



## ADVANCED GEOSPATIAL INC.

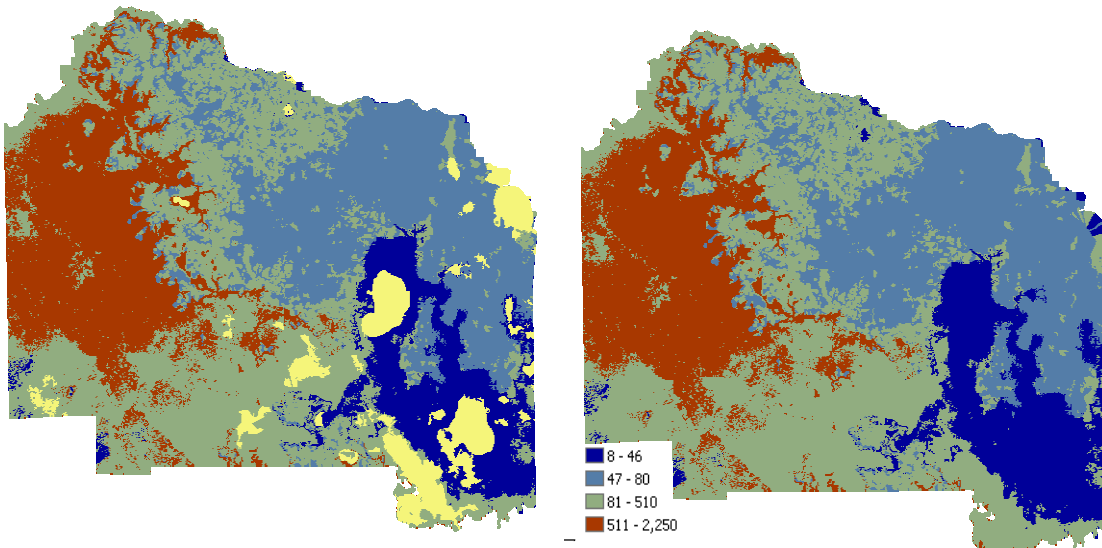
2441 MONTICELLO DR., SUITE 600  
TALLAHASSEE, FL 32303  
850.580.4447  
WWW.ADGEO.NET

### Generalization of ACAVA Results

Process began by modifying the ACAVA results, first by converted the output results from a floating point grid into an integer grid. To do this we had to multiply the original grid by 100,000 to remove the decimal places and maintain all of the significant digits. This has to be done since the focal statistics and nibble functions will only work with integer grids. Next we removed the no data areas from the results (lakes and null soils) since these areas were affecting the generalization of the models. Using the NIBBLE command we assigned the nearest neighbor value to the no data areas.

Before NIBBLE command; No data areas are yellow

After NIBBLE command; No data areas removed

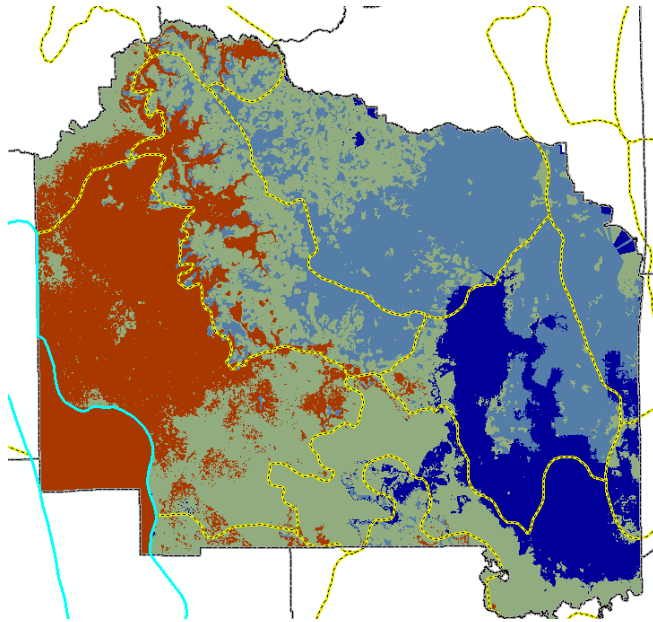


Because there were problems identified with the first ACAVA model and the input layer Head Difference, we had to find a way to account for the “banked recharge” occurring in the southwest corner of the county. In recent aquifer vulnerability studies we developed a new layer to use in similar areas called “Recharge Potential”. 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). Recharge potential values were calculated for the study area by subtracting the USGS 2000 potentiometric surface of the FAS (USGS, 2001) from land surface elevation. Resulting recharge potential values from the study area range between 10 ft and 90 ft (relative to mean sea level) and can be discontinuous, deeply weathered and perforated by karst features. Where recharge potential is high, aquifer vulnerability is increased.

