DELAWARE GEOLOGICAL SURVEY

University of Delaware, Newark
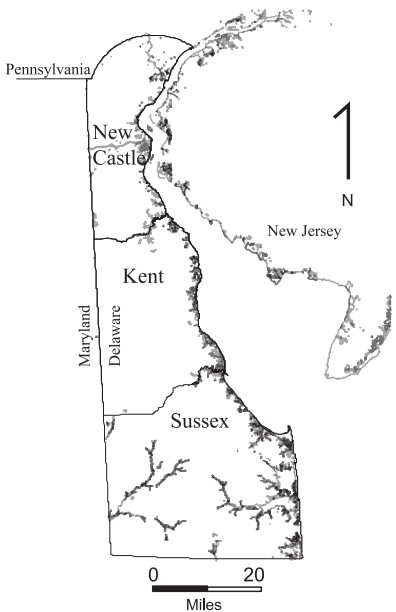John H. Talley, State Geologist

Report of Investigations No. 73

Plate 1: Water-Table Elevation Under Dry, Normal, and Wet Conditions
Figures 4A-C, 5A-C, and 6A-C
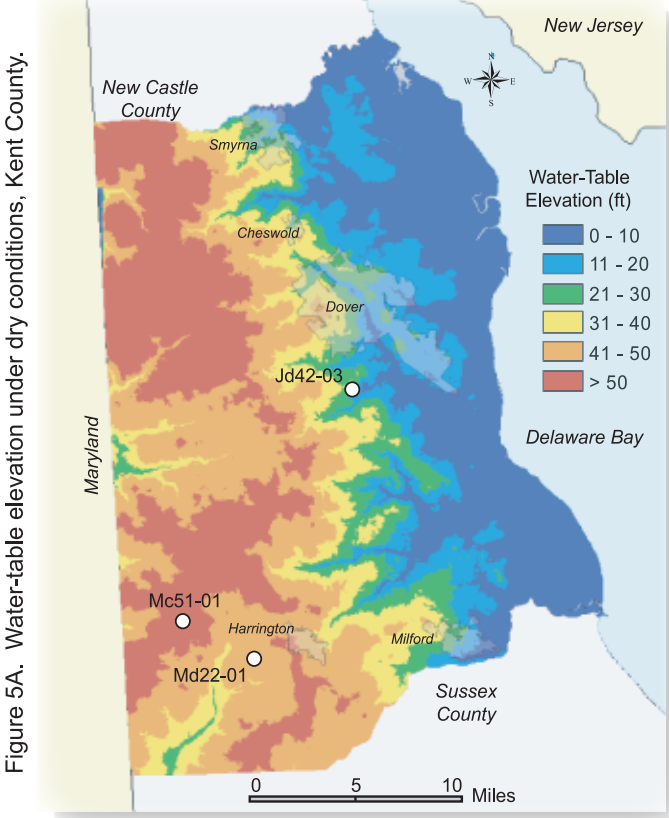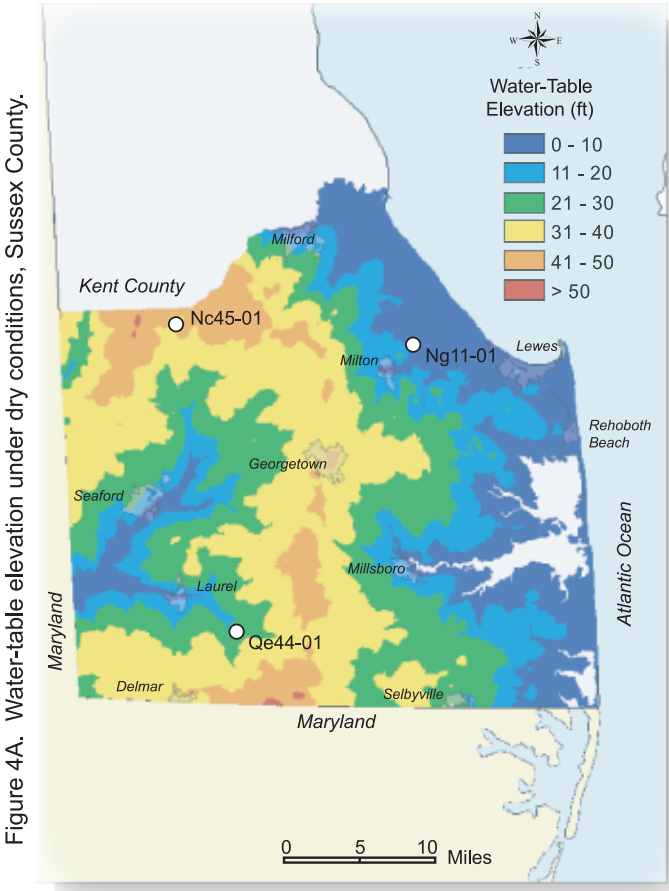Sussex, Kent, and New Castle Counties, Delaware

