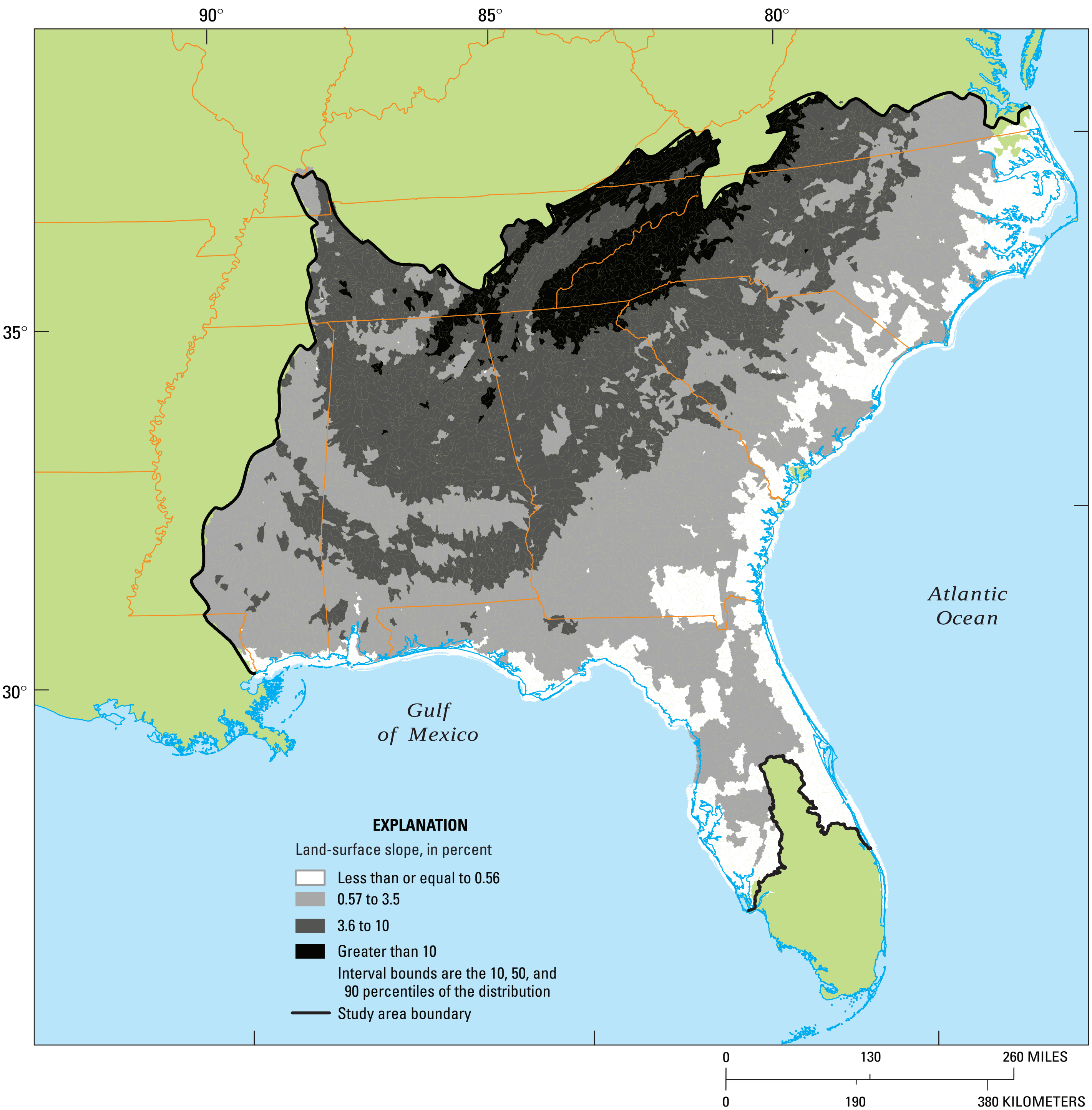

Figure 5E. Estimates of land-surface slope for individual catchments in the SAGT SPARROW model area, 2002.

