

First State Geology

Current information about Delaware's geology, hydrology, and mineral resources

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New DGS Report Focuses on Eastern Sussex County

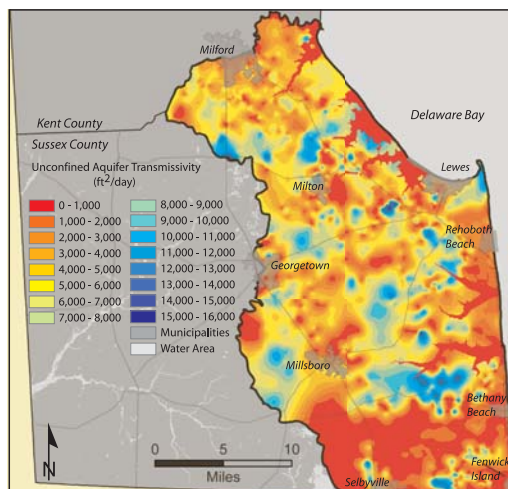
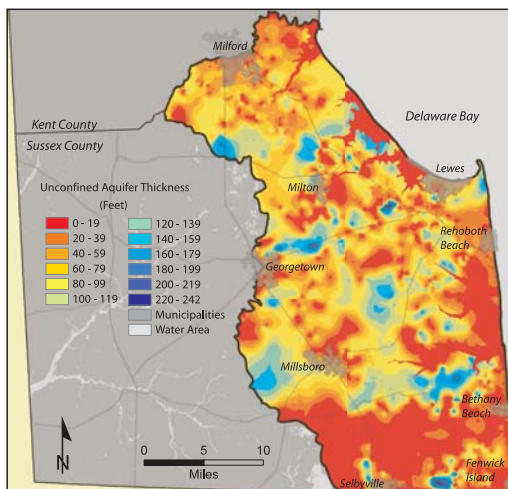
By A. S. Andres

The Delaware Geological Survey released a new technical report entitled "Thickness and Transmissivity of the Unconfined Aquifer of Eastern Sussex County, Delaware" which presents the results of research by A. Scott Andres and Andrew D. Klingbeil.

DGS Report of Investigations No. 70 documents technical aspects of the unconfined aquifer mapping program, including rules developed to map confining beds, a systematic method to estimate transmissivity from lithology, the creation of digital products (versus traditional paper maps), and potential applications to real-world issues. The method is now being applied to mapping the unconfined aquifer in western Sussex County. The unconfined aquifer mapping program is funded by the Department of Natural Resources and Environmental Control through a grant from the U.S. Environmental Protection Agency.

There are growing concerns about the impacts development has on the quality and quantity of this important natural resource. The report and digital products provide information that will be useful in guiding informed management decision making regarding anticipated growth and economic development, developing and protecting water supplies, locating and designing land-based wastewater disposal systems, supporting agriculture, and educating the public about ground water. Ground water provides nearly all fresh water for public, domestic, commercial, irrigation, and industrial uses in Delaware south of the Chesapeake and Delaware Canal and about 25 percent north of the Canal.

Report of Investigations No. 70 is available in PDF format from the DGS web site at <http://www.udel.edu/dgs/> under



Maps of thickness (left) and transmissivity (right) of the unconfined aquifer of eastern Sussex County, Delaware.

"Publications." Printed copies of the publication may be requested by contacting the Survey at (302) 831-2833 or via email at delgeosurvey@udel.edu.

Richard N. Benson Retires

By J. H. Talley

Senior Scientist, Dr. Richard N. Benson, retired from the Delaware Geological Survey in February following more than 30 years of service to the DGS, University of Delaware, and the State of Delaware. He had a joint appointment as associate professor in the Department of Geology at the University of Delaware, and is a Delaware registered geologist.

Dick earned a bachelor of arts degree in geology from Augustana College and a Ph.D in geology from the University of



Minnesota. He joined the DGS in 1975 following six years of employment as an assistant professor of geology at Augustana College and four years as a geologist with Humble Oil and Refining Company. While employed at Humble Oil, he conducted research in regional stratigraphy and well-site paleontology, and developed petroleum prospects in the Louisiana Gulf Coast. The broad base of knowledge and experience gained in industry and academia enabled him to contribute significantly to our understanding not only of the geology and hydrology of Delaware, but also that beneath the Outer Continental Shelf offshore Delaware.

