

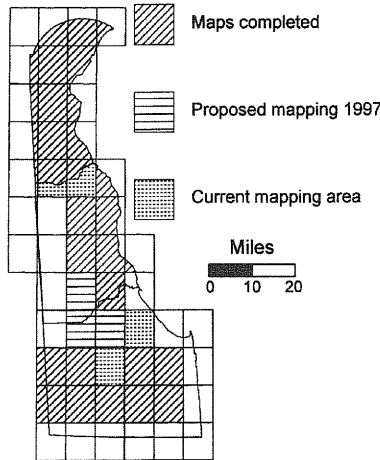
# First State Geology

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

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University of Delaware



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## Ground-Water Recharge Mapping

By A. Scott Andres

The program to map ground-water recharge potential is entering its sixth year. Mapping efforts to date have covered much of the state (see map). The maps depict areas that have been characterized, on the basis of a good understanding of the geology, by their ability to transmit water into the shallow Columbia aquifer.

The completed maps are used by the Department of Natural Resources and Environmental Control (DNREC), the Department of Agriculture, and New Castle County to ensure that supplies of ground water will meet future demands, to maintain adequate discharge of ground water to bodies of surface water, and to reduce the potential for degradation of ground-water quality.

This program has been supported by the DNREC through the Clean Water Act, by New Castle County, and by the General Assembly's appropriations to the DGS. Completion of maps for the entire state is uncertain because of cut-backs in federal funds.

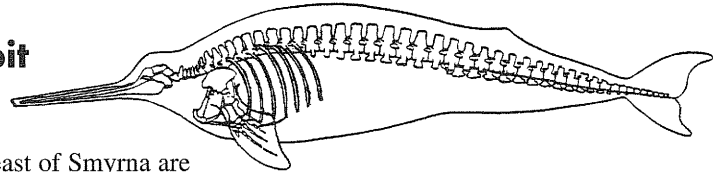
## New DGS Fossil Exhibit

Fossils from the Pollack Farm site (Id11-a) southeast of Smyrna are now on public display. Three cases in the lobby of the DGS Building hold marine shells and bones and teeth of fish, sharks, rays, amphibians, reptiles, and marine and terrestrial mammals found during excavation of a borrow pit for the construction of State Route 1 (see Winter and Summer 1992 and Summer 1993 issues of *First State Geology*). The fossils are of early Miocene age (about 18 million years old) and are remarkably well preserved. The shells are not much different in appearance from those found today on Delaware's Atlantic beaches.

The fossils are from the Cheswold sands of the Calvert Formation. The Cheswold is an important aquifer in Delaware. The fossils accumulated with the sands in an environment that brought together the remains of terrestrial, estuarine, and marine animals.

One exceptional display showcases an assembly of bones that form a partial skeleton of *Zarhachis flagellator*, an extinct marine porpoise that was about 16 feet long. What makes *Zarhachis* so interesting is that its skull and snout together comprise 6-7 feet of that total body length. Other items on display include land tortoise shell fragments, crocodile teeth, a rhinoceros jaw and teeth, horse teeth, jawbone and teeth of a peccary, chalicothere bones, and fish and shark teeth.

The displays are still being developed; however, they are open for public viewing and will remain as permanent exhibits in the DGS Building. The building is open Monday through Friday,



Restoration of extinct porpoise *Zarhachis flagellator* (R. Kellogg, Smithsonian Explorations, 1933)

except holidays, from 8:00 A.M. to 4:30 P.M. For more information please contact W. S. Schenck at (302) 831-8262 or by e-mail at [rockman@udel.edu](mailto:rockman@udel.edu).