To account for this higher recharge we clipped a part of the Brooksville Ridge by the county boundary and converted it into a grid. The Brooksville ridge boundary came from the "Physiographic Divisions of

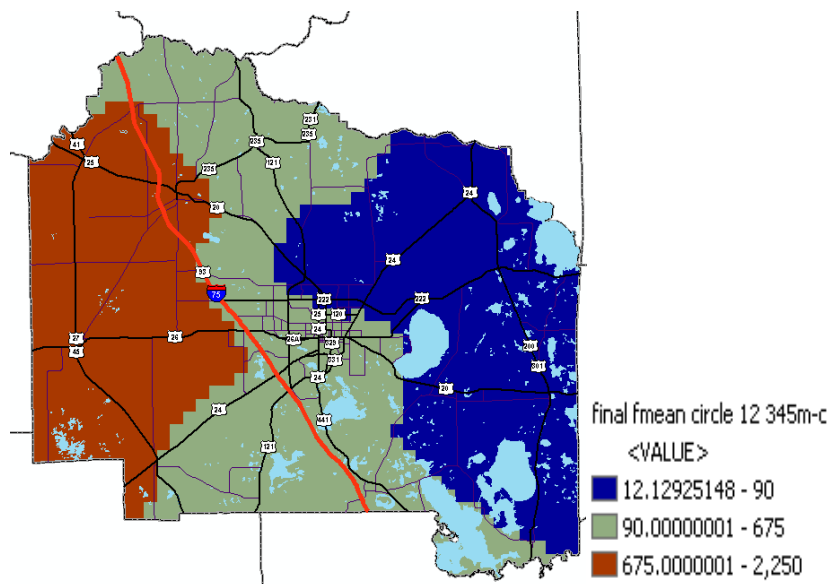


Florida" map. This map depicts the locations and names of physiographic units as defined by Dr. H.K. Brooks, the maps author. The grid was then given a vulnerability value that was considered to be high and then merged with the results.



With the vulnerability map prepared an appropriate cell size for analysis was needed. Recent projects recommended that model results be applied on a local scale of greater than or equal to approximately 1.0 mi<sup>2</sup> for statewide studies (Florida Aquifer Vulnerability Assessment) or approximately 0.75 mi<sup>2</sup> for localized studies (Wekiva, Leon and Marion County Aquifer Vulnerability Assessments). Based on similarities to larger scale projects, AGI determined that the model results be used at the recommended scale 0.75 mi<sup>2</sup>, or an approximate 4,500-ft grid cell size. In other words, decisions using this tool made within a 0.75 mi<sup>2</sup> area (approximate 4,500-ft x 4,500-ft area. This is the equivalent to an approximate cell size of 1,380 m. To smooth the results we used ¼ of that cell size or 345 m.

Upon completion of the data layers and the selection of an analysis cell size we ran a focal statistics filter on the data set. The statistical filter was called a Focal Mean and it was run in a circular radius going out 12 cells. This means that it goes out from each cell that it is analyzing and calculates the average value for all of the cells in that 12 cell window. The result of this statistical analysis can be seen in the image below. The final output groups the two lower vulnerability classes, Vulnerable and Less Vulnerable, into one class. More information on focal statistics can be found below and parts of it were copied from the ArcGIS Desktop help.



## More on focal statistics from ArcGIS help

### Overlapping neighborhood statistics: focal functions

The Neighborhood Statistics function is a focal function that computes an output raster where the value at each location is a function of the input cells in a specified neighborhood of the location. For each cell in the input raster, the Neighborhood Statistics function computes a statistic based on the value of the processing cell and the value of the cells within a specified neighborhood, then sends this value to the corresponding cell location on the output raster.

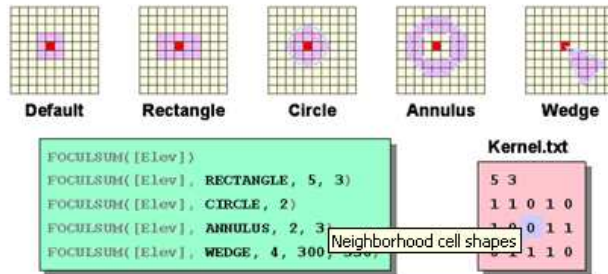
#### *Types of neighborhood statistics*

The following statistics can be computed within the neighborhood of each processing cell, then sent to the corresponding cell location on the output raster.