Dick was involved in research related to development of the subsurface geologic framework and geologic history of the Delaware Coastal Plain and the petroleum resource potential of the U.S. Atlantic Continental Margin. His scientific contributions are significant and invaluable in that they enabled the DGS to more fully understand the relationship between geologic formations and associated major aquifers that are used for public, industrial, commercial, and irrigation throughout the Coastal Plain of New Castle, Kent, and Sussex counties. He also served as DGS editor for many years. The results of his work are contained in more than 42 publications and reports related to the

geology and hydrology of Delaware and the Atlantic Outer Continental Shelf. In addition, he has served on numerous state, federal, and university graduate student committees, taught several courses, presented numerous lectures, and supported his profession through active participation and service in professional societies.

Dick is a very fine scientist and educator, but more important, he also is a very good person who is highly respected by his colleagues and friends. His kindness, thoughtfulness, congeniality, respect for others, and humor are admirable qualities that will be missed at the Survey.

DataMIL Updates and Enhancements



By M. L. Pomilio

Several data layers were added to the Delaware DataMIL over the past six months. New Castle, Kent, and Sussex counties each provide a Communities layer which replaces the out-dated Geographic Names Information System (GNIS)-populated place names. An additional change to the GNIS layer includes the removal of duplicative names attached to individual Delaware Spatial Data Framework (DSDF) layers such as municipal boundaries, schools, and hydrologic features. In addition, recently scanned and geo-referenced 1961 aerial photographs can now be accessed through the Delaware DataMIL.

The National Hydrography Dataset (NHD) replaces the 1993 digital line graph hydrography data as the new Hydrology framework layer on DataMIL. The NHD is more complete and allows improved labeling of water features. The DataMIL staff at the DGS and Deborah Sullivan, of the Delaware Department of Natural Resources and Environmental Control (DNREC), were trained by the U.S. Geological Survey (USGS) to edit and update the NHD geodatabase. DNREC is the data steward for the NHD Spatial Data framework layer and will lead the effort to ensure the NHD line work matches the 2002 aerial photography enabling users to more accurately locate Delaware water features.

The biggest news, however, is the ability to produce a DataMIL version of the USGS 7.5-minute topographic map. These "Delaware DataMIL 7.5-minute Series (Topographic) Quadrangle" maps use the current data from the DataMIL to create large format (36" x 24") topographic-style

maps. These new map products retain the USGS Delaware quadrangle names and include areas bordering the original quadrangle boundaries to accommodate the common 36-inch width of large-format plotters and printers. New maps are generated semi-monthly and are accessible from the Get Topo Map tool in the DataMIL Map Lab. The final format is in Adobe PDF and can be downloaded and sent to a plotter or saved to disk. For those who do not have large-format plotting capability, the file can be taken to any local copy center that can print large-format graphics. Because the USGS no longer prints up-to-date hard copies of the 7.5-minute topographic maps, this new application is Delaware's solution to continue providing a 1:24,000-scale map series for the state.



By M. L. Pomilio

"Delaware GIS 2006: Patterns of Change" was held May 31 – June 2 at the University of Delaware Clayton Hall Conference Center. Four pre-conference workshops were held on the University of Delaware campus. Environmental Systems Research Institute (ESRI) hosted ArcGIS Tips & Tricks and ArcPad: Hands-On. John Callahan (UD Research and Data Management Services) focused on the new Delaware Metadata Portal, and Miriam Pomilio (DGS) instructed attendees on how to use the Delaware DataMIL.

A first at the Delaware GIS conference this year was an evening exhibitor social at Clayton Hall. This social event allowed attendees to visit with exhibitors and network with fellow GIS professionals. An interactive game encouraged attendees to visit all the exhibitors. Attendees visited each exhibitor's booth and tried to identify locations in Delaware from historic (1937 or 1954) aerial photographs. The game tied into the conference theme "Patterns of Change" and showed how drastically some areas of Delaware have changed over the years.

