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Florida Springs Protection Areas

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Introduction

The Florida Springs Protection Areas map was created by the Florida Geological Survey (FGS) at the request of the Florida Department of Community Affairs. The purpose of the map is to identify areas that contribute flow to Florida springs and to provide a published resource for land use decision-makers as they work to protect and restore both the quantity and quality of water discharging from Florida's springs.

A springshed is defined as "those areas of surface water and ground-water basins that contribute to the discharge of the spring." (Copeland, 2003). To delineate a springshed or a spring protection area one must have an understanding of the hydrogeology of the study area, potentiometric surface maps, knowledge of internally drained areas and conduit connections. Consideration should be given to aquifer recharge, aquifer vulnerability and the uncertainty in the data. Expert knowledge should be used to refine the delineated protection area boundaries where appropriate. Current and future research will improve our understanding of springsheds/protection areas and their boundaries; as a result the Florida Springs Protection Areas map will be periodically updated.

This map was created by compiling available springshed maps from the Water Management Districts, the US Geological Survey and the Florida Department of Environmental Protection. Utilizing geographic information system software or GIS, these springsheds were projected onto a map of the State of Florida. To delineate springsheds for the remaining springs, additional geologic data layers were utilized, including FGS spring locations, the thickness of overburden on the Floridan Aquifer System (FAS) and the thickness of Intermediate Confining Unit sediments.

Realizing that springshed boundaries are dynamic due to changes in climate (seasonal and long-term) and pumpage, a township buffer is applied to address lateral uncertainty. For the non-outlier springs. After applying the township buffer, best professional geologic judgment and expert hydrogeologic knowledge were used to further refine the delineated spring protection areas. Specifically, areas were excluded where the FAS is overlain by very thick confining. Utilizing the 2000 FAS potentiometric surface map, regional ground-water divides were used to refine some of the springs protection area boundaries.

In the springs protection area, the "sole source" of drinking water and the source of spring discharge is groundwater. Whether pumped from a well or flowing from a spring vent, it is the same **water**. Numerous contaminants including bacteria, metals, nutrients and pesticides are detected in spring waters. These contaminants and potentially others may be found in ground water within the protection area. Utilizing this map, citizens and the government can better protect the natural treasures we call springs as well as their drinking water.

A step by step outline of the process used to create this map is shown in the insets.

