



Florida

Department of Environmental Protection

"More Protection, Less Process"

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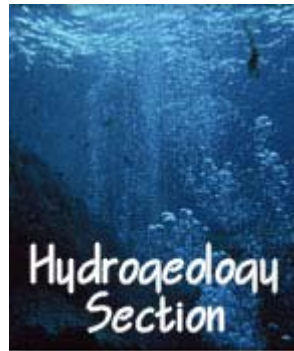
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Florida Geological Survey - Hydrogeology Section



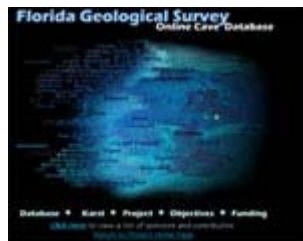
Hydrogeologic Resources

Develop, model and disseminate hydrogeology coverages, develop interactive data access for aquifer framework data for use in ground-water modeling; conduct aquifer vulnerability mapping for

application in land-use, resource management and conservation activities; geophysical characterization of karst features, sinkhole studies and mapping, archive cave maps, locate and characterize onshore and coastal fresh water submarine springs, evaluate submarine springs as potential public water supplies for coastal communities;

Hydrogeology Pages

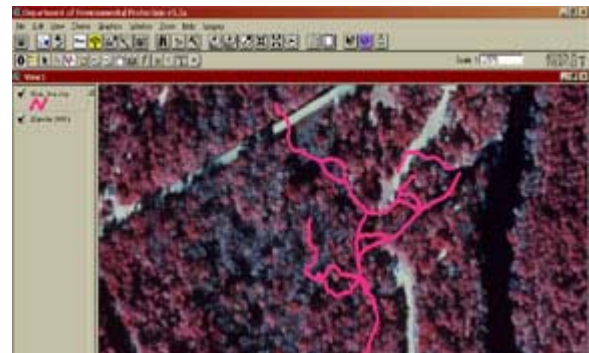
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<http://www.hazlett-kincaid.com/FGS/cave-db/index.htm>

With this database, two and three dimensional cave maps are available to scientists and resource managers. Geo-

- » Dye-tracing tests are important toward understanding the complex and dynamic ground-water flow systems in karst terrains, such as the Woodville Karst Plain. <http://www.gue.com/wkpp/>
- » In addition to archiving hard copies of cave maps, a digital cave database is also under development



referenced cave maps assist land-use planners to minimize impacts on ground-water and spring water quality, and allow more effective planning of structures to avoid potential collapse into sinkholes associated with cave systems. In this image (right), note the intersection of the cave system with roadways.

» Springshed Maps

The FGS is the State repository for springshed maps and is actively working with WMDs, USGS and the private sector to compile a complete set of currently available springshed maps. In March 2005, the FGS facilitated a meeting of springs researchers and interested parties to discuss various aspects of springshed delineation. At this meeting, it was agreed that potentiometric based springshed maps for the first and second magnitude springs would be developed and provided to the FGS. That a peer review group would be established to review future springshed delineation maps. The FGS would coordinate this as well as develop and publish a listing of acceptable delineation methods.

» Florida's First Magnitude Springsheds Poster 12



Click to enlarge. Poster can be opened in the free Adobe Reader. See link on left sidebar to download the reader

» Spring Protection Areas

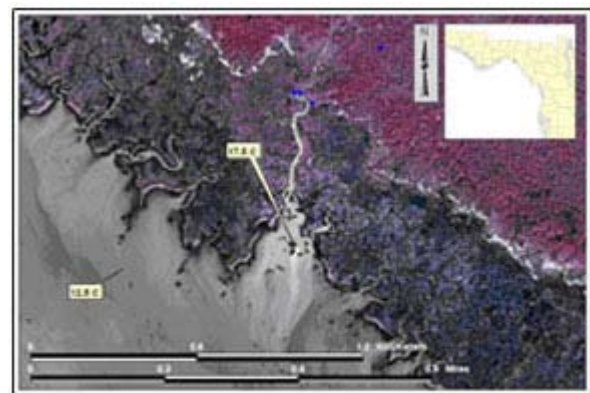
Recently, the FGS was asked to create an updatable "Florida Springs Protection Areas" map for the Florida Department of Community Affairs. The purpose of the map is to identify areas that contribute flow to Florida's springs and provide growth and land use decision-makers with a published resource to assist them in protecting and restoring the quantity and quality of spring discharge. Utilizing data from Florida water management districts, the U.S. Geological Survey and the Florida Department of Environmental Protection, the FGS utilized GIS software, expert knowledge and interpretation to generate a map delineating springs protection areas.