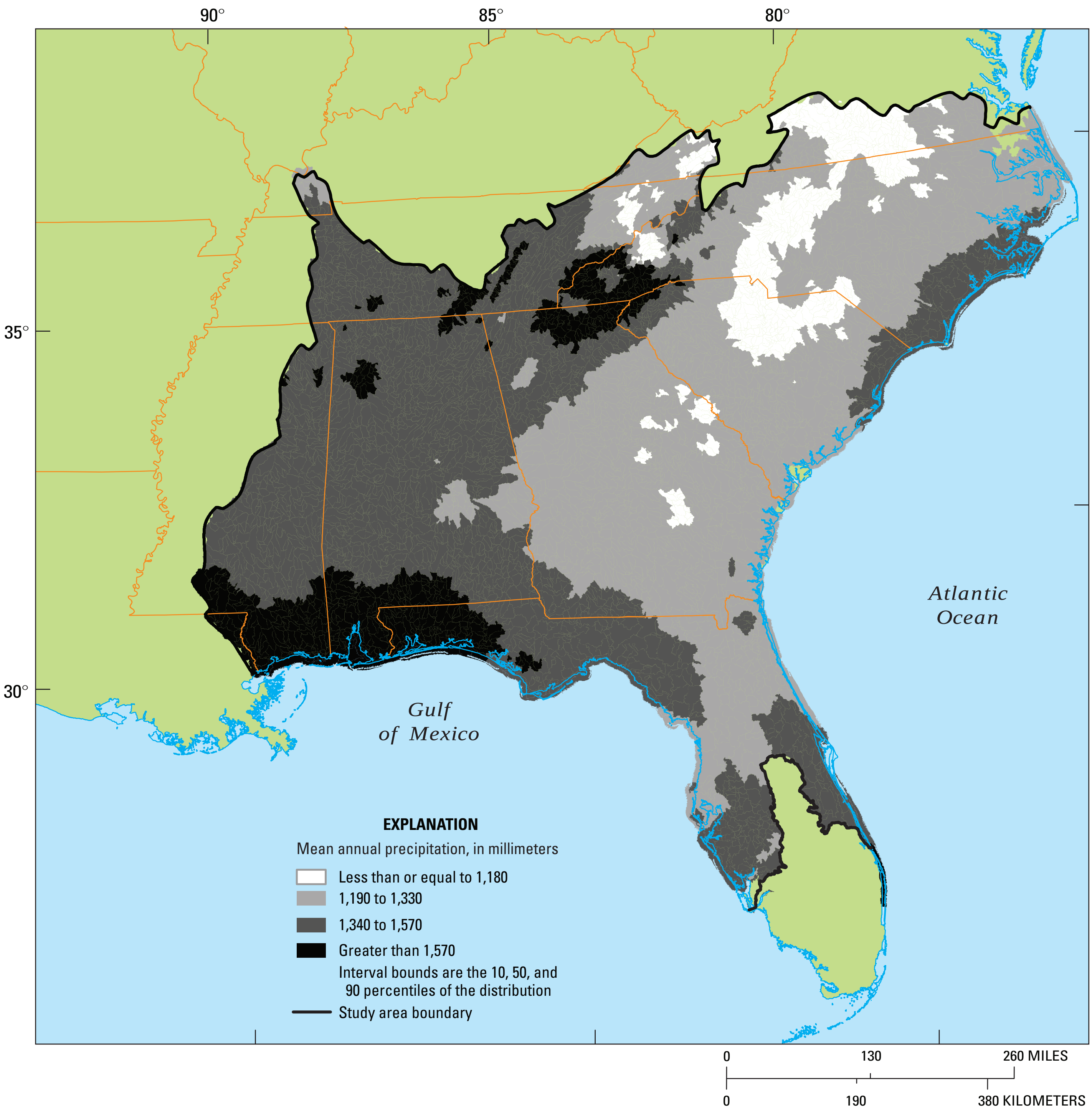

Figure 5F. Estimates of precipitation for individual catchments in the SAGT SPARROW model area, 2002.