The keynote speaker, Allen Carroll, Chief Cartographer and Executive Vice President of National Geographic Maps, outlined the history of National Geographic Maps and how GIS technology is being used to create maps and serve on-line information to the public and educational facilities.

Presentations throughout the day focused on the patterns of change in our region. The capstone speaker this year, Martin Brückner, author of "*The Geographic Revolution in Early America: Maps, Literacy, and National Identity*" and Associate Professor of English at the University of Delaware, provided an overview of how maps in early America shaped the geographic revolution. Dr. Brückner also hosted a book signing event during the evening social.

Steve Cardano, Science Coalition Specialist for Indian River School District, received the 2006 GIS in Education Award. Mr. Cardano is based at the Ingram Pond Nature Center and works with students to monitor blue bird nesting sites in the Inland Bays using Global Positioning Satellite (GPS) and GIS. Sandy Schenck (DGS) received the 2006 Delaware Geographic Service Award given in memory of Vernon C. Svatos (see separate article).

This year's K-12 student contest, "Migration: Change to the Human Situation" provided students in Delaware an opportunity to study human migration and to investigate the effects that migration can have on culture, climate, the environment, a place or region, economics, or citizenship. Students were encouraged to use posters, PowerPoint presentations, and 3-dimensional models to describe their projects. This year's winners received a certificate of recognition and a savings bond. The K-12 student contest was co-sponsored this year by the Delaware Career Resource Network and Advanced Technology Solutions.

A full day post-conference workshop led by Tracey DeLiberty (UD Department of Geography) and Thomas McKenna (DGS) focused on the use of GPS units and incorporating these data into a geographic information system environment.

In Memory of Ralph Orlansky

By P. P. McLaughlin, Jr.

Delaware Geological Survey Adjunct Research Associate, Dr. Ralph Orlansky, passed away on Friday, January 13, 2006 in Newark, Delaware, following a brief illness. Ralph came to the DGS in 1992 and made valuable contributions to the DGS research program as a volunteer researcher. His research efforts on pollen and plant spores, which are used for age dating and correlating formations and aquifers, will have a lasting benefit to us in solving geologic problems in Delaware.

Ralph attended college after serving in World War II and had his first experience in geological research at the Missouri School of Mines where he received his master's

degree in geology in 1950. Following his master's studies, he went to work in the oil industry for a geophysical service company in Texas from 1951 to 1963 and was involved in the earliest years of seismic reflection data processing, an important modern tool in the search for oil and gas resources. In 1967, Ralph obtained his doctorate degree in geology at the University of Utah which brought him into the field of fossil pollen and spores.

Ralph began working at the DGS in 1992, working on projects that included looking at both modern and fossil pollen and spores. He assembled a reference collection of modern pollen from herbaria, botanical gardens, and local parks. In the last few years of his work, he collaborated with colleagues and students in documenting this collection in a searchable photographic database. His work on fossil pollen involved processing samples and documenting specimens from cored, subsurface geologic formations in Dover, Delaware and Clayton, New Jersey. His most recent work on the Dover project focused on documenting the stratigraphic sequence of fossil pollen and spore occurrences by creating a searchable photographic database.

Ralph's careful, thoughtful approach to his work and quiet, humble, considerate manner were greatly appreciated by his colleagues at the DGS. He cared greatly about the environment, education, and bettering society and was committed to organizations dedicated to these causes. He is sincerely missed.

William Schenck Awarded Prestigious GIS Award

By: Office of State Planning Coordination

William (Sandy) Schenck, of the Delaware Geological Survey was honored with the *2006 Geographic Community Service Award* at the annual Delaware GIS Conference on June 1. Mr. Schenck was honored for his many years of leadership in the geospatial data community.

For more than 20 years, Sandy has been a leader in promoting the use and sharing of geographic information and geospatial data in Delaware. He has shared his knowledge of geology and geography with generations of Delaware students through the Earth Science Information Center at the DGS. He headed the State Mapping Advisory Committee (SMAC), was a founder of the Delaware Geographic Data Committee (DGDC), and is an active member of the DGDC and of the Delaware Spatial Data Implementation Team.

