



Florida Aquifer Vulnerability Assessment Phase II

Levy County, Floridan Aquifer System



Michael Sole, Secretary



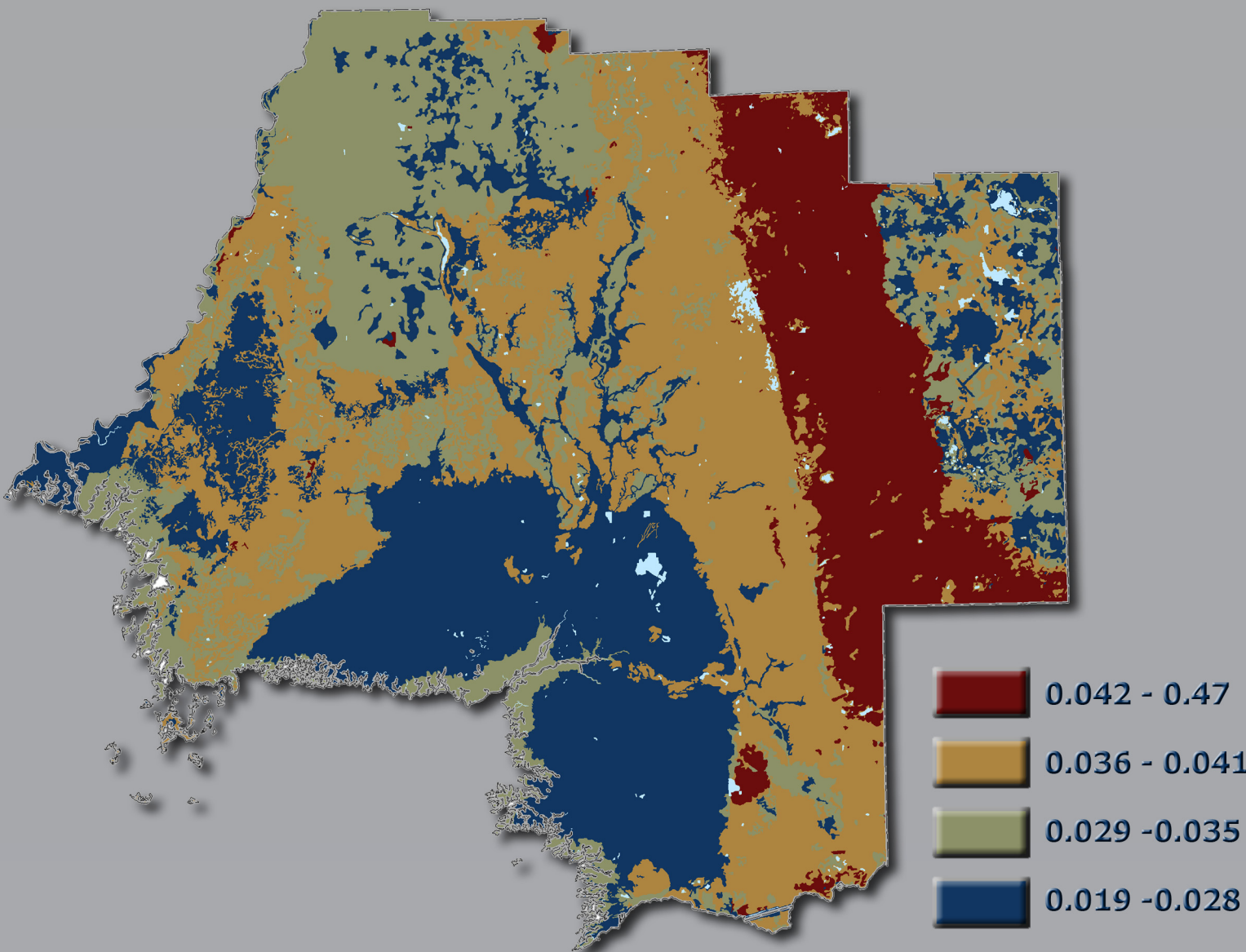
Walter Schmidt
State Geologist and Director

