP PLAN, DEVELOP AND MANAGE THE CONSTRUCTION OF AN URBAN MOUNTAIN BIKE PARK

By Mike Westra

The Backcountry Bicycle Trails Club (BBTC) and its volunteers are currently building Seattle's I-5 Colonnade Mountain Bike Skills Park. The park is located under the I-5 freeway, nestled between the city's Capitol Hill and Eastlake neighborhoods. It will feature over 1.5 miles of mountain bike trails on 2 acres of terrain loaded with fun practice obstacles to challenge riders of all ability levels.

Completing construction according to scope, schedule and budget does present significant challenges for the volunteers managing the project and building the trails.

Challenges for the Project Manager:

- Accurate scheduling, budgeting and status reporting
- Maintaining accurate and up-to-date documentation
- Effective communication of plans and task details with crew leaders and trail builders
- Handling the above quickly using precious spare time

Challenges for the Crew Leaders and Trail Builders:

- Understanding trail flow and user experience before picking up a shovel
- Understanding how the day's tasks fit into the trail flow and user experience
- Relaying issues, status, suggestions and ideas back to the project manager

Challenges for the BBTC Board of Directors:

- Acquiring the information necessary to make key strategic and financial decisions
- Managing the biking community's perception of the park

See: Urban Bike Park, page 4

LATE BREAKING NEWS (PAGE 15):
WAURISA ELECTION RESULTS
FALL WORKSHOP: ASSET MANAGEMENT WITH GIS

ALSO IN THIS ISSUE:

PRESIDENT'S COLUMN

Greetings to all of my Washington GIS friends. The time has come to step down as President of the Washington Chapter and I am ready to pass this privilege to one of my colleagues. I will take this opportunity to express my gratitude for your support over the years that I have served as treasurer and then president. My time on the board has been one of profound personal and professional growth. Through this experience, I have come to gain a deeper appreciation of teamwork and what it takes to be a leader. I have worked with some of the finest, knowledgeable, experienced, passionate, and inspired individuals I have ever met, and upon reflection that is the foremost reason I am so enthusiastic about our organization. I have been allowed to feel that I have made a difference, a contribution to something much larger than my own world of utility pipes, and for that I am most grateful.

These are exciting times. We are watching GIS go from a relatively obscure technology to a mainstream industry. With the advent of Google Earth the awareness and uses for spatially enabled data continues to grow exponentially, and the need for qualified practitioners along with it. The U.S. Department of Labor and the nation's educators look to organizations like ours to help identify the knowledge and skill sets that define our field. GIS is greater than the sum of its parts. I perceive a discipline, a tool, and a profession. I see a synthesis of computers and people, hardware and software, diverse technologies and ideas, creating innovative solutions for problems coming to us from over the horizon, as yet unknown.

That's where our chapter comes in. Our primary purpose, as stated in our bylaws, is "…recognizing, supporting, and encouraging broad professional growth, education, communication, technical development, and service to its members." We do this by developing and hosting conferences and workshops. We do this through continued outreach to professionals involved in geospatial technologies. We are enthusiastic about building a bridge for those being prepared by our institutes of higher learning. We are actively engaged in clearing the path of impediments that limit our growth and development as professionals.

Our chapter has accomplished many things in its short existence. We have faced the challenges of building a framework to guide us and identified creative ways to fund our activities. We have established the Washington Chapter of URISA as the premier GIS organization in Washington State and have been recognized nationally for excellence in serving its members. This is the legacy I inherited and I am proud to pass it on.

See: President's Column, page 9

USING OPEN SOURCE SOFTWARE TO DEVELOP A LAND COVER DATA LAYER FOR MASON, COUNTY

By Kim Cimmery

Introduction

This is a general description of how I developed a preliminary land cover grid data layer for Mason County using the open source GIS SAGA (System for Automated Geoscientific Analyses) program.

Figure 1. Location of Mason County, Washington

SAGA has been developed at Goettingen University in Germany. The second major release, version 2.0, was on June 2, 2007. The developers' goal is to provide users an effective and easy to learn package of tools for implementing geo-scientific spatial analytical methods.

The choices for open source GIS software are limited. SAGA is available for both Windows and LINUX operating systems. It is extremely easy to install on Windows desktops. After installing it, one of the first efforts I undertook was to develop my own database for Mason County. It was very easy and fast. In no time at all, after locating a wide variety of public-domain data, I was generating view-sheds, suitability maps based on soil survey data, displaying data layers in 3-D, developing slope and aspect maps, etc. But, the one data layer that eluded me was land cover.

Developing the Land Cover Layer

The starting point for my land cover layer was development of a Mason County boundary data layer using a Washington state counties GIS layer. This boundary layer was used as a mask with all data layers. The grid data layer spatial matrix was defined by the boundary layer and the cell size definition the same as for a Landsat 5 pixel (28.5 meters).

All cells in the Mason County Boundary grid data layer have a value of 1 while cells outside of the county have a no data value of –99999. SAGA has a function called the *Grid Calculator* that I used to apply the boundary data layer (as a mask) to all input layers to exclude spatial area outside of the county.

The formula IFELSE(gt(a,0),b,-99999) was used in the SAGA *Grid Calculator* module. Two input files were identified. The first one, the boundary file, was referred to with the variable "a"; the second one, the data file, with the variable "b". The formula checked the boundary file grid cell to see if the cell value was greater than '0'. If it was, this meant the grid cell was within the county boundary and the corresponding cell value in the second data file (variable "b") would be included in the output grid data layer. I applied this process and formula with each of the input files.

I used the SAGA module *Create Constant Grid* to create an empty grid data layer that became the land cover layer. I named this layer 'MCland_cover'. All the grid data values within the county boundary were initially set to '0'.

The land cover data layer was developed by building a grid data layer for each land cover class and adding it to the land cover layer. As a land cover class grid data layer was created, the data values were re-classified (using the SAGA module *Reclassify*) for the cover class data value. The re-classified data layer with the correct values for the cover class was then added to the 'MCland_cover' layer. Each time I added a new cover class I used the SAGA *Grid Calculator* with the formula "a+b".

The SAGA module *Reclassify* supports changing single data values to a new value, a range of values to a single value, and a table to change specific ranges of data values to new values.

Transportation Classes

The TIGER (U.S. Bureau of Census) vector transportation layer for Mason County, in shape format, was directly opened as a vector data layer in SAGA.

I used the SAGA module *Grid/Gridding/Shapes to Grid* to convert the vector layer to a grid data layer. One of the module parameters is called "project". This parameter defines the characteristics for the output grid data layers. These include the number of rows and columns of grid cells, the size of each grid cell, and the UTM coordinates of the SW corner of the project area envelope.

The output grid data layer ('MCroads') contained data values ranging from 1 through 14,533 (based on a selected attribute for the vector layer). I used the *Reclassify* module to convert these values to 1's with the 'range' option in the *Reclassify* module.

Next, I used the *Grid Calculator* to add the roads to the 'MCland_cover' layer. The two input layers were 'MCland_cover' (referred to as "a" in the formula) and 'MCroads' (referred to as "b"). The simple formula is "a+b". I replaced the original 'MCland_cover' layer with the output grid data layer using the same name.

The source data for Mason County railroads was the TIGER vector data. The same process described for roads, above, was used for creating a railroad grid data layer and subsequently adding it to the land cover layer.

Hydrology Classes

The TIGER vector layer for water bodies was used as the source data for Mason County water bodies. The process described above for converting the vector layer to a grid layer and adding the resultant grid data for water bodies was used.

SAGA has several modules that can be executed with a USGS DEM as input data, to develop topographic and hydrologic grid data layers. I used these modules to develop a grid data layer representing the stream network.

See: Open Source Data Development, page 3

OPEN SOURCE DATA DEVELOPMENT

Continued from page 2

After executing a pre-processing step I generated a 'Catchment Area' grid data layer using the *Terrain Analysis/Hydrology/Catchment Area/Parallel Processing* module. Catchment areas are analogous to watershed basins. Before stream channels can be identified, the catchment areas had to be delineated.

The *Channel/Channel Network* module was used to produce grid and vector data layers for the stream network.

Vegetation Classes

Most of Mason County land cover is vegetation; conifer, deciduous, riparian. There are some high elevations in the Olympic Mountains that are alpine and sub-alpine vegetation environments.

I located and downloaded a Landsat 5 TM scene for July 21, 1988. Bands 2 through 6 were available. The vegetation cover classes were interpreted from a vegetation index grid data layer. Vegetation indices derived from satellite data are related to the amount of vegetation on the ground in a pixel area. They normally are a function of the reflectance values in the visible and infrared band wavelengths. Green vegetation absorbs red light (low reflectance value) but strongly scatters or reflects light from the near infrared band (high reflectance value).

The most popular index, the Normalized Difference Vegetation Index or NDVI, is calculated with this formula: NDVI = (NIR – RED) / (NIR +RED). This formula produces index values in the range from –1 to +1. Values on the positive side represent green vegetation, the more positive the more greener. Values less than zero, generally mean no vegetation.