Sandy is a respected member of the

National States Geographic Information Council (NSGIC) and was awarded the USGS' *John Wesley Powell Award* in 2003 for his work on the team that developed the Delaware Data Mapping and Integration Laboratory (DataMIL). He leads the Geographic Names Committee for the State and helps to represent Delaware on interstate boundary issues.

"Sandy Schenck is an educator, a leader, and a mentor," said Mike Mahaffie, lead staff for the DGDC. "His dedication to the use and sharing of geospatial information makes him a natural choice for this award. I'm pleased to call him my colleague; I'm proud to call him my friend." The *Geographic Community Service Award* is given annually in memory of the late Vernon C. Svatos, a seminal figure in GIS in Delaware. The award honors those who demonstrate a commitment to furthering geographic knowledge and understanding in the State.

DGS Participates in Drillers Seminar

By P. P. McLaughlin, Jr.

Two staff members of the DGS participated in the Drilling and Grouting seminar sponsored by the Delaware Water Well Drilling Licensing Board with the support of the Department of Natural Resources and Environmental Control (DNREC), Baroid Industrial Drilling Products, and the DGS. The seminar, held on June 9 at Killens Pond State Park, focused on providing drillers with the latest information on techniques for grouting during construction of water wells.

Ground water is an important natural resource for the residents of Delaware. It is obtained from wells drilled into underground water-bearing formations called aquifers. Construction of a water well in Delaware typically involves drilling a hole into the ground to the level of the aquifer, installing a length of pipe into the ground (the casing) with openings at the end (the screen), packing sand around the screen (the gravel pack), and sealing the casing into place with clay or cement (the grout). The grouting step is important to both quality of well construction and environmental protection. The driller aims to place a continuous fill of impervious material in the open space (or annulus) between the casing and the wall of the hole drilled. Such an impervious fill protects the ground water from surface contamination or contamination from poor quality water or pollution in other underground zones. However, proper grouting requires careful attention to techniques. The Water Well Drilling Licensing Board thought that it would be beneficial

for Delaware's drillers to have the opportunity for continuing education on this subject and charged board member John McFarland of American Water Wells Systems, Inc., with organizing a seminar.

DGS Senior Research Technician Steve McCreary joined with Alan Pongratz of DNREC, Dennis Duty of Baroid Industrial Drilling Products, and John Fuhr, Jr., John's Well Drilling, Inc. to drill a hole and demonstrate grouting techniques. More than 40 participants were in attendance, including licensed water-well professionals and DNREC employees involved in water-well permits and regulatory enforcement; DGS Director and State Geologist John H. Talley, a member of the licensing board, was also on hand for this workshop. The drilling crew drilled a hole to 80 ft depth, extending through the surficial Columbia aquifer and into the underlying Choptank Formation. The drillers identified a target zone for installation of the well screen based on the samples of drilled materials, or cuttings, obtained during drilling of the well. McCreary and DGS Senior Scientist Pete McLaughlin gave a demonstration of the use of geophysical logs by dropping gamma ray and resistivity probes in the hole to confirm the exact depths of the zone to be screened. Following insertion of the well screen, casing, and gravel pack in the hole, grouting techniques were explained by Dennis Duty and demonstrated by the drilling crew. The final result was a high-quality well installation that provided a good example of the most effective techniques to properly grout a well and an educational experience that should benefit the attendees involved in Delaware's water well industry.

DGS Welcomes Jaime Tomlinson

By P. P. McLaughlin, Jr.

Jaime Tomlinson, joined the DGS in June as a limited term researcher. Jaime received her Master of Science degree in geology from the University of Delaware earlier this year. She is working with DGS staff members, Peter P. McLaughlin, Jr., and Stefanie J. Baxter on an integrated study examining the aquifers and groundwater resources of Sussex County, Delaware. Funding for this project is provided by the Department of Natural Resources and Environmental Control.

Ground water is one of the most important natural resources in Sussex County and is the sole source of drinking water. In addition, it is used extensively for irrigation, supplies local industries, and provides base flow for streams. Jaime's participation in this project involves collecting and

organizing data for the Sussex County ground-water study and conducting basic geologic and hydrologic research relevant to understanding ground-water resources of southern Delaware.