Statistic	Description
Majority	Determines the value that occurs most often in the neighborhood.
Maximum	Determines the maximum value in the neighborhood.
<b>Mean</b>	<b>Computes the mean of the values in the neighborhood.</b>
Median	Computes the median of the values in the neighborhood.
Minimum	Determines the minimum value in the neighborhood.
Minority	Determines the value that occurs least often in the neighborhood.
Range	Determines the range of values in the neighborhood.
Standard deviation	Computes the standard deviation of the values in the neighborhood.
Sum	Computes the sum of the values in the neighborhood.
Variety	Determines the number of unique values in the neighborhood.

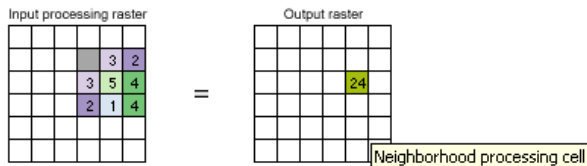
## Neighborhood shapes

The neighborhoods that can be specified are a rectangle of any dimension, a circle of any radius, an annulus (a doughnut shape) of any radius, and a wedge in any direction. The width and height units of a rectangular neighborhood can be in cells or map units. The default is a neighborhood of 3 x 3 cells. The size of the circle depends on the specified radius. The radius is identified in cells or map units, measured perpendicular to the x- or y-axis. Any cell center encompassed by the circle will be included in the processing of the neighborhood.



## How a neighborhood function processes each cell

Conceptually, the function visits each cell in the raster and calculates the specified statistic with the identified neighborhood. The cell for which the statistic is being calculated is referred to as the processing cell. The value of the processing cell as well as all the cell values in the identified neighborhood are included in the neighborhood statistics calculation. The neighborhoods can overlap. Cells in one neighborhood may also be included in the neighborhood of another processing cell. To illustrate the neighborhood statistics processing, take the processing cell with a value of five in the diagram that follows. If a rectangular 3 x 3 cell neighborhood is specified, the sum of the value of neighboring cells plus the value of the processing cell equals 24. So a value of 24 is given to the value of the cell in the output raster in the same location as the processing cell in the input raster.



## The neighborhood function for an entire dataset

The above processing occurs for each cell in the raster. In the diagram below, each cell for the output raster has been calculated by summing the cells in a 3 x 3 neighborhood for each cell. The cells highlighted in yellow identify the neighborhood of the input processing cell with a value of five and output cell value of 24. This process is performed on every input processing cell to calculate an output value for each cell. The neighborhoods for neighboring processing cells overlap.



## Processing cells of NoData

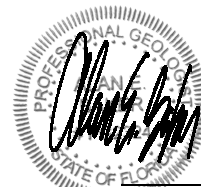
If a cell of NoData is present in the neighborhood, it will be ignored in the processing. If the entire neighborhood consists of cells of NoData, the output cell value will be NoData.

## REFERENCES

- Copeland, R., Scott, T.M., Lloyd, J.M., 1991, Florida's Ground Water Quality Monitoring Program: Hydrogeological Framework: Florida Geological Survey Special Publication No. 32, 97 p.
- Scott, T.M., Campbell, K.M., Rupert, F.R., Arthur, J.D., Missimer, T.M., Lloyd, J.M., Yon, J.W., Duncan, J.G., 2001, Geologic Map of the State of Florida: Florida Geological Survey Map Series 146, Scale 1:750,000, 1 sheet.
- United States Geological Survey, 2001, Potentiometric Surface of the Upper Floridan Aquifer, West-Central Florida, U.S. Geological Survey Open File Report 01-310, Arc/Info Geospatial Data Layer; 1:500,000

## Professional Geologist Certification

I, Alan E. Baker, P.G., no. 2324, agree with the findings in this map titled “**Alachua County Floridan Aquifer System Protection Zone Map**” and do hereby certify that I currently hold an active professional geology license in the state of Florida. The model and report were prepared by Advanced GeoSpatial Inc., a State of Florida Licensed Geology Business (GB491), and have been reviewed by me and found to be in conformance with currently accepted geologic practices, pursuant to Chapter 492 of the Florida Statutes.



Alan E. Baker, P.G.  
Florida License No. 2324

August 18, 2008

Date