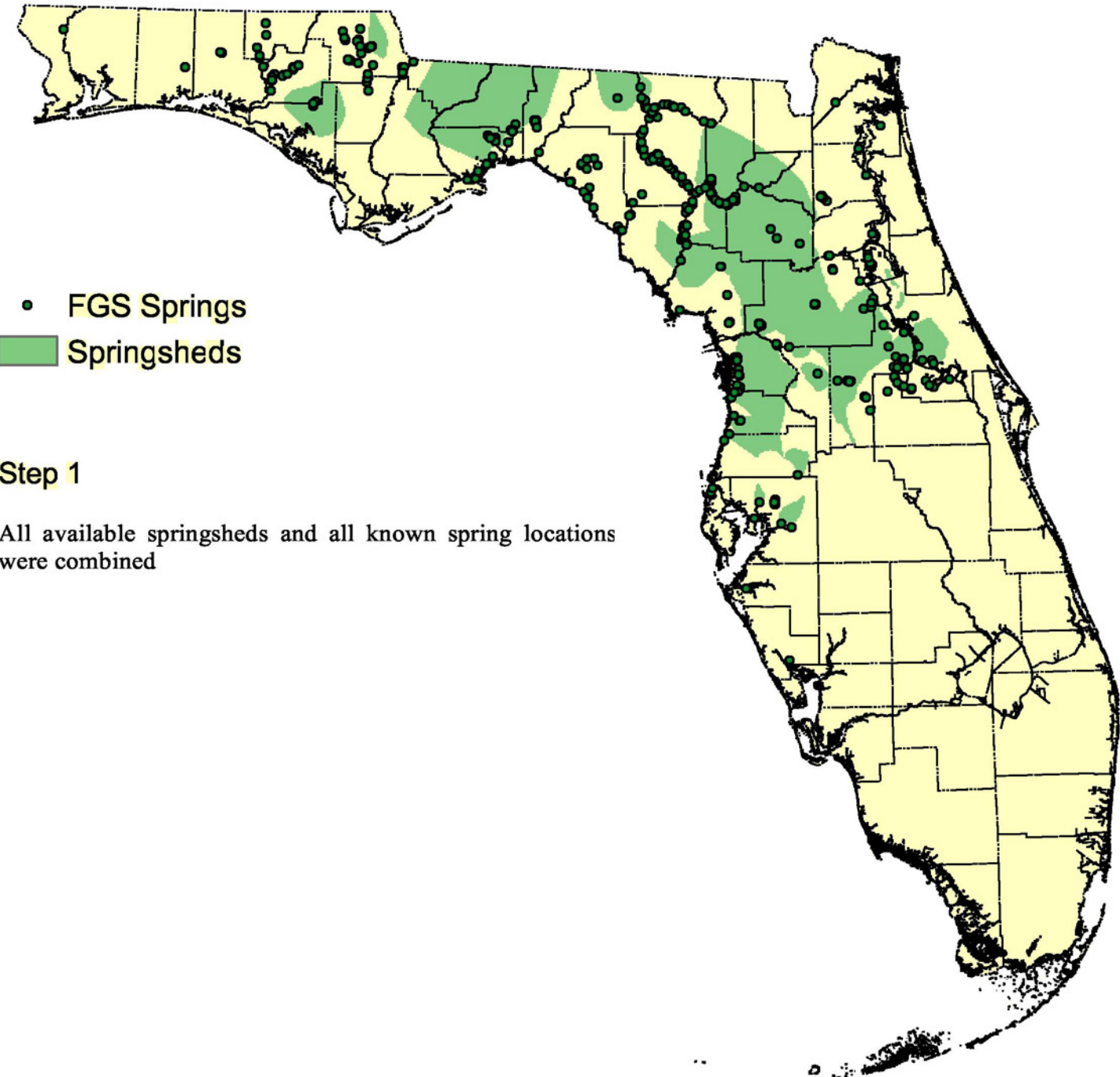
References

- Aucott, W.R., 1988, Areal Variation in Recharge to and Discharge from the Floridan Aquifer System in Florida: U.S. Geological Survey Water Resource Investigations Report 88-4057, 1 map.
- Cichon, J.R., Wood, H.A.R., Baker, A.E., and Arthur, J.D., 2004, Application of Geologic Mapping and Geographic Information Systems to Delineate Sensitive Karst Areas for Land-Use Decisions, American Geological Institute website, <http://www.agiweb.org/environment/publications/mapping/graphics/florida.pdf>, 2004.
- Copeland, R., 2003, Florida Spring Classification System and Spring Glossary: Florida Geological Survey Special Publication No. 52, p. 14
- Todd, D.K. 1980. Groundwater Hydrology. John Wiley & Sons, New York, 535 pp.

Qualification

This geologic data was developed by the Florida Department of Environmental Protection (FDEP) - Florida Geological Survey (FGS) to carry out agency responsibilities related to management, protection, and development of Florida's natural resources. Although efforts have been made to make the information accurate and useful, the FDEP/FGS assumes no responsibility for errors in the information and does not guarantee that the data are free from errors or inaccuracies. Similarly FDEP/FGS assumes no responsibility for the consequences of inappropriate uses or interpretations of the data. As such, these digital data are distributed on "as is" basis and the user assumes all risk as to their quality, the results obtained from their use, and the performance of the data. FDEP/FGS bears no responsibility to inform users of any subsequent changes made to this data. Anyone using this data is advised that precision implied by the data may far exceed actual precision. Comments on this data are invited and FDEP/FGS would appreciate that documented errors be brought to staff attention. The development of these data sets represents a major investment of staff time and effort. As a professional responsibility, we expect that the FDEP/FGS will receive proper credit when these data sets are utilized. Further, since part of this data was developed and collected with U.S. Government or State of Florida funding, no proprietary rights may be attached to it in whole or in part, nor may it be sold to the U.S. Government or the Florida State Government as part of any procurement of products or services.