## Cooperative Research on Offshore Sand Resources

By Kelvin W. Ramsey

The Delaware Geological Survey continues its evaluation of offshore sand resources for beach nourishment and other uses. On October 3, 1996, the DGS hosted a meeting of state and federal agencies involved in this work offshore Delaware, Maryland, and New Jersey. Participants represented the Maryland Geological Survey, the New Jersey Geological Survey, the Delaware Department of Natural Resources and Environmental Control, the New Jersey Department of Environmental Protection, the Philadelphia and Baltimore districts of the U.S. Army Corps of Engineers, and the Minerals Management Service of the U.S. Department of the Interior.

The meeting emphasized the importance of interagency communication and cooperation in order to avoid duplication of effort and to optimize utilization of funding. In addition, common areas of research and future sand resource needs were discussed. In order to reduce costs

we will pursue a cooperative sediment coring project offshore the three states involved. The purpose of the coring is to obtain samples to determine their suitability for beach nourishment or other uses and to further knowledge of the offshore geology for refining models of offshore sand resource distribution.

## Honors for Bob Jordan

Readers of *First State Geology* are apprised of State Geologist Robert R. Jordan's many contributions to the science and profession of geology. His efforts have been duly summarized in the issues of this newsletter. In this issue we are proud to report the formal recognition by two national organizations of his years of dedicated service.

The American Geological Institute (AGI), the umbrella organization of 29 geoscience societies, awarded its highest honor, the Ian Campbell Medal, to "Bob Jordan, whom we honor, has much in common with Ian Campbell," as stated by citationist William L. Fisher, former director of the Bureau of Economic Geology at the University of Texas at Austin, at the awards ceremony during the annual meeting of the Geological Society of America in Denver, October 29, 1996. The Ian Campbell Medal is given in recognition of singular performance in and contribution to the profession of geology. In comparing Jordan with Campbell, Fisher adds "The character and career of both men show a keen dedication to geology as a science and profession. Both reveal men fiercely loyal to the integrity of geology. . . Bob Jordan . . . has developed an effective and scientifically respected state geological survey . . . His indefatigable work for several of our national geological societies is as distinguished as it is pervasive."

Bob Jordan again was honored as the 1996 Recipient of the Award of Honorary Membership in the American Institute of Professional Geologists (AIPG) at the organization's annual meeting in Columbus, Ohio, October 8-11, 1996. Citationist John J. Amoruso was unable to attend, but Thomas E. Pickett, recently retired from the DGS, read Amoruso's prepared remarks: "His frequent, effective testimony before multitudinous governmental bodies has guid-

ed many of these bodies to scientifically logical, legislative, regulative, and operational decisions." On a more personal note Amoruso adds, "As meetings sometimes wallowed in minutiae . . . he would summarize the important facets of the discussion and in a deliberate, sonorous voice offer his analysis, conclusions, and recommendations, bringing focus back to the meeting."

Congratulations, Bob, on two well-deserved awards!

## Nearby Maryland Earthquake

At 7:43 A.M. on October 17th, 1996, a 2.5-magnitude earthquake occurred in north-central Cecil County, Maryland. The event was recorded on two of the Delaware Geological Survey's seismographs. Preliminary assessment of these data plus those from a station at Millersville University, Pennsylvania, and stations in New York State operated by Lamont-Doherty Earth Observatory indicates that the earthquake's epicenter was in the vicinity of Rising Sun. The earthquake was felt over much of northern Cecil County and eastern Harford County, Maryland, and southern Lancaster County, Pennsylvania. There were no felt reports of the event in Delaware.

The DGS maintains the only network of seismic-recording stations between New York and Virginia. Much of the data gathering and public requests for information regarding local and regional earthquakes focuses on the DGS when such an event occurs. Public concern about geologic hazards such as earthquakes is high. The DGS makes every effort to provide prompt and accurate information. For this event, the staff of the DGS gave seven radio, four newspaper, and two television interviews as well as answered several inquiries by telephone.