Publications

Recent DGS Publications Report of Investigations

No. 70, Thickness and Transmissivity of the Unconfined Aquifer of Eastern Sussex County, Delaware: A. Scott Andres and Andrew D. Klingbeil, 19 p., 1 plate.

Geologic Map

No. 13, Geologic Map of New Castle County, Delaware: Kelvin W. Ramsey, 1:100,000.

Other Publications by DGS Staff

Browning, J.V., Miller, K.G., **McLaughlin, P.P. Jr.**, Kominz, M. A., Sugarman, P. J., Monteverde, D., Feigenson, M. D., and Hernandez, J. C., Quantification of the effects of eustasy, subsidence, and sediment supply on Miocene sequences, U.S. Mid-Atlantic Margin: Geological Society of America Bulletin, v. 118; no. 5/6; p. 567-588.

Sugarman, P. J., Miller, K. G., Browning, J. V., Kulpecz, A. A., and **McLaughlin, P.P. Jr.**, Hydrostratigraphy of the New Jersey Coastal Plain: Sequences and facies predict continuity of aquifers and confining units: Stratigraphy, v. 2, no. 3, p. 259-276.

Aleinikoff, J. N., **Schenck, W. S.**, **Plank, M. O.**, Srogi, L., Fanning, C. M., Kamo, S. L., and Bosbyshell, H.,

Deciphering igneous and metamorphic events in high-grade rocks of the Wilmington Complex, Delaware: Morphology, cathodoluminescence and backscattered electron zoning, and SHRIMP U-Pb geochronology of zircon and monazite: Geological Society of America Bulletin, v. 118, no. 1/2, p. 39-64.

Staff Notes

Presentations

Peter P. McLaughlin, Jr. with Sugarman, P. J., Miller, K. G., **Benson, R. N.**, Browning, J. V., and Brenner, G. J., 2006, "Application of Microfossils to Production-Scale Problems in Ground-Water: Aquifer Biostratigraphy of the Cretaceous and Miocene of Delaware and New Jersey, Middle Atlantic Coastal Plain, USA," 2006 AAPG-SEPM Annual Meeting.

Mark P. Neimeister, A. Scott Andres, and Vincent Pellerito, "Modeling Ground-water Contaminant Flow Paths in Delaware," Delaware GIS 2006: Patterns of Change, University of Delaware, Newark, May 31-June 2.

Miriam L. Pomilio, "Delaware Data Mapping and Integration Laboratory (DATAMIL), an interactive, online tool for use by federal, state, county, and local governments," Advanced ArcGIS Class, University of Delaware, March 6; Atlantic chapter of the Urban and Regional Information Systems Administration, March 16, and at Delaware Center for Education Technology conference, April 6, Dover; "Delaware DataMIL: Serving Delaware's

Base Map Information," Delaware GIS 2006: Patterns of Change, University of Delaware, Newark, May 31-June 2.

Service and Awards

Congratulations to **P. Steven McCreary**, class valedictorian from James H. Groves High School.

Peter P. McLaughlin, Jr., co-chaired technical session, "NAMS Symposium, CHRONOS: Constraining the Geologic Record," Annual Meeting of the American Association of Petroleum Geologists and the Society for Sedimentary Geology, April 9-12.

Peter P. McLaughlin and **P. Steven McCreary** participated in the Delaware Water Well Drilling Licensing Board Drilling and Grouting Seminar, Killens Pond State Park, June 9.

Congratulations to **William S. Schenck** for 25 years of service at the DGS and for receiving the 2006 Geographic Community Service Award which is given annually to those who demonstrate a commitment to furthering geographic knowledge and understanding in Delaware. Sandy also testified before the State Senate in support of SB386 which clarifies language in the Delaware Code pertaining to Regulation of Professional Geologists (Del. Code 24, Chapter 36), June 27.

John H. Talley served on the organizing committee, provided opening remarks along with Barry Drucker, U.S. Minerals Management Service, and was moderator for the opening session of the 1st Minerals Management Service Marine Minerals Program Information Transfer meeting, June 20-22.



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