I used the *Grid Calculator* to develop the NDVI layer. Band 4 was near infrared (NIR); Band 3 was red. Band 4 became variable "b" and Band 3 became variable "a". The formula for the *Grid Calculator* was "(b – a) / (b + a)".

High Elevation, Alpine and Sub-Alpine Class

Up to this point, the land cover grid data layer was based on using U.S. Census Bureau TIGER data and processing USGS DEM data with SAGA tools.

Tundra or arctic and sub-alpine vegetation or cover occurs in high relief, high elevation areas, above 4000' in the Olympic Peninsula. I used the USGS DEM grid data layer in combination with the NDVI data to delineate these high elevation vegetation classes.

The timber line for the southwest Olympic Peninsula generally occurs at around 5000'. Analyzing the NDVI data layer, it appeared that there was an arctic or alpine cover class for 5000' and above. This is probably mostly exposed rock and snow. From 4000' to 5000' it appeared that there was a sub-alpine class with a mixture of exposed rock and probably some groundcover.

I used the SAGA *Contour* module, and the USGS DEM grid data layer as input, to generate a vector data layer containing 500' contour intervals, starting at 3500' to a maximum of 6500'. I graphically superimposed the vector contours data layer on the NDVI data layer. The 4500' contour corresponded well with the lowest elevation for NDVI values in the range for what I am calling high elevation vegetation. During this process I also used the SAGA module *Local Morphometry* to generate an aspect grid data layer. I looked at the north facing aspect areas to see if I could discern a difference in the timber line on north- verse south-facing slopes. I could see some differences but they did not seem significant.

I used the same process from earlier cover classes to create a grid data layer for high elevation vegetation and to add the class to the land cover grid data layer.

Conifer, Deciduous, and Riparian Classes

Using the limited amount of photographic coverage available to me (i.e., ortho-photo quadrangles, black and white and color aerial photography) I correlated photo patterns with patterns on the NDVI data layer. I found that conifer vegetation had NDVI values ranging from .15 to .61; deciduous vegetation from .61 to .7; and riparian from .7 to 1.0. These classes occur outside of all the other previously mapped cover classes. In particular, outside of the "Vegetation, High Elevation" class which has an elevation component.

These three cover grid data layers were added to the 'MCland_cover' layer using the process described earlier.

Urban Class

Again using ortho-photo quadrangles and some available aerial photography to provide ground-truth, I verified interpretations of the NDVI grid data layer values. The urban class is represented by NDVI values less than .15 to –1.0. The problem that emerges is that spectral returns for urban and timber harvest areas are similar.

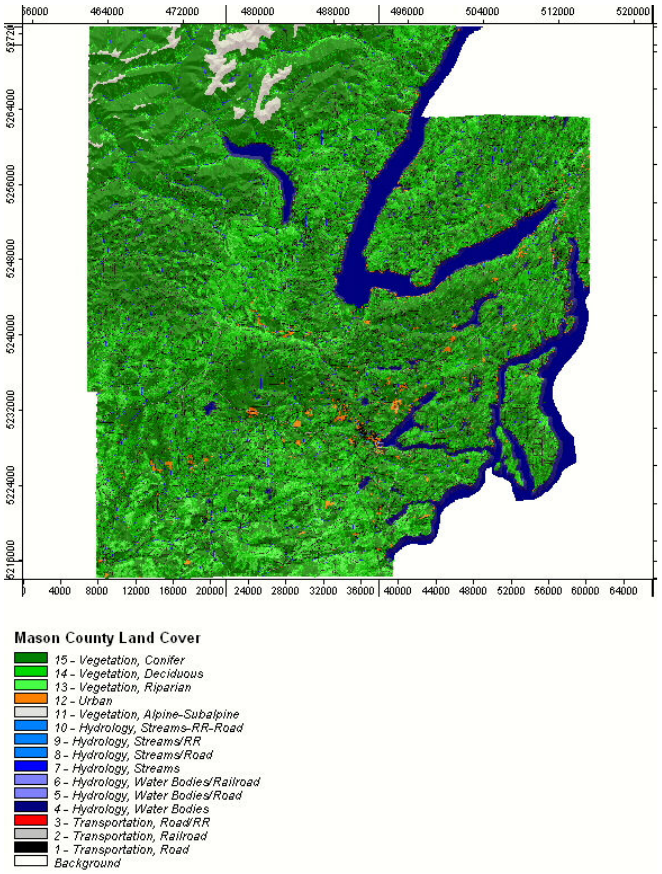


Figure 2. Mason County Land Cover Map

See: Open Source Data Development, page 4

OPEN SOURCE DATA DEVELOPMENT

Continued from page 3

In Mason County, the few existing urban areas are below 400' in elevation. Using the ground-truth sources, urban-like returns that occur above 400' most often are clear-cuts and bare soil. I used the Mason County DEM to reclassify the "urban" NDVI values above 400' to a conifer vegetation class (15). My assumption is that most commercial timber land will be managed for conifer production.

The "Urban" land cover class is not a homogenous classification. It includes commercial, industrial, and residential.

Discussion

This is a good start for the land cover grid data layer. It has satisfied a desire to explore the image processing capabilities included in SAGA as well as functions that support development of a land cover layer.

My final land cover layer will include more detailed cover classes. I intend, in particular, to explore further land cover class breakdowns for the vegetation and urban classes. One approach will be to remove all the non-vegetation class pixels (as portrayed on the 'MCland_cover' grid data layer) from the Landsat bands and use both supervised and unsupervised classification with the remaining pixels. I will explore the same approach with the urban class and try to differentiate between commercial, industrial, and residential or at least commercial/industrial and residential. In addition, I will explore several more sophisticated vegetation indices, compare unsupervised and supervised classifications, and apply some geo-spatial statistics.

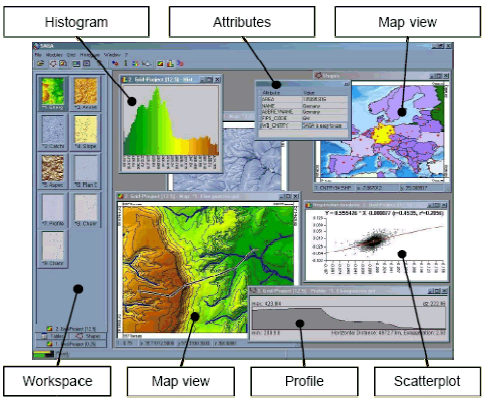
My experience with SAGA started with version 1.2 several years ago. For the past year I have been using the beta release for 2.0. I am impressed with the capability incorporated in SAGA. The functions I used for my preliminary land cover map are only a few that are available. What I like about SAGA is the wide range of tools it has, either as built-in core functions, or as user provided modules (developed with the SAGA API), to quickly explore alternative approaches for meeting analysis requirements.

Questions or comments about the Mason County land cover map or SAGA can be addressed to:

Kim Cimmery kcimmery@wavecable.com

Information about SAGA can be found at: http://www.saga-gis.uni-goettingen.de/html/index.php.

Downloads for SAGA 2.0 are available at: http://sourceforge.net/projects/saga-gis/.



SAGA API

URBAN BIKE PARK

Continued from page 1

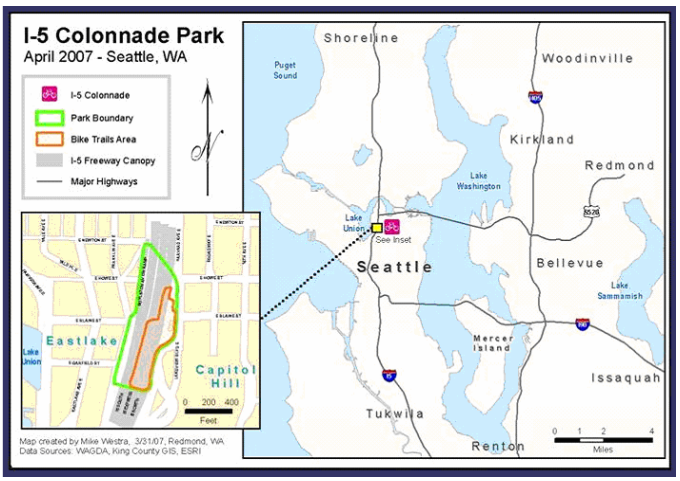


Figure 1. Location of Seattle's I-5 Colonnade Park

One of the key tools to help overcome all of these challenges is GIS. In fact, along with project management software and basic project management discipline, GIS is significantly improving overall project efficiency and results. The following describes a few examples of how GIS is being used in each phase of the project lifecycle.

Kicking Off the Project

GIS gives the project manager a much better ability to communicate when bringing the sponsors, key stakeholders and project team to the table for the first time. Various maps were created to show park location, boundaries, access, topography, freeway canopy, trail layout and high level design scenarios. All were easier to create than using other software tools, and were very effective at communicating key information. Figure 2 (page 5) shows high-level design concepts for the Advanced Area of the park.