## NED Seismic Station Upgrade

By Charles T. Smith

The morning of October 17th brought attention to a local earthquake, and the afternoon brought the installation of seismic equipment into a new station housing our good friend "NED." NED, the official code for our seismometer at NEwark, DElaware, was originally

installed in November 1972 in an existing farm outbuilding. The small storage structure was located next to an historic barn and served as a housing and utility tie for the DGS seismic station. The aged outbuilding was in such poor condition that further repair would not keep it serviceable.

The outcome of exploring several options was to move the station slightly and place a portable building atop a concrete slab. The slab was built to surround a short concrete pier upon which instruments are placed.

A planned upgrade of NED is the installation of horizontal seismometers to supplement the existing vertical seismometer. This will provide greater precision in locating the epicenters of local earthquakes.

## Marlene A. Carucci Retires

After more than 38 years of service to the DGS and the University of Delaware, Marlene A. Carucci retired at the end of August. As Executive Secretary, she was responsible for most of the business of operating an increasingly complex organization. Ms. Carucci essentially grew up with the DGS and had a unique understanding of its procedures and administration.

Marlene Carucci's performance for so many years was consistently faithful and flawless. She took pride in her work and exerted a high level of quality control throughout the Survey. Dedicated, discreet, and knowledgeable, she was a very rare example of the best qualities to be sought in an employee.

A native of Wilmington, Ms. Carucci will continue to reside in that city. She is greatly missed, but has the very best wishes of her colleagues at the DGS and the many others to whom she represented us. We hope she will enjoy a long and rewarding retirement. We will remain grateful for her contributions.

## Mary F. Sullivan and Stefanie J. Baxter Join DGS

We are pleased to welcome Mary F. Sullivan as the new Executive Secretary at the DGS and Stefanie J. Baxter to the position of Research Associate I.

Mrs. Sullivan has served for eight

years in the University's Office of the Vice Provost for Research, last as Administrative Assistant to the Vice Provost. Before joining the University, she had significant experience in business activities relating to insurance, schools, and industry. Mrs. Sullivan brings a wide range of important skills to the DGS, and we look forward to many years of productive association.

Mrs. Baxter is also well acquainted with Delaware as she earned her M.S. degree in marine studies from the University and has worked with the DGS as a project geologist for almost 2 years. The established high quality of her research and service assures that she will contribute importantly as a member of our core geologic staff. Her responsibilities will emphasize hydrogeology.

## Information Preservation

There is increasing concern nationwide about the loss of basic geologic information of all types, primarily as a consequence of reduced budgets. State Geologist Robert R. Jordan was invited to a meeting of specialists convened by the American Geological Institute (AGI) in Washington in July to develop support for AGI's National Geoscience Data Repository System (NGDRS). Although AGI first sounded the alarm about the loss of oil industry core samples, it is now clear that this threat exists for all types of samples, geophysical records, fossils, databases, and maps.

As industry, especially the domestic oil and gas industry, and government downsize, budgets for storage and curation of geologic samples and data are being cut. Vast quantities of valuable materials are being discarded or neglected. NGDRS is working to preserve collections and improve public access. AGI is not seeking to build new repositories but, rather, to encourage preservation of existing collections and, most critically, to develop a computer "metadata" system that will provide access to information about the diverse locations and kinds of geologic information.

The DGS has more than 100,000 samples of rock outcrops, drill cuttings, and cores in its Core and Sample Library as well as many other collections and databases. It supports the NGDRS and

expects significant benefits to users of geologic information in Delaware. It is important that our systems be compatible with an evolving national system to assure efficient flow of information in and out of the DGS.

## Ground-Water Quality Monitoring in Southern New Castle County

*By Stefanie J. Baxter*

New Castle County will continue to experience increased development of its water resources, especially ground water, for public, domestic, agricultural, and industrial uses. At this time, aquifers provide more than 25 million gallons per day (MGD) of water for all uses. All of the potable water used in southern New Castle County (6.8 MGD) comes from aquifers, and a significant amount is withdrawn from the regional, shallow, water-table aquifer. Favorable hydrologic characteristics coupled with its position close to land surface render this aquifer particularly susceptible to contamination.