Creating the water-table elevation maps for Sussex County, Delaware, was a multi-step process that involved dividing the county into three separate geographic sections (east, west, and north). In large part, the geographic sections of Sussex County were delineated based on watershed boundaries and hydrography arcs (e.g., streams) in the area. Each geographic region of Sussex County has its own unique well observation data set, and thus its own unique set of regression coefficients for dry, normal, and wet conditions. Wells Qe44-01 and Ng11-01 were used for eastern Sussex , Qe44-01 and Nc45-01 for western Sussex , and Ng11-01 and Nc45-01 for northern Sussex County. Water-table elevation grids for dry, normal, and wet conditions were created for eastern Sussex, western Sussex, and northern Sussex County and were then pieced together in order to create a unified, county-wide water-table elevation grid for each (dry, normal, and wet) hydrologic condition (Figs. 4A-4C, respectively) (Martin and Andres, 2005a). Because land-surface elevation was a component of the multiple linear regression, the water-table elevation maps resemble the land-surface elevation DEM maps.

Initially, the process for calculating the water-table elevation maps for Kent County was going to be consistent with that for Sussex County. Long-term water-level measurements from monitoring wells Mc51-01, Md22-01, and Jd42-03 were analyzed in order to define the time periods for dry, normal, and wet hydrologic conditions. Kent County was divided into three geographical sections (south, central, and north) based on watershed boundaries and hydrography. However, the water-level observation point data sets for central and northern Kent County failed to render regression coefficients sufficient to calculate an accurate water-table elevation grid. The regression analysis produced poor R^2 values for each condition. Therefore, the water-level points were combined into a single data set and the water table was estimated for the entire county for dry, normal, and wet conditions (Figs. 5A-5C, respectively) (Martin and Andres, 2005b).