Planning the Project

GIS was used in several ways to help with project planning. High level trail layout maps helped define the final scope. Detailed design maps with zoom-in insets on key design challenges were used extensively to develop the work breakdown structure, resource estimates and schedule.

Spatial Analysis was extremely valuable in dealing with one the biggest design issues facing the project team: trail routing, budgeting and scheduling in steep slope areas. Initially, the perception was that most of the steep terrain was already being dealt with in the park's Novice Area. However, a slope analysis proved differently. Figure 3 (page 6) clearly shows that the bulk of the steep slopes are in the untouched Advanced Area. This analysis was presented to the BBTC board and was a key step in changing the direction of the design for a large section of the park.

See: Urban Bike Park, page 5

For a full report on the 2007 Dick Thomas Student Paper Competition, see page 11.

URBAN BIKE PARK

Continued from page 4

Executing the Project

Two routine project management tasks were tackled far more efficiently and effectively using GIS: status reporting and action planning. Project Management software is good at generating graphs, text tables and text lists to communicate status, next steps and action items. However, for a project involving a significant geographic area and spatial problems to solve, communicating with GIS maps was far more effective. Status maps were created to show color-coded trails, so with a quick glance the reader could not only get a picture of overall completion status, but understand the spatial aspects of work – where work was complete, in progress and not started. Status maps are used regularly in project planning and status meetings.

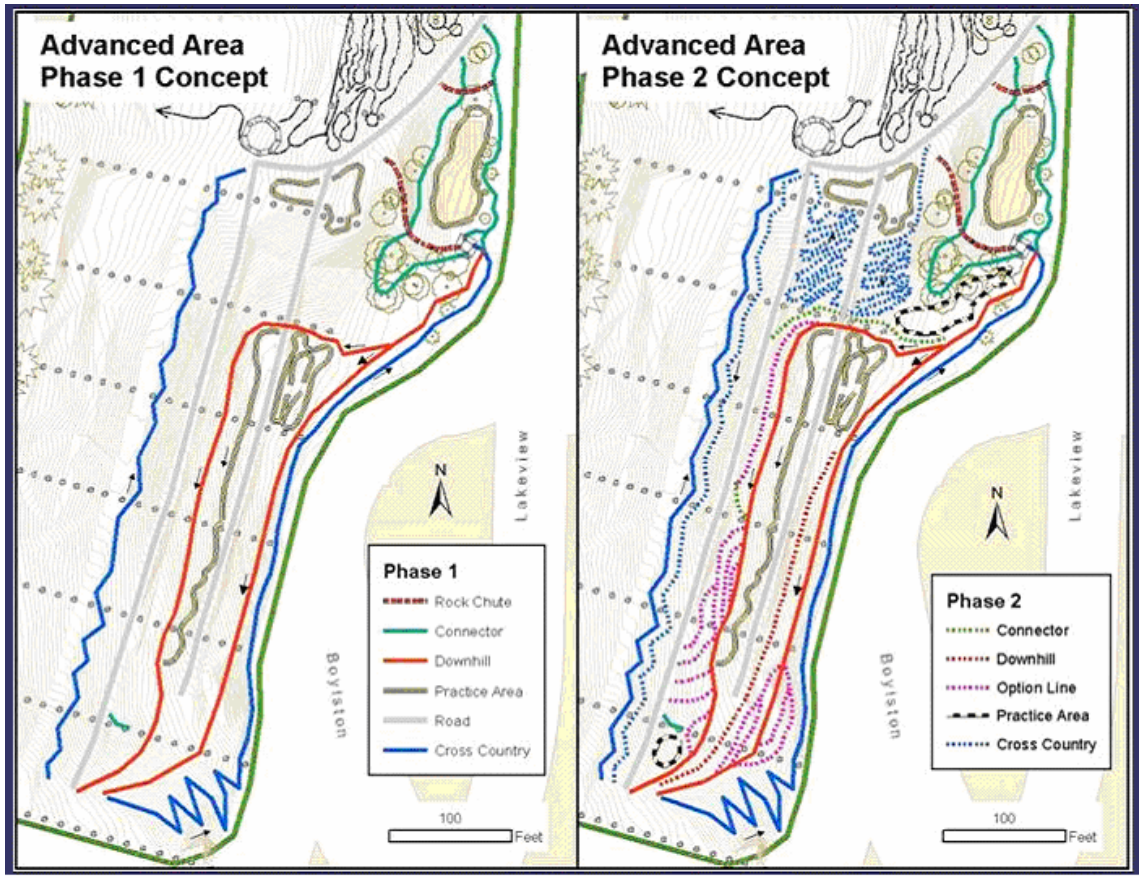


Figure 2. Advanced areas high-level design concept.

Attributes from the Project Management software's work breakdown structure were joined to the GIS trail and park features layers. By using the GIS's identify feature, a user can then simply click on a trail segment or park feature and see all the information from the work breakdown structure, such as total feet of trail, percent complete, resources assigned, materials required, start and stop dates, etc. Furthermore, updates on total percent-of-trail complete were automated using the GIS's calculated fields and statistics features.

For managing work on-site, mapped tasks and work plans proved to be far more effective than a simple text list of tasks. This was particularly valuable in the BBTC's volunteer-powered environment where first-time volunteers and crew leaders who can help out only once per month are common occurrences. Figure 4 (page 6) shows a combination work plan and status map which was created as a hand-out to quickly get volunteers up-to-speed. Status maps relay a quick picture of how the park and trail are laid out, what is complete and what needs to be done. Work plans show what needs to be done that day and exactly where the task needs to take place.

Justifying and Selling the Project

Often overlooked, most projects require an ongoing effort to justify, sell and evangelize throughout the lifecycle of the project. I-5 Colonnade is no exception. The BBTC leadership team needed to regularly address skepticism... Why build a park under the freeway? Why downtown Seattle? There was a general misperception that most members and mountain bikers don't live near the park. GIS was used to map out membership density, the membership centroid and King County's population centroid. The maps show both membership density clearly centered around the park, with both centroids less than 8 miles away. A 2006 spatial analysis of mountain bike trail availability in King County was also used to justify resources and park location.

See: Urban Bike Park, page 6

URBAN BIKE PARK

Continued from page 6

Closing the Project

The I-5 Colonnade Park Novice Area is scheduled to be complete by 8/31/07. GIS will be used extensively to document the project at every level, including plans for future enhancements and ongoing maintenance activities. 3D visualization maps showing trail routing around the columns will also be a valuable part of the park's final documentation package.

Conclusion

GIS proved to be a huge benefit to the I-5 Colonnade Bike Park Project. In summary, the following shows specifically how GIS and GIS tools were used to help overcome the challenges described in the introduction above.

For the Project Manager's challenges in scheduling, budgeting, status reporting and general communication, GIS was used to provide:

- Maps of general topography, layout and park access
- Maps of detailed trail design, layout and routing
- Slope analysis and maps of slope implications on trail layout
- Spatial status reports, work plans and action registers
- Maps of design change proposals and final changes

For the Volunteer Crew Leaders' and Trail Builders' challenges in understanding the park's big picture (trail flow and user experience) as well as the day's tasks, GIS was used to provide:

- Park maps showing construction status and key landmarks
- Work plan maps showing what needed to be done as well as where it needed to be done
- Maps for volunteers to relay issues, suggestions and ideas back to the project manager

For the Board of Directors' challenges in making strategic decisions and managing the biking community's perception of the park, GIS was used to provide:

- Maps of park location, boundaries, access, topography, freeway canopy, trail layout and high level design scenarios
- Spatial Analysis of membership and potential users
- Spatial Analysis of mountain bike trail availability

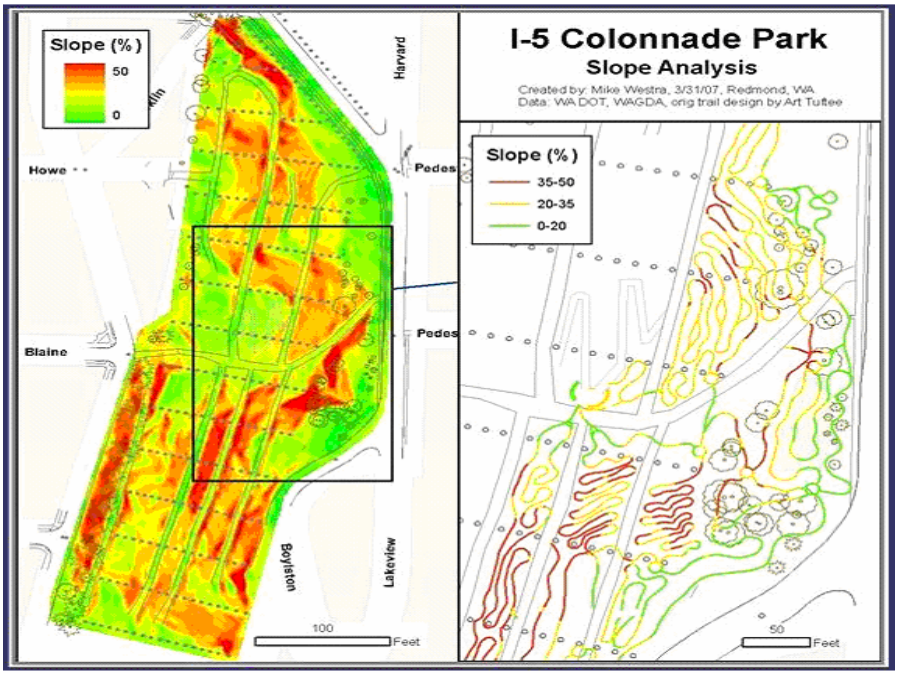


Figure 3. Slope Analysis map showing steep terrain (left) and trails on steep slopes (right).