INTRODUCTION

The Floridan aquifer system is the most important and prolific source of fresh water in Levy County. Groundwater use from the Floridan aquifer system in Levy County is an estimated 57 million gallons of water per day for public supply, agriculture and other uses. In addition to this amount, there are over 6,257 self-supply wells in the county tapping the Floridan aquifer system providing fresh water to homeowners (SWFWMD; 2006, 2003 (Revised), and 2004). Levy County's 34,450 residents (U.S. Census Bureau, 2000) rely almost exclusively on the Floridan aquifer system for their fresh water needs.

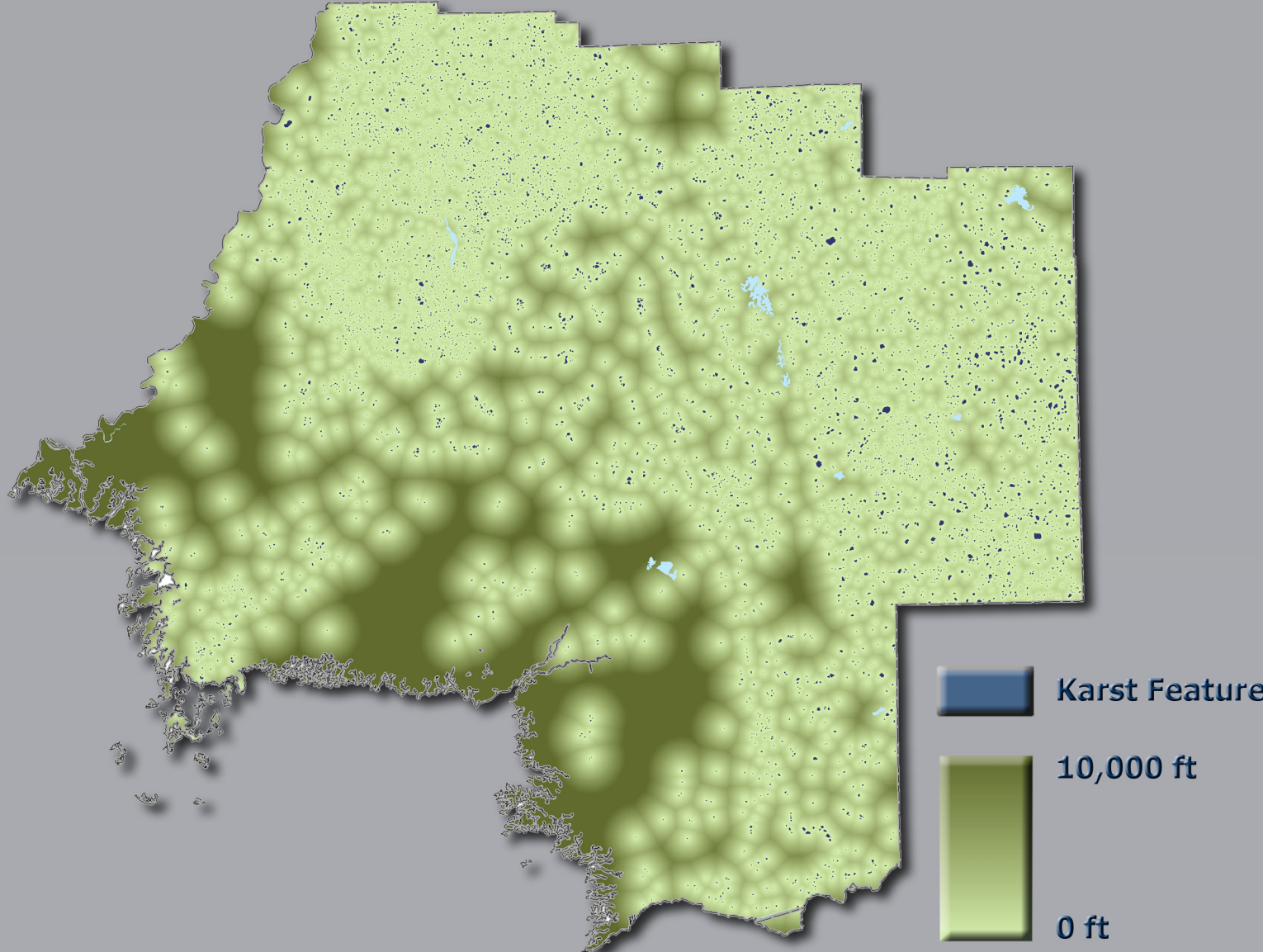
Identifying areas of Levy County where the Floridan aquifer system is more vulnerable to contamination from activities at land surface is a critical component of a comprehensive groundwater management program. Protection of the Floridan aquifer system is an important measure to take in helping ensure viable, fresh water is available from the Floridan aquifer system for continued future use in the Levy County study area. Aquifer vulnerability modeling allows for a pro-active approach to protection of aquifer systems, which can save significant time and increase the value of protection efforts. Maps of three types of data were used to determine aquifer vulnerability in Levy County; soil pedality, karst features and recharge potential. Maps explaining these data are displayed below.