» Offshore Springs

In cooperation with other FGS programs, a significant effort is dedicated to locating and characterizing the offshore springs. Using aerial thermography, this offshore spring was discovered in February, 2003 by comparing temperature difference in the ocean and spring water.)

» Update of Florida's hydrostratigraphic nomenclature

Since the mid 1980, hydrogeologists around the state have used hydrostratigraphic nomenclature as defined in FGS Special Publication # 28. However, over the past several years, it has become apparent that an update is needed. Recently, representatives from the FGS, Water Management Districts, the US Geological Survey, and Florida's University System created an ad hoc committee to develop updated nomenclature, along with regional hydrostratigraphic cross sections. The



Click to enlarge
Locating and characterizing offshore springs using aerial thermography

FGS took the lead. Geologists at the FGS are currently constructing seven hydrostratigraphic cross sections across the state at a regional scale. Each section will display both stratigraphic and hydrostratigraphic information. Once the drafts are complete, they will be forwarded to the other committee members for their review. By the end of 2005, a revised edition of Special Publication #28 is scheduled for completion.

» Update of Florida's hydrostratigraphic nomenclature

The FGS maintains a [sinkhole database](#), however these are only sinkholes that are reported to the agency. Thousands of sinkholes sculpt the topography of Florida and play an important role regarding ground-water contamination potential as well as in helping predict the occurrence of future sinkholes. This image shows the locations of closed topographic depressions in Florida. Most of these features were formed due to the occurrence of sinkholes.

Sensitive Karst Areas

The Floridan Aquifer System (FAS), a thick sequence of tertiary carbonates, is a major fresh water resource in the Florida panhandle. Overburden comprised of Surficial Aquifer System and/or Intermediate Aquifer System sediments may act to protect the FAS from potential contamination sources where it is present. This overburden can be several hundred feet thick where it provides variable confinement for the FAS, or it can be thin to

absent in areas where carbonate units comprising the FAS are exposed at or near land surface. In areas where the overburden is thin to absent, the potential for karst terrain development such as sinkholes and collapse features is increased. Karst terrain provides preferential flow paths for surface water to enter the underlying aquifer system, and therefore places them at a greater risk of contamination from the surface.

To develop the sensitive karst areas (SKA) boundary the FGS utilized a Geographic Information System incorporating spatial data layers such as the state geologic map, land surface topography and overburden thickness maps. Land surface topography is comprised of the Digital Elevation Model (DEM) developed for the FAVA project. The



DEM was created by digitizing U.S. Geological Survey Quadrangle maps, converting these arcs to a Triangular Irregular Network and then into a 30 X 30 meter GRID. The DEM GRID along with a GRID of the



top of the Floridan Aquifer System, acquired from the NFWFMD, was used to develop a FAS overburden GRID. This was accomplished by subtracting the FAS overburden from the DEM. Areas of less than 100 feet of FAS overburden were then identified and overlain on areas affected by karst topography in the NFWFMD. Based on the combination of these two maps the SKA limits were identified for the NFWFMD.

This methodology was created for the Florida Department of Environmental Protection, Division of Water Resource Management and was inserted in the FDEP Environmental Resource Permit Applicant's Handbook - Volume II, Engineering Requirements for Stormwater Treatment and Management Systems - Water Quality and Water Quantity. The delineated SKA maps are used when sighting proposed stormwater holding ponds and establishes additional design criteria for these structures including minimum thickness of sediment between the surface and limestone, total depth of holding pond, vegetation requirements, sediment traps, liners and potentially ground-water modeling. For more information on this project please refer to the American Geological Institute website:

Application of geologic mapping and geographic information systems to delineate sensitive karst areas for land-use decisions

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