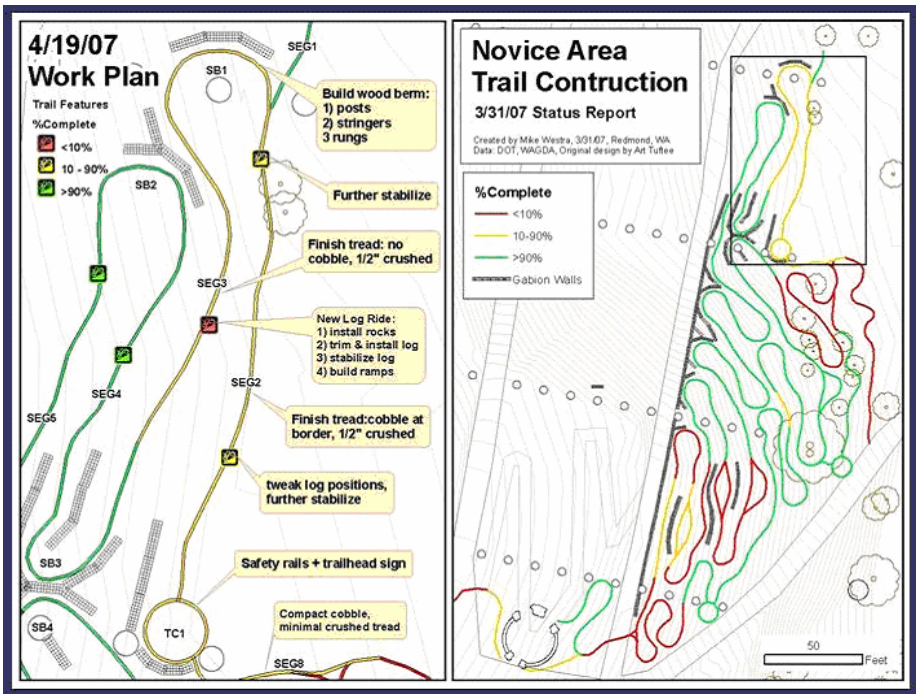


Figure 4. Work plan (left) and Status map (right).

For projects with a significant spatial component, maps generally capture interest better than the usual text and tables generated by common project management software. For example, it's one thing to go to the project sponsors and say "we've got some steep slope challenges", and it's entirely another to show it in red on a map!

For more information contact Mike Westra at: mwestra1@gmail.com

To learn about the Backcountry Bicycle Trails Club, see: http://www.bbtc.org/

WITH GIS - IS WHAT YOU SEE WHAT YOU GET?

By Linda Gerull & Paul Fly, Pierce County GIS

When you look at a GIS map display, what assumptions are you making? Do you assume the data is accurate, that is it complete, that the lines and points are precise? In several meetings we have attended recently, the topic of map scale and data accuracy has surfaced. Many GIS users know about positional accuracy, which describes how well a feature on a map represents its actual location on the ground, expressed in terms of map scale (such as 1"=100' or +/- 10 feet). But there are other data accuracy issues that must be understood if the maps, analyses, displays, and reports made with GIS are to be reliable.

An understanding of data accuracy will help ensure your GIS product can be substantiated if challenged, and will hold up under the scrutiny of other GIS users, and most importantly, is an "ethical" use of GIS. Consider the following when using GIS datasets:

Completeness *– is the dataset complete?*

A dataset's completeness depends on the source that was used in creating it as well as the way it has been maintained over time. For example, using 1:800 scale orthophotography, about 60% of all manholes can be successfully mapped. If you are using a manhole dataset made this way for scheduling inspection crews, does this level of accuracy meet your project needs? The answer is probably not!

Currentness *– is the dataset current and does it contain the most up-to-date information?*

The Pierce County parcel dataset in CountyView is updated every two weeks. Datasets such as census are updated every ten years. If your project requires the most current data, you should know the update cycle and specific version of data you are using.

Content *– what does the data attribution represent?*

Many GIS datasets map a single type of feature, such as bridges. But most datasets map multiple feature types, using a code in an attribute field to distinguish between feature types. Within Pierce County, the Road file contains a map class code that distinguishes roads as arterials, highways, etc. The wetlands dataset has a code for verified and unverified wetlands. These codes need to be understood in order to correctly map and analyze datasets.

Geographic accuracy – what the positional accuracy of the mapped features?

Parcels:

Questions about parcel line accuracy typify the issue of positional accuracy. A plat map created by professional surveyors for the purpose of establishing the location of property lines puts the priority on the positional accuracy of parcel lines. Such maps are used to resolve questions about the location of property lines.

In contrast, the purpose of the typical Assessor's tax parcel database is to record property ownership and associated tax-related information. When the tax parcel dataset is used in GIS, the crisp lines can give a false impression of the accuracy level. It is up to the users of GIS to know about data accuracy and take care not to create misleading products. Just because a dataset can be displayed at a scale of 1"=50' does not mean its accuracy is equivalent to that scale.

Geocoding:

Geocoding is another case where it is important to understand the data as well as the way GIS software processes data. We often ask Pierce County GIS users, *"Why do you sometimes see geocoded points clumping at street intersections?"* This question brings up addresses, how address information is stored, and how the process of geocoding works. Pierce County street data does not include specific addresses, but rather an address range is stored for each street segment. Geocoding works by taking an actual address and using the address range stored in the street data to estimate a point location.

The thing to keep in mind is that some address ranges are "actual" (verified) and others are "theoretical" (unverified). Theoretical address ranges are often large, which can produce point clumping when real addresses are geocoded. For example, if the addresses along a street segment range from 100-400, but in the street database the segment's address range is stored as 100-800, then when a set of real addresses are geocoded, the resulting points will clump toward one end of the street, with no points at all toward the other end. It is important to remember that geocoding produces **approximate** locations of addresses. GIS users should take this into account when producing or using geocoded addresses.

Terrain Models:

Terrain models in "grid" (DEM) and "triangulated" (TIN) formats provide another example of the need to understand underlying data accuracy and how accuracy is affected when geoprocessing is performed. Starting from a set of points with known locations (such as survey, GPS, or raw LIDAR points), a grid terrain model is made by overlaying a regular grid of cells (a "raster") and computing values for each cell by averaging and interpolating the points. In contrast, a triangulated terrain model is made by connecting the points with series of edges, resulting in a mesh of triangles. The edges are stored as "vector" line data. The original points remain, unaltered, as the vertices of the triangulated mesh.

There are strengths and weaknesses to both gridded and triangulated terrain models. Grid models are typically smaller in file size, but represent an approximation of the surface (based on the size of the grid cell). In contrast, triangulated models are more accurate, but have very large file sizes. GIS can use these 3D terrain models to create contour line data.

Contour lines are widely used in many applications. When you use contours, how well do you understand their positional accuracy? Do you know what type of terrain model was used to produce the contours? What was the accuracy of the terrain model? What was the accuracy of the original point data? The difficulty of answering these kinds of questions illustrates the importance of taking data accuracy issues into account when doing GIS analysis and creating maps. These issues can make the difference between valid results and questionable ones.