Soil Pedality Theme

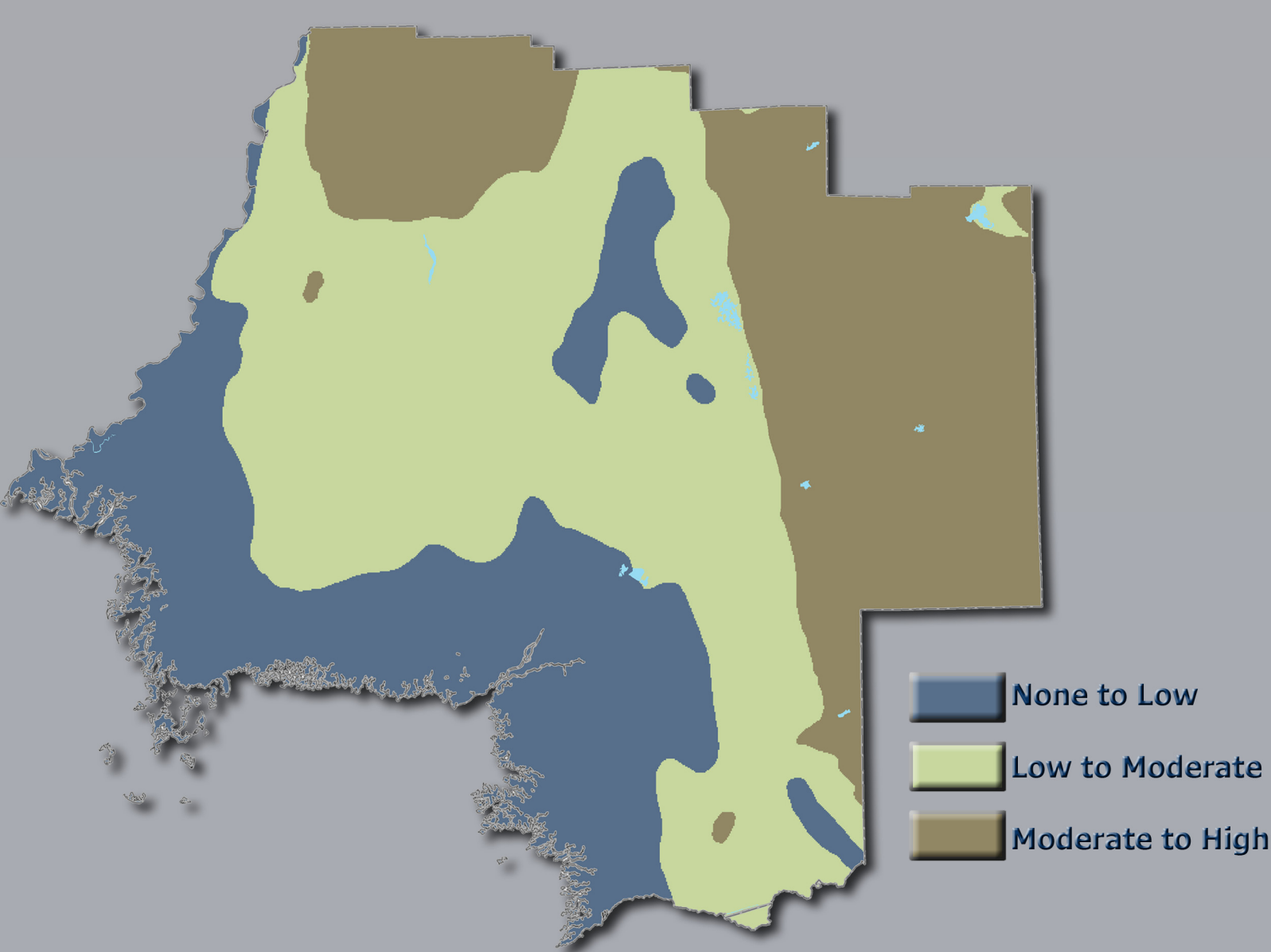


Soil pedality is a relatively new concept used to estimate how water moves through soil (Lin et al. 1999). The rate that water moves through soil is a critical component of any aquifer vulnerability analysis, as soil is an aquifer system's first line of defense against potential contamination. Soil pedality values, which are calculated based on soil type, soil grade, and soil structure, are unitless, and higher values correspond to higher flow rates and therefore higher aquifer vulnerability. In 2006, Levy County soils data were redesigned for the study area by the Natural Resources Conservation Service. As a result, more detailed information is available for soils analysis for the LCAVA project than during previous projects.