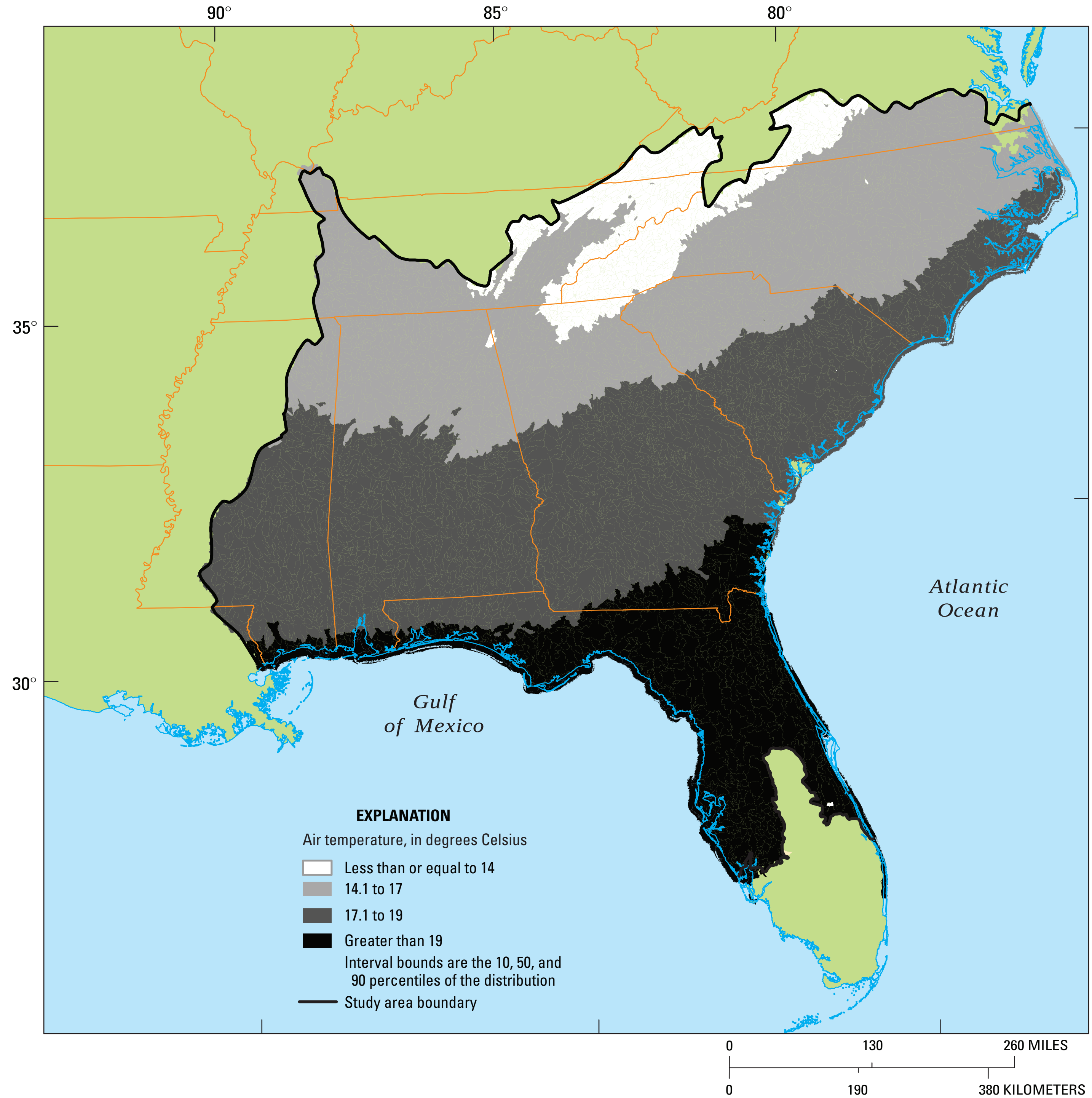

Figure 5G. Estimates of air temperature for individual catchments in the SAGT SPARROW model area, 2002.