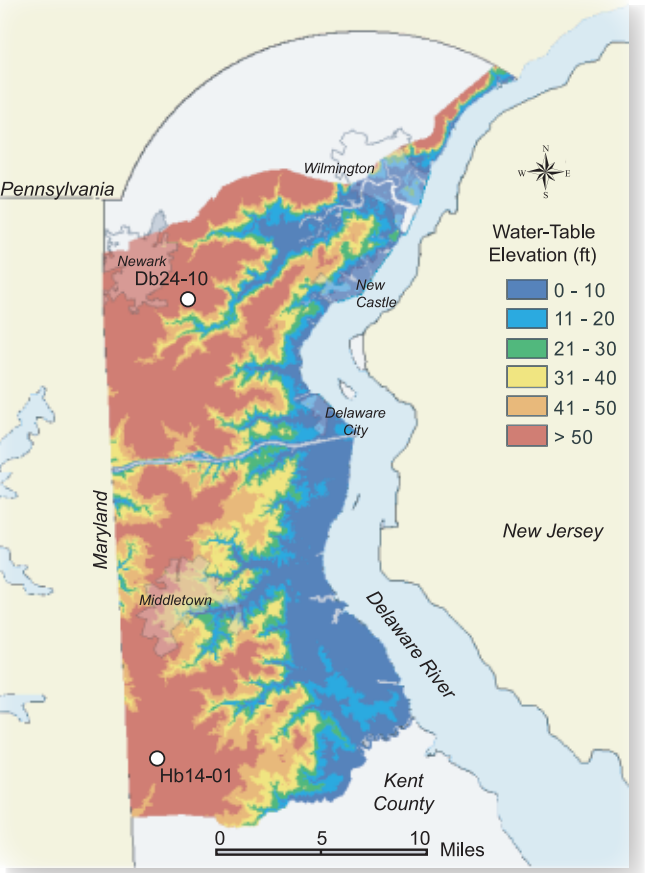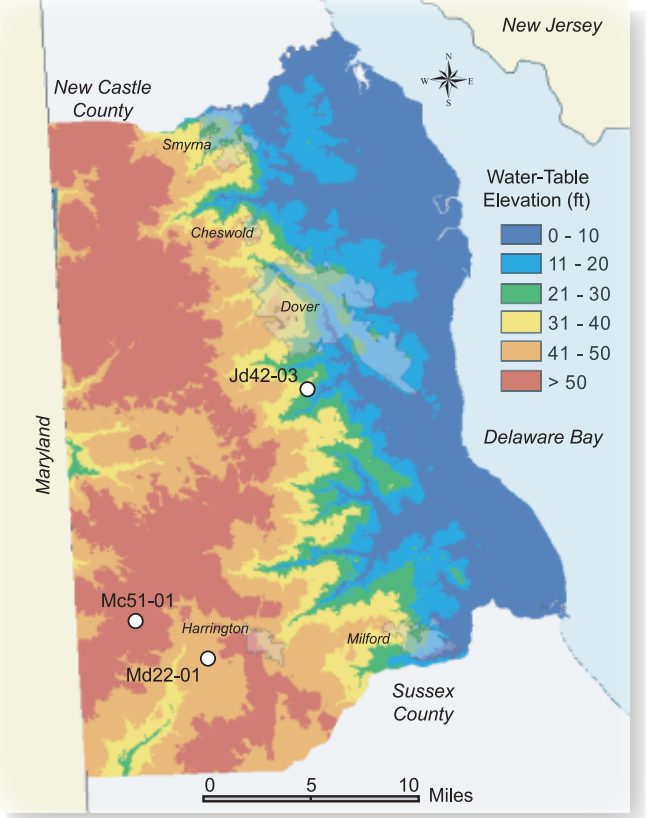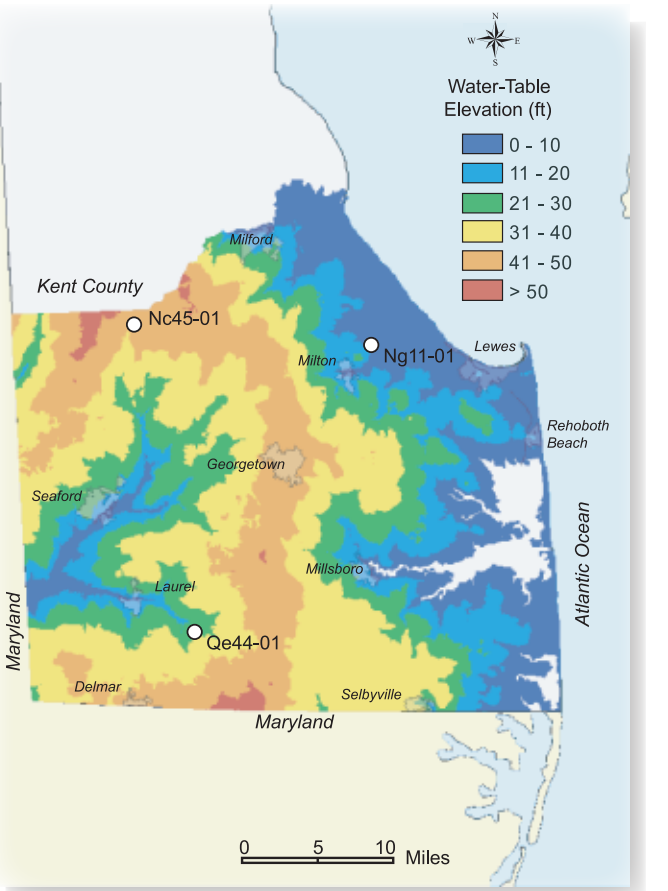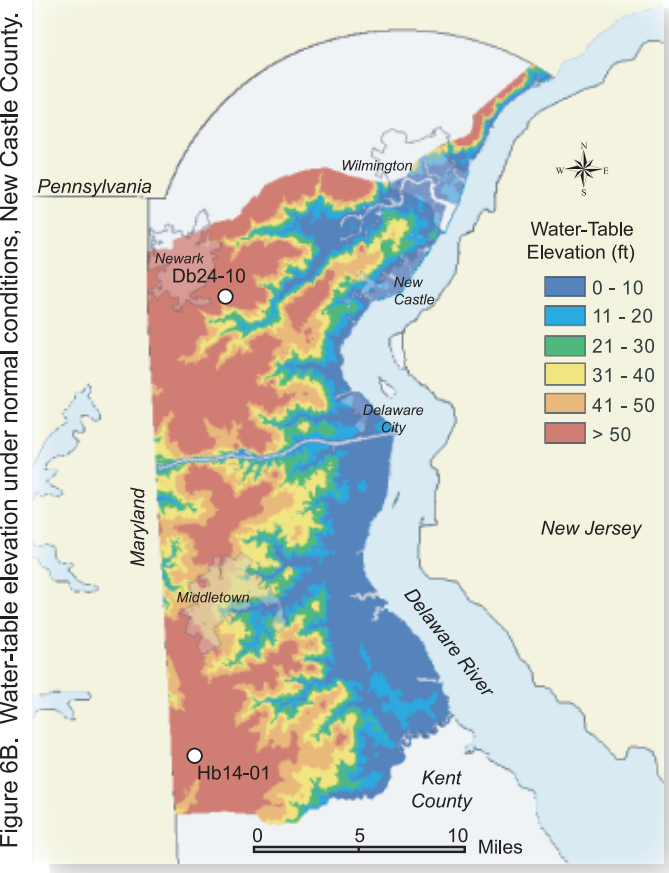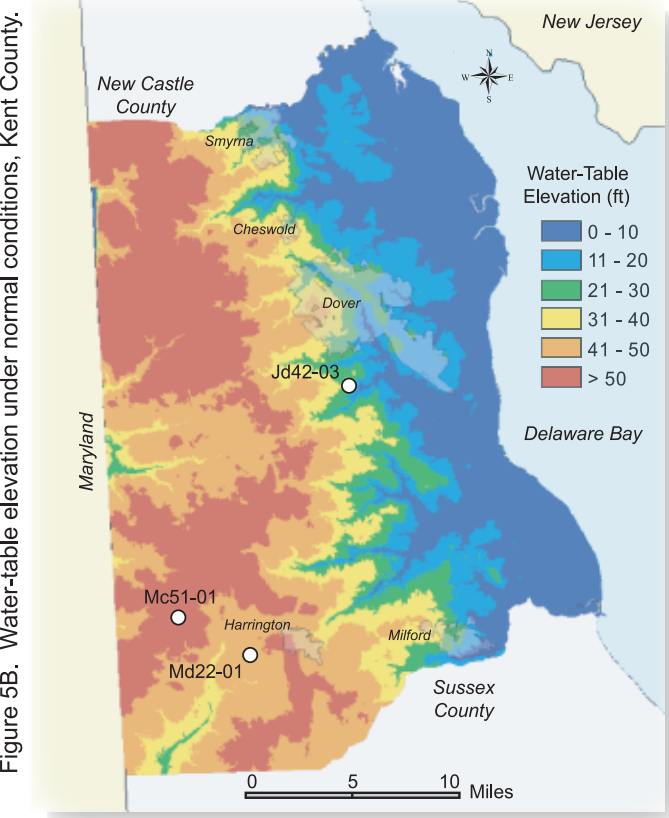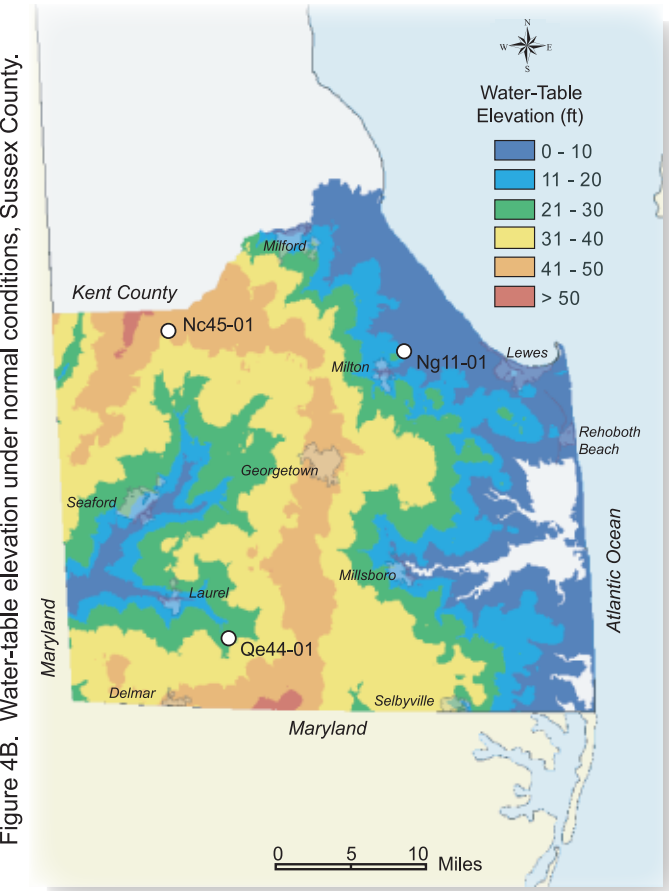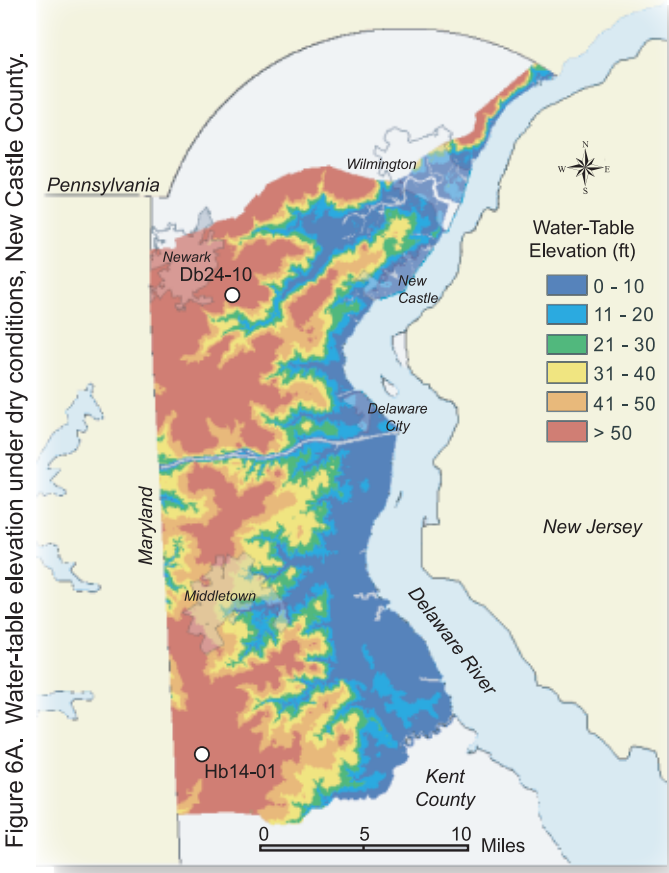
Calculating the water-table elevation maps for New Castle County also involved applying the same concepts that were established in Sussex County by dividing New Castle County into two separate sections (north and south) with the C&D Canal acting as the logical hydrologic boundary. Long-term water-level measurements from monitoring wells Jd42-03, Hb14-01, and Db24-10 were compared in order to define the time periods for dry, normal, and wet conditions. However, as was the case in Kent County, the regression analysis performed on the water-level point data sets for these areas failed to produce useable correlation coefficients; therefore, the water-level points for the north and south sections were conjoined to produce a single dry, normal, and wet data set for the entire county. The regression analysis performed on these wells produced the regression equations that created the water-table elevation maps for dry, normal, and wet conditions (Figs. 6A-6C, respectively) in the Coastal Plain of New Castle County (Martin and Andres, 2005c). The Piedmont region of Delaware was excluded from this work due to the sparse availability and inaccuracy of water-level data for this area.

SUSSEX COUNTY

Figure 4A. Water-table elevation under dry conditions, Sussex County.

Figure 4B. Water-table elevation under normal conditions, Sussex County.

Figure 4C. Water-table elevation under wet conditions, Sussex County.

KENT COUNTY

Figure 5A. Water-table elevation under dry conditions, Kent County.

Figure 5B. Water-table elevation under normal conditions, Kent County.

Figure 5C. Water-table elevation under wet conditions, Kent County.

NEW CASTLE COUNTY

Figure 6A. Water-table elevation under dry conditions, New Castle County.

Figure 6B. Water-table elevation under normal conditions, New Castle County.

Figure 6C. Water-table elevation under wet conditions, New Castle County.

DRY   NORMAL   WET