See: What You Get With GIS, page 8

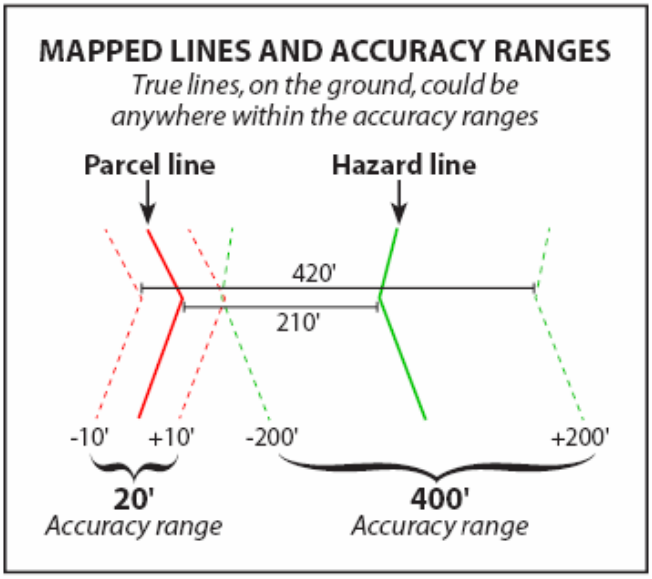
WHAT YOU GET WITH GIS

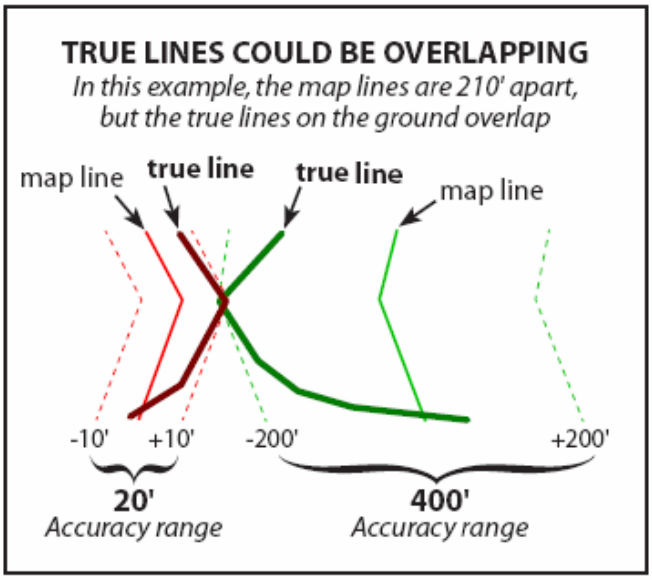
Continued from page 7

Spatial relativity – *making comparisons between datasets.*

GIS users often combine datasets in order to determine relationships between different feature types. For example, parcel data and flood hazard area data might be combined in order to determine how close a specific parcel is to a flood hazard area. Another example might be determining whether a wetland is within a buffer zone along a proposed highway. Both examples involve two datasets used together. The accuracy issues described in this article so far relate to single datasets and how well true locations "on the ground" are represented. When multiple datasets are compared, there is the additional issue of the accuracy of datasets relative to one another.

Take the example of comparing a parcel to a hazard area. It is quite possible that the parcel and the hazard area do not overlap on a map display but do overlap in truth. Thus it is important to remember that the lines on a map are not 100% accurate positionally. Rather, the positional accuracy of data is described (in the metadata) in terms such as +/- 10 feet. The true line could be off from the mapped line.





To continue the example, say you checked the metadata for the parcel and the hazard data and found the positional accuracy of the parcel lines to be +/- 10 feet, and the hazard area lines +/- 200 feet. The first thing to remember is that +/- 10 feet means the total range of possible error is 20 feet. For an accuracy of +/- 200 feet, the total range of possible error is 400 feet. Therefore, between a mapped parcel line and a mapped hazard area line, the true lines could be different by as much as 420 feet. The lines on a map may look precise and suggest a certain conclusion (such as, "the parcel and hazard area do not overlap"), but after checking the positional accuracy of the data, the obvious conclusion may turn out to be questionable.

Given the accuracy levels of +/- 10 feet for the parcel and +/- 200 feet for the hazard area, how close can the mapped lines be before there is the **possibility** of overlap? As described above, the maximum combined possible error is 420 feet, but this question of overlap is different. In this case, if the mapped lines are less than 210 feet apart, they might in truth overlap. The parcel line, with it's +/- 10 foot accuracy, may in truth be 10 feet toward the hazard area. And the hazard line, with it's +/- 200 foot accuracy, may in truth be 200 feet toward the parcel. Thus even if the lines on the map are 210 feet apart, in truth they may be touching. At less than 210 feet on the map they may be overlapping.

This example shows how knowledge of relative spatial accuracy is needed to properly answer questions involving multiple datasets. The map lines may suggest a false conclusion. When positional accuracy is taken into account and no sure conclusion can be determined, field verification should be used.

Metadata

A user of spatial data and GIS must know how the data was created and processed, what the attribute values represent, and the data's spatial accuracy characteristics, as well as how GIS software processes will affect the data and its accuracy. Users must know these things in order to make good decisions, conduct analyses, and create maps with trustworthy validity. Data questions can usually be answered by checking a dataset's metadata. Please read the metadata and ask for clarification from the data steward if anything is unclear. Included in metadata is data owner and contact information. In order to make good decisions you need to thoroughly understand the data and tools you use. Pierce County's metadata can be accessed in CountyView or, in a pinch, from the Geo Data Express website (under "Ordering Data", "Available Data").

Ethics and GIS

Data accuracy and the correct representation of data are ethical issues for GIS users. GIS users should not display data in ways that give a false impression of accuracy. Maps, like statistics, always involve some degree of generalization and bias, but are often treated as objective statements of truth. There are ways to show lower levels of accuracy, like using wide lines to represent fuzzy boundaries and large point symbols to show features whose locations are somewhat uncertain. Also, many datasets contain attribute fields specifying "confidence" levels, which could be more widely used in maps to reveal the "fuzziness" and limitations of underlying data.

See: What You Get With GIS, page 9

Editor's Note: A discussion during the 2007 Washington GIS Conference led to an agreement that better cooperation and communications between the GIS and Survey communities would be mutually beneficial. The following article is the first in a series related to GIS and survey that will appear in future issue of *The Summit.*

WHAT SURVEYORS WANT FROM GIS

SPATIAL ACCESS TO PROPERTY RECORDS

By Karen Zollman

If you are a mapper who has had even a single conversation with a Land Surveyor, you know that they are disappointed with the poor spatial accuracy of maps created by GIS. Fortunately, that attitude is changing as more Surveyors use spatial data from a variety of agencies over the web. Many surveyors routinely visit websites such as the National Geodetic Survey (NGS) to look for data, or locally, the Washington Council of County Surveyors (WCCS) data warehouse. www.surveycontrol.state.wa.us/wccsmap/

These sites use low-accuracy reference maps to help the user navigate to locations of interest and then select survey monument data to review and download. Most Land Surveyors prefer spatial access to data because it yields a more discrete result than a database query.

One of the most used map products a City or County provides is a property or parcel map. Those who create *and* use these maps must understand that these are "compilation" products and understand their characteristics.

Most County GIS parcel maps were created by trace-digitizing the Assessor's legacy parcel maps that were drafted over many years from information recorded with the County Auditor. The geometry of these maps was often represented as a one-mile-square. The lack of spatial accuracy is immediately apparent when users compare digital orthophotography to these parcel maps. A plethora of rubber sheeting methods have been employed to match or *conflate* parcel map features to the photography in an attempt to improve the spatial accuracy. The results varied, but like the old adage, "Beauty is only skin deep..." fundamentally, these methods do not rectify the problem.

But what accuracy is really required? These maps are not legal property records, just a reference or index to them. As a compilation product, parcel maps incorporate all of the errors of the property records and statistically we know that a few more are added during the compilation process. Just look at all the lengthy disclaimers on these maps! The spatial accuracy and feature completeness of a compilation map is directly related to the:

1. Survey grid's density and accuracy—for reference by the property records
2. Property records used—completeness, interpretation, legality of records
3. Map Development Order—survey grid 1st, ROW 2nd, parcels 3rd

Let's look at these key elements and their affect on spatial accuracy.

See: What Surveyors Want, page 10

WHAT YOU GET WITH GIS

Continued from page 8

GIS users should not map information at scales beyond the accuracy of the source data. For example, a GIS user should not zoom-in on a 1:24,000 (1"=2,000') land classification map and start making measurements at a scale of 1"=100', or create 1 foot contours from a 20 foot contour set regardless of how well defined the line appears to be. Keep in mind the difference between **accuracy** and **precision**. Data with high levels of precision (location specified to the centimeter, for example) can give the impression of high accuracy. However, highly precise spatial data all too often turns out to be unbelievably faithful representations of incorrect locations.

An ethical GIS user should know about their data sources and accuracy. This knowledge must be used to keep display scales within accuracy limits and to ensure that inferences derived from spatial data are appropriate and not misleading. As with statistics, it is very easy to reach misleading conclusions. It takes special care to avoid such mistakes and produce useful, high-quality work.

This article first appeared in the Pierce County GIS Bulletin, May 2005 Issue. Used with permission.

For more information about Pierce County GIS, see: http://www.co.pierce.wa.us/PC/abtus/ourorg/is/gis.htm or contact:

Linda Gerull: LGERULL@co.pierce.wa.us

Paul Fly: pfly@co.pierce.wa.us

GIS CODE OF ETHICS

Linda Gerull and Paul Fly's article in this issue (What You See Is What You Get) raises the topic of ethics and GIS. The GIS Certification Institute (http://www.gisci.org/) has developed a 'Code of Ethics' as part of the GIS Certification Program.