Potential Karst Feature Theme



Recharge Potential Theme



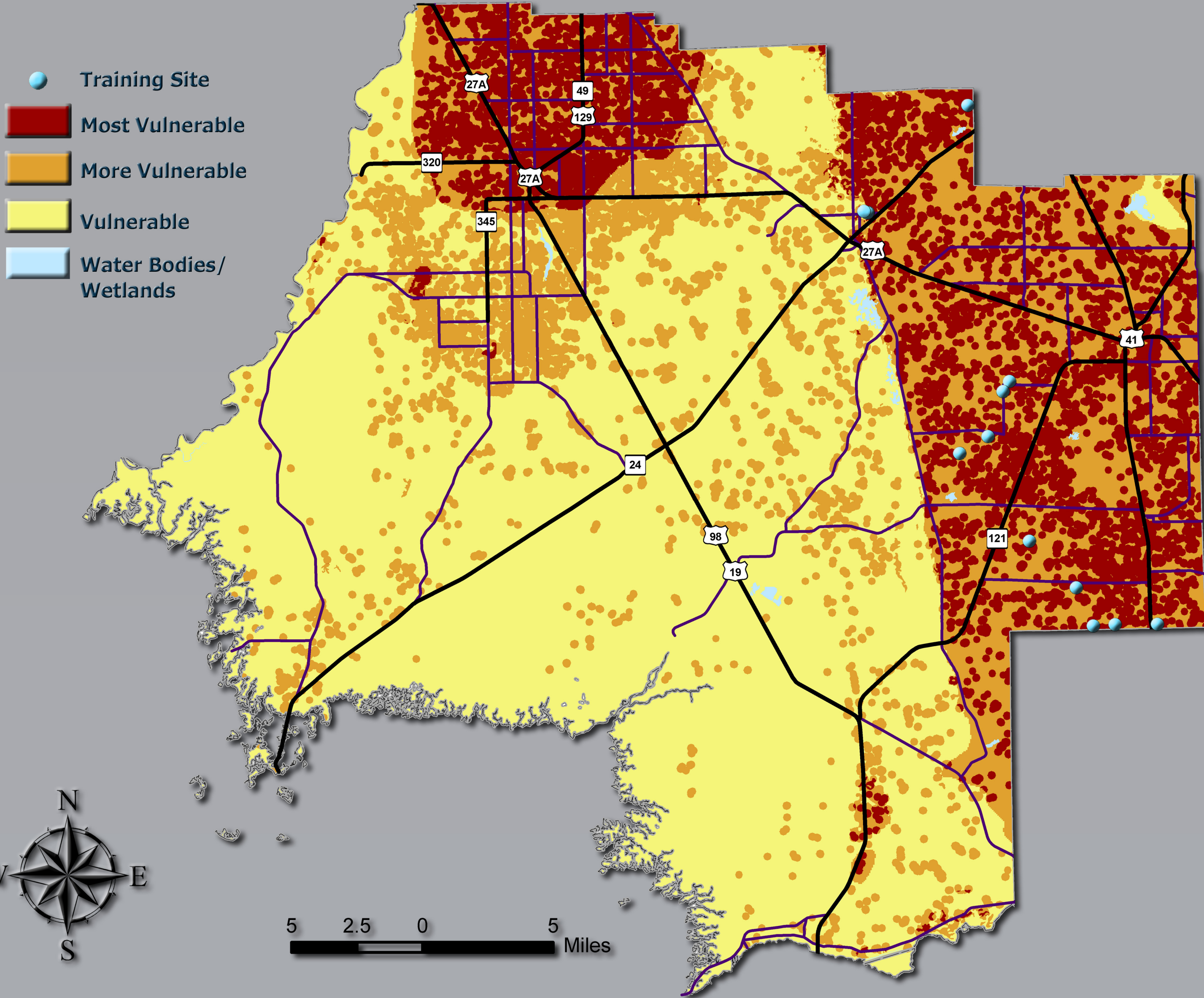
In Copeland et al. (1991), the area of the Brooksville Ridge in central Florida is defined as having higher recharge potential than adjacent areas. The Brooksville Ridge is chiefly composed of undifferentiated Hawthorn Group sediments which are poorly to moderately consolidated clayey sands and silty clays (Scott et al., 2001). In the study area, these sediments are estimated to exceed 100 feet in thickness. In other areas of Florida, Hawthorn Group sediments forming the Intermediate Confining Unit normally provide an effective confining or semi-confining unit for the underlying FAS. In Levy County, however, these sediments are generally highly weathered, leaky, thin and intensely breached by karst features. These factors combine to increase the recharge potential to the FAS in the study area where these sediments are present. Where recharge potential is high, aquifer vulnerability is increased.

APPROACH TO MODEL DEVELOPMENT

The primary purpose of the Levy County Aquifer Vulnerability Assessment, or LCAVA, is to provide a science-based, water-resource management tool that can be used to help minimize adverse impacts on groundwater quality, including focused protection of sensitive areas such as springsheds and groundwater recharge areas. The modeling process used for the LCAVA project is "weights of evidence," and is based in a geographic information system (GIS). The approach used in the project is a modification of the technique used in Phase I of the Florida Aquifer Vulnerability Assessment project (Arthur et al., 2007). One of the main benefits of applying this technique to the LCAVA project is that it is data-driven, rather than expert-driven, and model output is dependent upon a training site dataset, which produces a self-validated model output. For LCAVA, training sites are groundwater wells with water quality indicative of a good connection between the aquifer and land surface, or simply, aquifer vulnerability.

Model generation is accomplished by associating training site locations with data layers representing natural conditions which control aquifer vulnerability. Data layers used for the LCAVA project are described on the lower left side of this poster and include karst features, soil pedality, and recharge potential. The model helps determine which areas of each data layer share a greater association with aquifer vulnerability based on the location of the training sites, and then combine them in a map as shown here. The model results are an estimate of the natural vulnerability of the aquifer system; land use types and human activities are not used as input. The LCAVA model output map indicates that the areas of highest vulnerability are associated with dense karst-feature distribution, higher soil pedality values and areas having a higher recharge potential.

VULNERABILITY OF THE FLORIDAN AQUIFER SYSTEM, LEVY COUNTY



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Qualifications:

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