How the Maps Were Made

Geographic information system (GIS) and desktop publishing technologies were used in the production of maps for this atlas. NASS developed an automated map production system to generate digital map files based on statistical data from the 2002 and 1997 Censuses of Agriculture. The system utilized agricultural statistical data files, geographic area boundary files, land use/cover boundary files, map parameter data files, and customized GIS and statistical software to produce thematic choropleth and dot-distribution maps. The customized software performed statistical calculations to class the data into categories and to allocate the number of dots for a geographic area. The software also executed other cartographic functions including, assigning symbology to represent the data; randomly placing dots; creating and positioning map titles, legends and notes; and outputting individual maps to digital image files. Colors for the maps were selected with the assistance of ColorBrewer, an online tool for selecting map color schemes. The color schemes were developed by Dr. Cynthia A. Brewer at Pennsylvania State University.

The U.S. Census Bureau provided a generalized county boundary file, urbanized areas boundary file, land use/cover boundary file (originator - USGS), and county-level land area/perimeter data file. NASS modified the county boundary file to show the county-level geographic areas for which agriculture census statistics are reported. The statistical data and geographic areas were identified by Federal Information Processing Standards (FIPS) codes that allowed for a 1-to-1 correspondence between the data and the geographic area. NASS updated the land use/cover boundary file with generalized urbanized areas. The continental U.S. and Hawaii were mapped at a scale of 1:20,000,000 and Alaska used a map scale of 1:60,000,000. The maps were projected using Albers Equal Area Conic projection.

On some maps, a note indicates that the statistical data are from sample data. An explanation of “data based on a sample of farms” is available in the appendix section of the 2002 Census of Agriculture, Volume 1, Geographic Area Series.

Choropleth Maps

The choropleth maps portray quantitative data as a color showing the density, percent, average value, or quantity of a phenomenon within the boundary of a geographic area. Sequential colors indicate increasing positive/negative data values. For maps showing positive values, light colors represent lower values and dark colors represent higher values. For maps having both positive and negative values, light colors represent midrange values, while dark colors represent end range values. Each color represents a range of data values that were determined by classification techniques that grouped ranges of data values into classes. By matching the FIPS codes of the geographic areas to the FIPS codes of the statistical data, each geographic area was assigned a color corresponding to its data value and the data class to which it belonged. GIS software assisted in determining classes and in symbolizing the classed geographic areas. Geographic areas with non-disclosed data are shown, because a class represents a range of data values rather than a specific data value.

Many of the choropleth maps in the atlas show derived values (density, percent, or average) that adjusted the data for variation in size of geographic areas. However, some choropleth maps show quantities of a phenomenon. For these maps, large geographic areas may exhibit greater quantities than smaller geographic areas. This may be attributable to the size of the geographic area rather than relative intensity of the phenomenon within the geographic area. NASS statisticians made the decision to show either derived values or quantities and also selected data classes, based on the assumed preferences of the data users.

Dot-Distribution Maps

The dot-distribution maps portray quantitative data as a dot which represents a number of the phenomenon found within the boundary of a geographic area. The pattern of distributed dots reflects the general locations where the phenomenon was most likely to occur. The pattern and number of dots within a geographic area reveal the density of the phenomenon. Two types of dot-distribution maps are included in the atlas: the first type is a traditional dot map showing the distribution of a phenomenon, and the second type is an increase/decrease dot map showing increasing (positive) and decreasing (negative) data values as they related to the last agricultural census. The traditional dot map symbolizes data with blue dots. The increase/decrease dot map symbolizes data using blue dots for positive data values and red dots for negative data values.

Placement of dots utilized land use/cover files, weighting factors, customized statistical algorithms, and GIS software to allocate and randomly place dots within geographic areas. A land use/cover file is a digital vector file containing 17 land use/cover categories. NASS statisticians assigned weighting factors to each land use/cover category based on the likelihood of a specific type of agricultural activity occurring within a category. The weighted land use/cover files were merged with the geographic area boundary files to produce weighted land use/cover filter files. Customized statistical software used the weighted land use/cover filter files and statistical data files to calculate and assign the number of dots for each weighted land use/cover polygon based on the dot value, polygon size, and assigned weighting factor. GIS software then randomly placed the specified number of dots within each weighted land use/cover polygon. Because dot positions were randomly determined, the dots do not show the actual locations of the phenomena.

The dot value assigned to a dot actually reflects a range of data values. For example, if the legend indicates that one dot equals 500 acres of corn, then in most cases, no dot is placed for county-level geographic areas with data values less than 250 acres of corn, one dot is placed for county-level geographic areas with data values ranging from 250 to 749 acres of corn, two dots are placed for county-level geographic areas with data values ranging from 750 to 1,249 acres of corn, and so on. This methodology can yield an undercount of dots at the state level, so dots are added to the map to reach the calculated state number of dots by including an extra dot for the county-level geographic areas with the largest positive/negative remainder values. For example, if a state has a total of 1390 corn acres, with county A having 240 acres of corn and county B having 1150 acres of corn, then normally county A would receive no dots and county B would receive 2 dots, for a total of 2 dots. However, there should be a total of 3 dots shown at the state level. Therefore, an additional dot would be placed in county A, because the remainder in county A (240 - 0 = 240) is greater than the remainder in county B (1150 - 1000 = 150). Geographic areas with non-disclosed data are shown because a dot represents a range of data values rather than a specific data value.