The Code of Ethics is intended to provide guidelines for GIS professionals. It should help professionals make appropriate and ethical choices. It should provide a basis for evaluating their work from an ethical point of view. By heeding this code, GIS professionals will help to preserve and enhance public trust in the discipline.

For more information about GIS ethics and the full code, see: http://www.gisci.org/code_of_ethics.aspx

---

PRESIDENT'S COLUMN

Continued from page 1

I want to thank my GIS comrades who have been and continue to be involved with the Board, as well as those volunteers in the wings who come to our rescue when the need is great. I also want to thank my wife, Michelle, for her support of a commitment that has taken me away from home and our time together. I believe she understands that I am better for having been of service.

GIS Rocks!

- Rick Lortz

WHAT SURVEYORS WANT

Continued from page 9

The Survey Grid

In Washington State, cadastral mapping (from the French word cadastre) uses a rectangular framework of survey monuments called the Public Land Survey System (PLSS) as the basis for property definition. The cadastral method is often not understood by the GIS community. In one meeting, my client said that none of the many GIS professionals they had consulted had ever heard of this method I had invented for creating parcel maps.

The statement sent visions of Al Gore trying, in vain, to explain that he had not said that he had created the internet, only the funding that created it. I visualized myself trying to explain to angry Land Surveyors across the state that no, I was not telling clients that I invented cadastral mapping. Fortunately, I was able to cite the origins of cadastral mapping—created by Napoleon in the 1700's as a method to assess property; later adopted by Thomas Jefferson; became the basis for property delineation for all but 19 metes and bounds states in the eastern United States—in one horrified breath.

Many compilation maps show coordinates for the Public Land Survey System (PLSS) corners such as Section and Quarter corners. These coordinates are useful in providing Land Surveyors with a "basis of bearing" for surveys in that Section.

What Land Surveyors Want:

- *Meta data that describes each survey monument represented by coordinates*
- *References to ROS that establish the survey monument as the corner of record*
- *A point ID citation that references a record in the WCCS data warehouse.*

Property Records

Surveyors often look first to compilation map products for citations that will lead them to documents of record. For example, County Auditor records—such as Plats, Records of Survey (ROS), Deeds, and State Rights of Way (ROW) plans—that define the legal ownership of the property. Citation information for these records may include Plat, ROS, and ROW plan numbers. Some citations on compilation maps are interesting but have little legal standing. For example, City ordinance citations indicate that the City Council intended to acquire or convey property rights, however, like a marriage license, the ordinance is only legal if it is signed and recorded with the County Auditor.

What Land Surveyors Want:

- *A citation for the County's Auditor File Number (AFN) for each property record*
- *ROW citations that include Agency, Plan number, and revision date*

Map Development Order

Developing the Survey grid, then mapping the ROW will constrain and identify errors in the parcel mapping. In our extensive experience applying the Cadastral methodology to develop parcel maps for cities and counties in Washington, we have identified an average of 2-3 properties per Section not currently on the Assessor Tax Rolls! Many of these are vacated ROW that has not been returned to the Tax Rolls.

In some cases the City or County ROW are not located where they are deeded. In one instance, a County was receiving revenue from franchise utilities along the County road. That road's present location did not match the deeded location. This meant that the County was potentially receiving revenue for a use on someone else's property. The solution was to vacate the location of the road as currently deeded, then monument and rededicate the road in its current location. Now the deeded location matches the occupation and the orthophoto.

What Land Surveyors Want:

- *Parcel maps that shows all the properties represented by Auditor records*
- *ROW mapped in the location deeded or noted as not according to deed.*
- *A way to communicate missing parcels or mis-located ROW*

In Conclusion

Land Surveyors are required to independently delineate property boundaries based upon the best available evidence. Property records research is a critical first step—before any field measurements are taken. It can be time consuming and expensive for the Land Surveyor, and doesn't always yield all of the recorded documents available. A Record of Survey filed with the County Auditor expresses a Land Surveyor's opinion of property boundary—again, based upon the best available evidence (If disputed, only a judge can determine property boundary). It is unfortunate if that opinion cannot be based on all the pertinent documents in the public record because of poor indexing.

Land Surveyors are required to independently delineate property boundaries based upon the best available evidence. Property records research is a critical first step!

The cadastral methodology for building accurate and complete parcel maps is expensive. Land Surveyors are realizing that good spatial accuracy will be a long, incremental process. In the meantime, parcel maps can be an invaluable reference to spatially identify property and ROW records.

What Land Surveyors Want: *Parcel maps that provide:*

- *Detailed survey monument, ROW, and property record citations*
- *User-friendly access to complete survey and property records*
- *The ability to submit information about missing parcels or mis-located ROW*

We thank you.

Karen Zollman (karen.zollman@seattle.gov) is the GIS/LIS Chair for the Land Surveyor Association of Washington www.lsaw.org

FIRST ANNUAL DICK THOMAS MEMORIAL STUDENT PRESENTATION COMPETITION

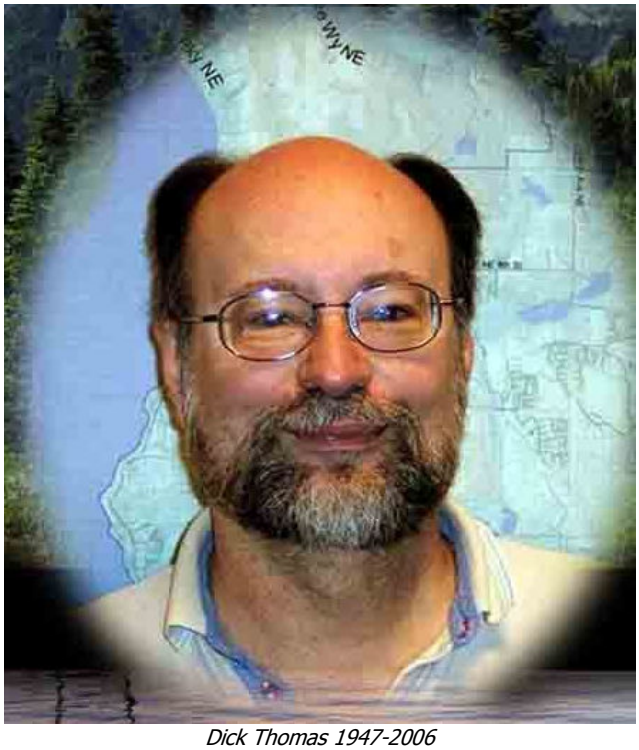
By Amanda Taub, WAURISA Outreach Committee Lead

The first annual Dick Thomas Memorial Student Presentation Competition at the 2007 Washington GIS Conference was a great success in Lynnwood, Washington (April 23-25, 2007)!

WAURISA established the Dick Thomas Memorial Award to honor Washington State GIS pioneer and mentor Richard 'Dick' Thomas, who passed away in 2006. The intent of this award is to honor Dick by continuing his work of encouraging students to excel in their studies and to assist them in their successful transition into GIS careers.

WAURISA's goal is to encourage students to present their original work related to GIS, geography, or geographic research in Washington State at the annual Washington GIS Conference. The competition was limited to current students enrolled at least 6 hours in a relevant curriculum at a secondary school, community college, technical school, or university program.

Entries were a paper or presentation based on original work by the student, conducted while enrolled in an appropriate academic program. Four entries were presented during a special student session at the 2007 Washington GIS Conference. Presentations were limited to 15 minutes with an additional 5 minutes for questions.



Dick Thomas 1947-2006

Interested students submitted 6 abstracts for review by the Student Presentation Competition Committee. The Committee selected 4 students' abstracts to be presented at the Competition.

The four selected students' abstracts were:

- James L. Poelstra, Central Washington University, "*A GIS Planning Tool for Integrating Lynx Habitat Conservation with Timber Production on State Forestland in Northeastern Washington*"
- Matt Lonsdale & Pam Michael, University of Puget Sound, "*Factors Affecting the Distribution of Beggiatoa spp. Mats in Hood Canal & Quartermaster Harbor, WA*"
- Lori Williams, University of Washington, Dept. of Epidemiology, "*Immune Function & Residential Exposure to Traffic Among Women in King & Snohomish Counties*"
- Mike Westra, University of Washington GIS Certificate Program, "*Using GIS to Help Plan, Develop & Manage an Urban Mountain Bike Park: Seattle's I-5 Colonnade Project*".

The abstracts and presentations were judged based on the students' demonstration of expertise and understanding of geographic concepts; demonstration of expertise and understanding of GIS, related technology, and its application; explanation of how the work presented relates to the topic and contributes to greater understanding or knowledge; demonstration of innovative approach and/or critical thinking; and the quality of the written abstract and public presentation.

The following prizes were earned by the student presenters.