Landform Characteristics

Landform characteristics considered as candidate nutrient-transport predictors include land-surface slope and proportion of flatland. The average percent-slope of the land surface was determined for each SAGT ERF1_2 catchment using a seamless digital elevation model (DEM) created from the 100-meter surface-elevation dataset for the SAGT area (Falcone, 2003). The SLOPE function in ArcInfo's GRID module (Environmental Systems Research Institute, Inc., 2008) was used to create a dataset that contains a percent-slope value for each 100-meter cell. A mean percent-slope value was calculated for each catchment using the ZONALMEAN function in the GRID module. Proportion of flatland was determined as the number of cells within a catchment with a slope of less than or equal to 1 percent, divided by the total number of cells within a catchment. Estimates for each catchment of mean percent slope (variable name slope_mean) and proportion of flatland (variable name p_flat) are listed in the file *SAGT_ERF1_input.xls.zip* (2.1 MB). The spatial distribution of catchment-level estimates of mean percent slope is illustrated in figure 5E.

Climate Characteristics

Climate characteristics considered as candidate nutrient-transport predictors include mean annual precipitation, air temperature, and excess precipitation. Estimates of mean annual precipitation were obtained from PRISM (Parameter-elevation Regressions on Independent Slopes Model), developed by Oregon State University, PRISM Group (Daly and others, 2002), specifically from the dataset United States Average Annual Precipitation data, 1971–2000. The PRISM dataset uses precipitation data from many climatological networks, and refines interpolation of a continuous surface by incorporating digital elevation model (DEM) parameters such as elevation and topographic facet. The final surfaces are distributed as 800-meter resolution raster datasets (Oregon State University, PRISM Group, 2007). The PRISM precipitation data were averaged within each catchment to arrive at an average annual precipitation value, in millimeters (variable name precip_mm in the file *SAGT_ERF1_input.xls.zip*, 2.1 MB). Spatial distribution of the catchment-level estimates of annual precipitation is illustrated in figure 5F.

The PRISM Group also distributes average annual air temperature data for the climatological period 1971–2000. These data, like the precipitation data, incorporate a variety of climatological network data and refine the interpolation of a continuous surface with ancillary data such as elevation. The 800-meter gridded surface of the 30-year mean value of daily mean temperature (in degrees Celsius) was used to calculate temperature estimates for each catchment (variable name meantemp_c in the file *SAGT_ERF1_input.xls.zip*, 2.1 MB). Spatial distribution of the catchment-level estimates of air temperature is illustrated in figure 5G.

Excess precipitation is represented by the variable pmpe, the mean annual precipitation minus potential evapotranspiration, which indicates the volume of precipitation that is available for direct runoff. This variable, developed by Wolock and McCabe (1999), is based on estimates of mean annual precipitation and potential evaporation at meterological stations, computed from mean monthly data from 1961–1990 and interpolated to a 1-kilometer grid using an inverse-distance weighting method. Gridded values were then averaged (Wolock, 2003) for watersheds of approximately 500 square kilometers in area. These watershed-average values were used to calculate (using the ZONALMEAN function) estimates for each catchment in the SAGT model area (variable name pmpe_inches in the file *SAGT_ERF1_input.xls.zip*, 2.1 MB).

Accumulation of Catchment-Level Estimates of Watershed Attributes to Estimates for the Total Upstream Watershed

The catchment-level estimates of nutrient source and transport attributes presented in the file *SAGT_ERF1_input.xls.zip* (2.1 MB) represent conditions in the incremental or local area that drains directly to each reach segment. Information discretized in this way preserves detail on spatial distribution of source attributes relative to transport attributes and allows for incorporating spatial referencing in the regression analysis, a key feature of the SPARROW model approach. The watershed-attribute estimates compiled for this report may be useful for purposes other than SPARROW modeling, however—for example, comparing watershed conditions among a set of stream sites, or examining relations between stream attributes (not necessarily nutrient flux) and watershed attributes. These types of applications require watershed attributes estimated for the total upstream drainage area for the stream site rather than the incremental or catchment area associated with the stream reach segment.

Estimates for each of the nutrient source and transport attributes for the total upstream watershed contributing to each reach segment are included in the file *SAGT_accumulated-fortotalwatershed.xls.zip* (1.9 MB). For watershed attributes expressed as mass or area (for example, nitrogen mass in fertilizer or area in forested land), the accumulated value is the sum of the catchment-level estimates for all catchments upstream from (and including) the reach segment. For all other watershed attributes (for example soil permeability or mean annual precipitation), the accumulated value is the mean of all the catchment-level estimates for all catchments upstream from (and including) the reach segment; catchment-level estimates are weighted by catchment area in the calculation of mean value.