In July 1994, the DGS, in cooperation with the Water Resources Agency for New Castle County, New Castle County Department of Public Works, Delaware Division of Public Health, and Delaware Department of Agriculture, designed a multi-phase ground-water quality monitoring network for southern New Castle County. Of 200 wells considered, approximately 60 were selected for continued monitoring and sampling. Fourteen new wells were drilled in watersheds where data are scarce or development is projected.

Water-quality sampling started in August 1996. Twenty-eight different field and laboratory measurements are performed on the water sampled from each site, including inorganic and organic constituents as well as radon and pesticides. Sampling is scheduled on a quarterly basis for shallow water-table wells and public wells. A yearly rotation was selected for wells screened in confined aquifers. Results of analyses are being entered into a database that will enable state and local officials to effectively manage ground-water development and use. Funding for the network is provided by the New Castle County Department of Public Works.

## Sunset Review of Geologists Registration Board

The Geologists Registration Board is currently under legislative Sunset Review. The Board's statute has recently been reviewed by the Legislative Council which considered comments from the Board members, both collectively and individually, and from many registrants. The statute will be "brought into alignment with current verbiage" according to Maryanne McGonegal, Sunset Review Committee research analyst. Some intended changes will include longer terms for Board members and the possibility of an examination requirement for registration. Along with these changes, the Board has revised its application form. The Board is currently scheduled for a Sunset Review hearing in February 1997.

## Cartographic Corner

*By W. S. Schenck*

The U.S. Geological Survey has reviewed its Digital Line Graph (DLG) Hypsography files and found some errors. Please be aware of this if you have ordered these files from USGS or have borrowed the CD from the Delaware Geological Survey. The USGS reports:

- (1) The Little Creek Quadrangle has many contour lines mismatched with those of adjoining quads owing to a bad geometric configuration during data collection. Other unmatched or anomalous contours are reported along the edges of the Lewes, Cape Henlopen, Fairmount, Rehoboth Beach, Frankford, and Bethany Beach quadrangles. These anomalies are due to unmatched source materials from which the hypsography was collected. These quads were revised in 1984 and published in metric, but during the 1992-93 remapping, they were converted back to English and switched to the NAD83 horizontal datum. Small anomalies occur along edges because these quads were not contoured with adjacent total revision maps.
- (2) All of the DLG header files contain information indicating NAD27 horizontal datum for the file. This is incorrect as the files are actually in NAD83.

The USGS will be correcting the Little Creek data problem and the misinformation in the DLG hypsography header files for all the quads collected and then reissue the files. The Delaware Geological Survey will be receiving a new set of these files for distribution to interested parties. For more information please contact W. S. Schenck at (302) 831-8262 or e-mail at [rockman@udel.edu](mailto:rockman@udel.edu).

Look for new information on the DGS Cartographic Information Center web site (<http://www.udel.edu/dgs/dgs.html>) databases. The map and aerial photography database is currently undergoing an update. New information is being added daily. Others available are the Benchmark and Boundary databases.

## Publications

### Recent DGS Publications

#### Bulletins

- No. 20, Stratigraphy of the Post-Potomac Cretaceous-Tertiary Rocks of Central Delaware: Richard N. Benson and Nenad Spoljaric, 28 p.

#### Reports of Investigations

- No. 54, Radiocarbon Dates from Delaware: a Compilation: Kelvin W. Ramsey and Stefanie J. Baxter, 18 p.

#### Other Publications by DGS Staff

- R. R. Jordan, 1996, The drought of '95: Transactions of the Delaware Academy of Science, v. 21, p. 35-51.