First Place: **Mike Westra, University of Washington GIS Certificate Program**

- Dick Thomas Award Plaque & First Place Certificate
- $1000 cash
- One year membership in WAURISA
- Free registration to the 2008 Washington GIS Conference
- Publication of paper in *The Summit*

Second Place: **James L. Poelstra, Central Washington University**

- Dick Thomas Award Second Place Certificate
- $250 cash
- One year membership in WAURISA
- Free registration to 2008 Washington GIS Conference

Third Place: **Lori Williams, University of Washington, Dept. of Epidemiology**

- Dick Thomas Award Third Place Certificate
- $100 cash
- One year membership in WAURISA

Honorable Mention: **Matt Lonsdale & Pam Michael, University of Puget Sound**

- Dick Thomas Honorable Mention Award Certificate

I want to thank Mike Westra, James Poelstra, Lori Williams and Matt Lonsdale & Pam Michael for their outstanding presentations. Their hard work and enthusiasm for their research shined in their presentations. I also want to thank the Selection & Judging Committee for their hard work. I am certain that I was not the only one to miss Dick's presence this year, but I am sure that he would have been proud of these students.

UPCOMING URISA EVENTS AND CONFERENCES

URISA's 45th Annual Conference
Sharing Technological Inspiration
August 20-23, 2007
Washington, DC
http://www.urisa.org/conferences/annual/info

2007 URISA CONFERENCE HIGHLIGHTS
Go beyond basic technology and applications and contemplate issues related to designing, managing and applying information technology – at its highest and best use – to improve our urban and regional environments. Join your colleagues, peers, thinkers and doers from around the world at URISA's 45th Annual Conference.

- Twelve pre-conference workshops
- Two important keynote presentations
- Interactive issues discussions
- Targeted professional development opportunities
- More than 200 presenters
- Vendor hospitality and user group meetings
- A packed exhibit hall
- Networking activities

In this day and age of tight budgets and numerous choices of conferences to attend, why choose URISA? I can tell you why I choose URISA - because of the people, because of the networking opportunities, because of the new ideas that I learn about - in the sessions, in the exhibit area, and in the hallways!
-Sandi Majewski, Crime Analyst, City of Las Vegas Police Dept

URISA's 46th Annual Conference
October 7-10, 2008
Sheraton New Orleans

Integrating GIS & CAMA Conference
Annual Conference for Professionals in Property Assessment, Tax Administration, Mapping and Information Technology
February 25-28, 2008
New Orleans, LA
http://www.urisa.org/gis_cama

And just dreaming.....
URISA Caribbean GIS Conference
Watch for news about the 2008 conference!
August 25-29, 2008
Grand Cayman
http://www.urisa.org/conferences/caribbean

OTHER UPCOMING GIS EVENTS:

GITA Annual Conference 2008

March 9-12, 2008
Seattle, WA
http://gita.org/events/annual/31/index.asp

PNW GITA 8th Annual Fall Conference
September 24-25, 2007
Whistler Resort, BC, Canada
http://www.gita.org/chapters/pacific/fall_conf_flyer.pdf

15th ACM International Symposium on Advances in Geographic Information Systems (ACM GIS 2007)
November 7-9, 2007
Seattle, WA
http://www.cise.ufl.edu/dept/acmgis2007/

2008 ACSM/LSAW Conference
March 4-8, 2008
Spokane, WA
http://www.acsm.net/conference.html

2007 Free and Open Source Software for Geospatial (FOSS4G) Conference
September 24-27, 2007
Victoria, BC
http://www.foss4g2007.org/

2007 Conference
Northwest ESRI GIS User Group
September 10-14, 2007
Tacoma, WA
http://www.nwesriusers.org/

GIS Day 2007
November 14, 2007
http://www.gisday.com/

Geography Awareness Week
November 12-16, 2007
http://www.mywonderfulworld.org/gaw.html
In 1987, U.S. President Ronald Reagan signed legislation establishing the third week in November as Geography Awareness

WAURISA SPONSORS

WAURISA thanks the following sponsors for their generous support:

The Summit **reaches more than 2600 readers across Washington State. For more information about the benefits of WAURISA Sponsorship, contact Angela Johnson (president@waurisa.org), or any WAURISA Board member.....**

Accela Government Software
http://www.accela.com/

Aerials Express
http://aerialsexpress.com/

ESRI
www.esri.com

GITA 2008 Conference: Seattle
www.gita.org

King County GIS Center
www.metrokc.gov/gis

Kuker-Ranken Incorporated
http://www.krinc.net/

Latitude Geographic
http://www.latitudegeo.com/

LizardTech
http://www.lizardtech.com/

The PPI Group
http://www.theppigroup.com/

In addition to the paid sponsors listed on this page, WAURISA acknowledges support from the following agencies that provide chapter board members:

- **Autodesk**
- **City of Bellingham**
- **City of Burien**
- **Fort Lewis GIS**
- **Kitsap County**
- **Lakehaven Utility District**
- **Mason County**
- **Douglas County**
- **Washington DOT**
- **Wendt GIS**

THE SUMMIT - EDITORIAL

GIS *AND* GEOGRAPHY – AGAIN!

The topic of the editorial in the previous issue of *The Summit* was GIS and Geography. Just a few days after publication, the Spring 2007 issue of ArcNews (http://www.esri.com/news/arcnews/arcnews.html) published an article by Dr. Jerome E. Dobson of the University of Kansas titled 'Bring Back Geography.' Dr. Dobson reviews not only the sad state of basic geographic knowledge in the U.S., but also the widespread lack of understanding about what geography really is and what geographers do.

Dr. Dobson doesn't just lament though, he presents sound recommendations how awareness can be raised. He urges that we start by using the word 'geographic' – not spatial or geospatial. Don't be afraid to use the 'G' word. And don't be afraid to explain what geography is – it's not just making maps.

Dr. Dobson provides an agenda for lobbying policy makers in Washington D.C. and in each state capitol:

1. *Every elementary and high school student should learn basic geography and experience GIS technology.*
2. *Every freshman should reach college knowing that geography is a viable major with solid career prospects after graduation.*
3. *Every college student must have access to a full geographic curriculum—thematic, regional, methodological, and technological.*
4. *Scholarships must be available to support the best and brightest students who choose to pursue undergraduate and graduate degrees in geography.*
5. *Research grants must be available to encourage substantially increased geographic research, including fieldwork, both foreign and domestic, by faculty and students.*
6. *Development grants must be available to upgrade or create geography faculties throughout the nation; to ensure topical, regional, methodological, and technological coverage; to upgrade GIS facilities; and to promote community outreach.*

Dr. Dobson's article should be required reading for every GIS student and professional and the topic of frequent discussion.

Be proud to say: 'I am a geographer!'

The Summit would like to hear from you. To encourage the discussion of issues and ideas of importance to the Washington GIS community we welcome letters to the editor and opinion essays. Letters to the editor should be a maximum of 100 words and essays should be limited to 500 words.

The Summit is published by WAURISA, The Washington State Chapter of the Urban & Regional Information Systems Association

Chief Editor: Greg Babinski
Interview Editor: Effie Moody
Olympia Area Editor: Whitney K. Buschmann

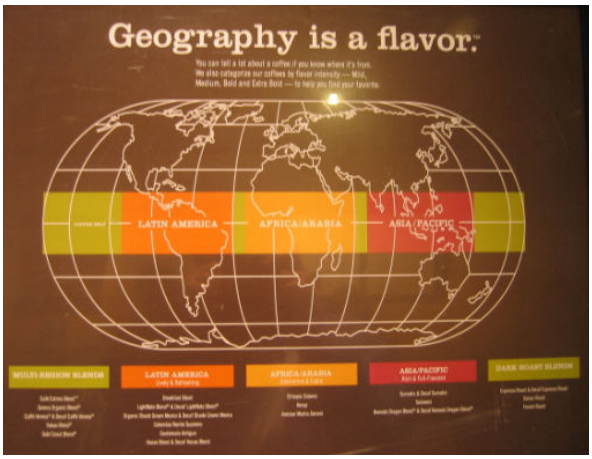
For subscriptions, content, comments, or suggestions, email: **SummitGISNews@URISA.org**

PUBLIC MAPS IN WASHINGTON

Starbucks is a worldwide company that is as symbolic of Washington State as is Boeing or Microsoft. We have a reputation as connoisseurs of the dusky brew, and most GIS professionals I know work best with a 'cuppa' at hand to the side of their monitor.

This map was photographed in a Starbuck's in Pioneer Square in Seattle.

Think about it – what other product is described so frequently by geographic names? French Roast? Italian? If you grind and brew your own beans, do you prefer Java, Kenya, Kona, Jamaica Blue Mountain, or my preference – Sumatra?



Starbucks Coffee Map

For an interesting website devoted to the 'geography of coffee' see: http://webhost.bridgew.edu/jhayesboh/RESOURCE/CoffeeGeog.htm

If you know of a public map display in Washington, feel free to send it to *The Summit* and we'll include it in a future issue.