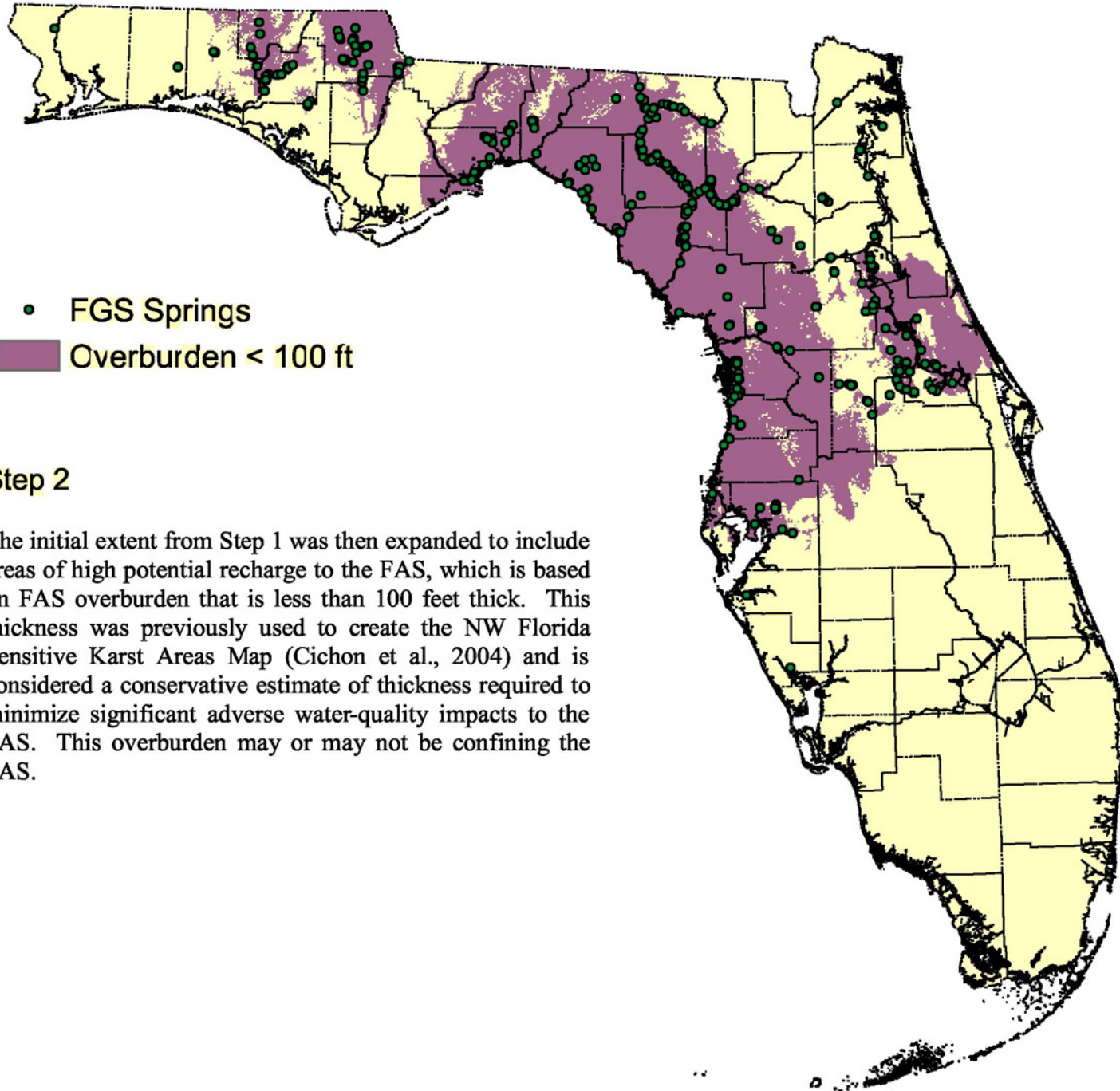
Springsheds and Springs



Step 1

All available springsheds and all known spring locations were combined

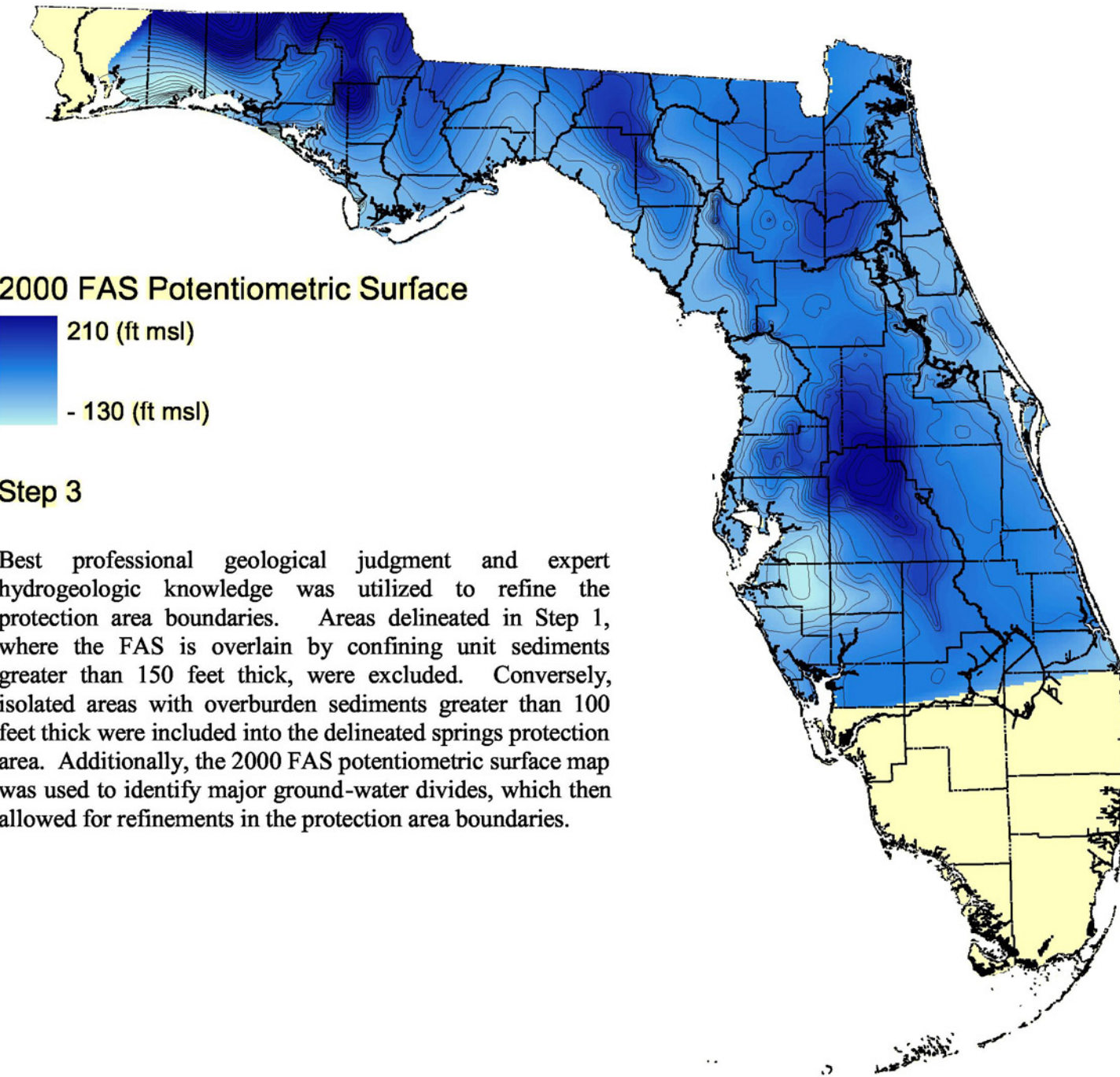
Overburden on Limestone



Step 2

The initial extent from Step 1 was then expanded to include areas of high potential recharge to the FAS, which is based on FAS overburden that is less than 100 feet thick. This thickness was previously used to create the NW Florida Sensitive Karst Areas Map (Cichon et al., 2004) and is considered a conservative estimate of thickness required to minimize significant adverse water-quality impacts to the FAS. This overburden may or may not be confining the FAS.