## Staff Notes

### Presentations

- **A. Scott Andres**, "Assessing the Impact of Agricultural Drainage on Water Quality in Sussex County, Delaware," at the symposium on Environmental Nutrient Loading from Agricultural Practices and Remediation, Waterloo Center for Ground Water Research, University of Waterloo, Ontario, Canada, August 20; with J. W. Gangloff, J. T. Sims, and J. M. Denver, "Influence of Agricultural Drainage Practices on

Phosphorus and Nitrogen Concentrations in Groundwater in the Atlantic Coastal Plain" and "Predicting Phosphorus Saturation of Atlantic Coastal Plain Soils Using Easily Measurable Soil Parameters," at "Globalization: A Challenge for Change," the 88th annual meeting of the Crop Science Society of America, Indianapolis, Ind., November 5; with **Kelvin W. Ramsey** invited to present a summary of current DGS geologic and hydrologic research in the Dover area to a U. S. Department of Energy workshop in Lewes on bioremediation projects at the Dover Air Force Base, October 29.

- **Stefanie J. Baxter**, "Design, Development, and Implementation of a Ground-Water Monitoring Network for Southern New Castle County, Delaware," invited speaker at Highland Community College, Freeport, Ill., November 27.
- **Richard N. Benson**, "Petroleum Systems of the United States Middle Atlantic Continental Margin," invited talk for the meeting of the Geology Department Advisory Council and the Udden Geology Club, Augustana College, Rock Island, Ill., October 4.
- **Johan J. Groot**, Professor Emeritus, "Records of Climate of Several Glacial-Interglacial Cycles Indicated by Pollen Assemblages and Other Data in Sediment Cores of the Atlantic and Pacific Oceans," at the 9th International Palynological Congress, Houston, Tex. June 23-28; with **Kelvin W. Ramsey**, "Palynological Evidence of Quaternary and Pliocene Climates of the Middle U.S. Atlantic Coastal Plain," at the annual meeting of the Geological Society of America, Denver, Colo. October 28.
- **John H. Talley**, "Hydrogeology of Delaware," Delaware Rural Water Association workshops, Dover, August 12, and Rehoboth Beach, August 13.

### Service and Awards

- **A. Scott Andres** will be on professional leave from January 2 through June 30, 1997. While on leave he will be concentrating his efforts on the geochemistry and hydrogeology of nitrogen and phosphorus in ground and surface waters. These topics are of critical importance to Delaware in terms of state and federal efforts to reduce eutrophication of surface water and protect drinking water sources. Preliminary plans include collaborative field and laboratory work with

researchers at Oregon State University and North Carolina State University.

- Congratulations to **Stefanie J. Baxter** who has been promoted to Research Associate I and is now a permanent staff member of the DGS. She recently completed a professional training course, "Quality Control Sample Design and Interpretation," offered by the U.S. Geological Survey in Denver, Colo., August 26-30.
- **Richard N. Benson** was elected to chair the Augustana College Geology Department Advisory Council for 1997; with Allan M. Thompson of the University of Delaware Department of Geology, he is co-chairman of the technical program of the 32nd annual meeting of the Northeastern Section, Geological Society of America, to be held at the Sheraton Valley Forge Hotel, King of Prussia, Penna., March 17-19, 1997.
- **Roland E. Bounds**, president of Friends of Mineralogy, Pennsylvania Chapter, presided over the Chapter's annual Mineralogical Symposium at West Chester University, Penna., November 15-17.
- **Robert R. Jordan** has been appointed a trustee of the American Geological Institute Foundation.
- **John H. Talley** is now the sole Associate Director of the DGS. John adds the duties of the other Associate Director **Thomas E. Pickett** who retired last year.
- Happy Anniversary to **Dorothy C. Windish** who completed 20 years of service to the DGS on September 7, 1996.

*First State Geology* is published by the Delaware Geological Survey, a State agency established by an Act of the Delaware General Assembly in 1951 and organized as a unit of the University of Delaware.

Robert R. Jordan  
*State Geologist and Director*  
Richard N. Benson,  
*Editor, First State Geology*

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Send mailing label and your new address, and/or

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