-Editor

THE SUMMIT – LITERARY CORNER

Joseph Conrad – From *The Heart of Darkness*

While at anchor in the River Thames aboard the Nellie, a cruising yawl, Marlow, the narrator of the book, describes for his guests his fascination with maps as a youth:

> *"Now when I was a little chap I had a passion for maps. I would look for hours at South America, or Africa, or Australia, and lose myself in all the glories of exploration. At that time there were many blank spaces on the earth, and when I saw one that looked particularly inviting on a map (but they all look that) I would put my finger on it and say, 'When I grow up I will go there.' The North Pole was one of these places, I remember. Well, I haven't been there yet, and shall not try now. The glamour's off. Other places were scattered about the Equator, and in every sort of latitude all over the two hemispheres. I have been in some of them, and . . . well, we won't talk about that. But there was one yet--the biggest, the most blank, so to speak--that I had a hankering after."*

Late Breaking WAURISA News

WAURISA ELECTS NEW OFFICERS AND BOARD MEMBERS

Election of new WAURISA Officers and Board members was completed on Monday, July 23. Elected to new 2007-2009 terms were:

- President: Angela Johnson
- Vice President: Dean Tatham
- Board Member: Lurleen Smith
- Board Member: Heather Spates
- Board Member: Donna Wendt

In addition, Rick Lortz assumes a two year term on the Board as Past-President.

For a complete list of current WAURISA Officers, Board Members, and Volunteers, see page 16.

2007 WASHINGTON GIS CONFERENCE RECAP

The 2007 Washington GIS Conference, held in April in Lynnwood was a big success. Over 250 attendees from 75 public agencies and over 50 businesses attended the day of technical workshops and two-days of educational sessions.

King County Executive Ron Sims gave an inspirational keynote address on Tuesday that kicked-off the event. A record number of sponsors filled the exhibit hall and filled an informative vendor technical track.

The quality of the other educational sessions was very high and touched a broad variety of topics. New this year was the Dick Thomas Student Paper competition (see page 11) which spotlighted some of the best work from GIS programs in Washington State. The Map and Poster contest once more dazzled with examples of innovative high quality work.

Donna Wendt was the recipient of the 2007 *Summit Award*, for highest contribution to GIS in Washington State.

What other said about the 2007 Conference:

I would like to extend my gratitude to the team that presented the WAURISA conference this week. It was a very educational and enjoyable forum for discussing GIS and other mapping technologies. I know that it takes an incredible amount of time, effort (sweat and tears?) to host an event like this. Keep up the great work and I'm looking forward to next year!

Carolyn Prentice
Wetland Ecologist/Wildlife Biologist

What a terrific conference. Everything was perfect and a real treat to attend. Most special, was the keynote speech by Ron Sims. He was brilliant… I can tell you that his speech started a lot of conversations among the GISers.

Linda Gerull
Pierce County GIS Manager

WAURISA ANNOUNCES FALL 2007 EDUCATIONAL WORKSHOP

GIS and Asset Management will be the topic of a day long WAURISA Educational Workshop on Tuesday, October 9, 2007.

Don Burdick, Board Member and Education Committee Chair, announced that WAURISA has arranged for this URISA Certified Workshop to be presented at a yet-to-be determined Puget Sound area location.

Workshop Description:

Public and private agencies face continuous challenges to accomplish more with less as increases in demand, regulatory requirements, infrastructure deterioration, and political and economic forces have significantly outpaced increases in capital and operating budgets. Many of these agencies are turning to Asset Management to cope with these challenges and improve business performance and effectiveness. This workshop will focus on several aspects of developing an asset management system that could help improve performance, reduce long-term costs, and maximize return on investment in infrastructure assets. Specific topics include:

- Strategy and Planning
- Data Collection Methods
- Software Solutions
- Information Management and Decision Support Tools
- Evaluation and Performance Measures
- GASB34 Reporting
- Life Cycle Costs

Intended Audience: This workshop is intended for utility, transportation, engineering, planning, and environmental managers and analysts of the public and private sectors.

Instructor:

Jason Amadori, Chief Operating Officer
Data Transfer Solutions, LLC, Orlando, Florida

Mr. Amadori has over 10 years experience in the fields of Asset Management, GIS, GPS and Environmental Studies. He has managed over 15 asset management projects dealing with approximately 4,000 miles of roads, containing over $5 Billion in asset infrastructure. Mr. Amadori is also skilled in the integration of technology to achieve project-specific goals by aligning existing technology with client's goals and objectives.

Save the Date:

Tuesday, October 9, 2007

GIS & Asset Management Workshop

Look for more information about this workshop on the WAURISA website (www.waurisa.org), in the Fall 2007 issue of *The Summit,* and in future announcements.

Note: Completion of this daylong workshop earns each attendee 0.2 Education Points for the GIS Certification Institute's GISP Program (see: www.gisci.org).

GIS USER GROUPS IN WASHINGTON

ACSM – Washington State Section
http://www.wss-acsm.org/

ASPRS Puget Sound Region
http://www.photogrammetry.com/ASPRS-PSR/

Central Puget Sound GIS User Group
http://waurisa.org/phpBB2/viewforum.php?f=24
Meetings the 3rd Tuesday of each month from 1:00 to 3:00pm at Mercer Island City Hall. Contact Nora Gierloff at: ngierloff@ci.tukwila.wa.us

Central Washington GIS User Group
http://www.cwgis.org/
Meets the 1st Friday of each month at the Super China Buffet in East Wenatchee, WA at 12:00 noon.

King County GIS User Group
http://www.metrokc.gov/gis/KC_Users_Group.htm
Meets 1st Wednesday of each month at 11:00am at the KCGIS Center, 201 S. Jackson Street, Seattle WA, Conf Room 7044/7045.

Northwest Washington GIS User Group
http://www.acadweb.wwu.edu/gis/nwgis_mtgs.htm

Spokane Regional GIS User Group
http://waurisa.org/phpBB2/viewforum.php?f=19
Contact: Dave Rideout, Spokane County 509-477-7251
drideout@spokanecounty.org .

Washington Geographic Information Council (WAGIC)
http://wagic.wa.gov/
Join Listserve at: http://listserv.wa.gov/archives/wagic.html

To have your GIS related group or event listed in future issues of *The Summit*, notify the editor at: SummitGISNews@URISA.org.

To be added to *The Summit* mailing list, contact: SummitGISNews@URISA.org

Back issues of *The Summit* are available at: http://waurisa.org/thesummit/

JOIN THE WASHINGTON GIS COMMUNITY FORUM!

The Summit is not the only communications resource available to members of the Washington GIS Community. Sign up as a member of the Washington GIS Community Forum (http://waurisa.org/phpBB2/index.php) and access the latest news about GIS jobs, training, projects, and professional activity in Washington State.

WAURISA BOARD OF DIRECTORS

President: Angela Johnson: angela.a.johnson@us.army.mil
Vice President Dean Tatham deant@burienwa.gov
Secretary Greg Babinski: greg.babinski@kingcounty.gov
Treasurer Steve Schunzel: sschunze@co.kitsap.wa.us
Past President Rick Lortz: rlortz@lakehaven.org
Board Members At-Large:
Don Burdick: dburdick@cob.org
Russ Michel: russ.michel@autodesk.com
Lurleen Smith: LurleeS@co.mason.wa.us
Heather Spates: spatesh@wsdot.wa.gov
Amanda Taub ataub@co.douglas.wa.us
Donna Wendt: d_l_r_wendt@hotmail.com

WAURISA COMMITTEE VOLUNTEERS

Marty Balikov: mbalikov@esri.com
Neil Berry: Neil.berry@seattle.gov
Glenn Brooks: brooks.glenn@comcast.net
Whitney Buschmann: buschmw@wsdot.wa.gov
Chuck Buzzard: cbuzzard@co.pierce.wa.us
Cort Daniel: cort.daniel@co.pierce.wa.us
Doug Day: dday@esri.com
Kristina Evanoff: evanoffk@soundtransit.org
Melissa Faga: mfaga@redmond.gov
Tami Griffin: griffit@wsdot.wa.gov
Tia Hillerman: thillerman@highlinewater.org
John Joseph: jjoseph@esri.com
Jitka Kotelenska: Jitka.Kotelenska@CH2M.com
Michelle Lortz: michelle@lortzco.com
Reily Love: webmaster@waurisa.org
Effie Moody: effie.moody@seattle.gov
Dave Rideout: drideout@spokanecounty.org
John Rose: johnrose45@msn.com
Greg Stought: Gregory.stought@kingcounty.gov
Mike Strong: Mike.strong@cityoffedralway,com
Matt Stull: matts@co.mason.wa.us
Bob Wendt: rwendt@cityoftacoma.org

Interested in volunteering your time to help WAURISA?
Contact Angela Johnson or any Board member listed above.

WAURISA
1402 AUBURN WAY NORTH
PBN 158
AUBURN WA 98002