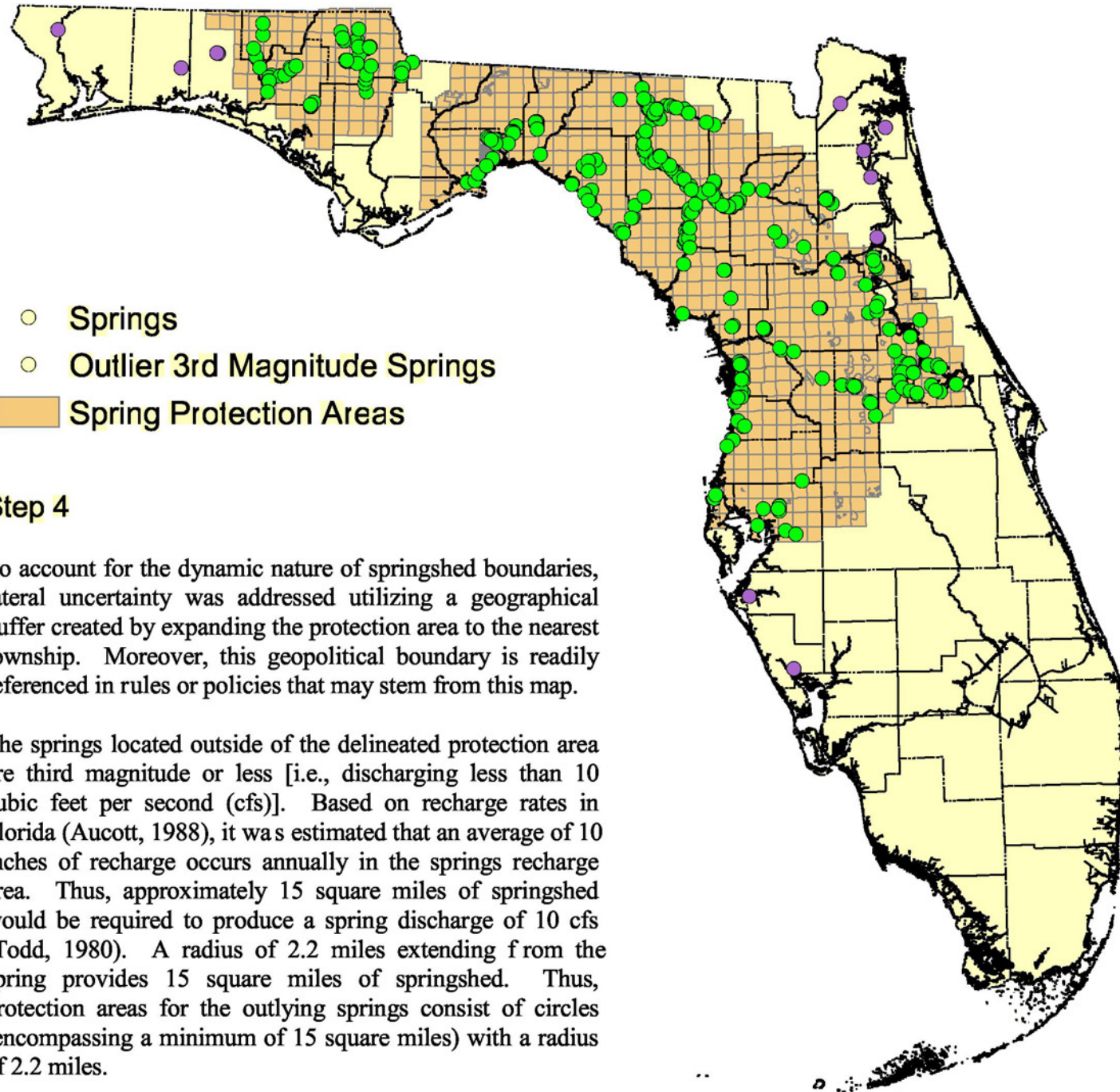
Professional Interpretation



Step 3

Best professional geological judgment and expert hydrogeologic knowledge was utilized to refine the protection area boundaries. Areas delineated in Step 1, where the FAS is overlain by confining unit sediments greater than 150 feet thick, were excluded. Conversely, isolated areas with overburden sediments greater than 100 feet thick were included into the delineated springs protection area. Additionally, the 2000 FAS potentiometric surface map was used to identify major ground-water divides, which then allowed for refinements in the protection area boundaries.

Township Buffer



Step 4

To account for the dynamic nature of springshed boundaries, lateral uncertainty was addressed utilizing a geographical buffer created by expanding the protection area to the nearest township. Moreover, this geopolitical boundary is readily referenced in rules or policies that may stem from this map.

The springs located outside of the delineated protection area are third magnitude or less [i.e., discharging less than 10 cubic feet per second (cfs)]. Based on recharge rates in Florida (Aucott, 1988), it was estimated that an average of 10 inches of recharge occurs annually in the springs recharge area. Thus, approximately 15 square miles of springshed would be required to produce a spring discharge of 10 cfs (Todd, 1980). A radius of 2.2 miles extending from the spring provides 15 square miles of springshed. Thus, protection areas for the outlying springs consist of circles (encompassing a minimum of 15 square miles) with a radius of 2.2 miles.

