1980 CENSUS MAPPING PRODUCTS

Donna M. Dixon
Geography Division
United States Bureau of the Census
Washington, D. C. 20233

ABSTRACT

The goals of this paper are to acquaint the reader with map products produced by the United States Bureau of the Census for the 1980 Decennial Census and to enable map users to select the appropriate census map for their use. Major categories of maps include the detailed 1980 Census Maps and the corresponding indexes, summary reference maps, and special purpose maps included in the various publication products. The paper revolves around the design and production flow of the basic map series and the subsequent evolution of derivative maps. The discussion of each series focuses on the following topics: intended purpose, format, scale, coverage, symbolization, and content. The summary briefly touches upon the automation of the mapping system in the context of long-range geographic support plans for the 1990 Decennial Census.

INTRODUCTION

The current mapping program at the United States Bureau of the Census is centered around the 1980 Decennial Census which, in the final count, will produce over 33,000 maps. The purpose of these maps is to provide a geographic framework for the data collection and data dissemination functions of the Bureau. To fulfill these functions, up-to-date coverage of the entire United States is produced in several different formats. These maps provide a great deal of information to any map user.

The maps are based upon a complicated geographical hierarchy designed to accommodate equally complex census needs. This hierarchy, combined with the sheer volume of maps and the number of different map series, results in a potentially overwhelming system of maps and mapping.

MAJOR MAP CATEGORIES

Map series produced at the Census Bureau can be divided into three major categories based upon the purpose of the series. These catgories include 1980 Census Maps, summary reference maps, and special purpose maps.

1980 Census Maps

The 1980 Census Maps provide the backbone for the census mapping program. These maps are the basis for all other maps produced, as they are the tools used in the original

data collection processes. They carry no data; they are outline maps that portray the census geographic hierarchy.

The 1980 Census Map coverage is divided into five map series which, together, cover the entire United States. The five series were created to accommodate the geographic complexity of the states. They include the metropolitan map series/ vicinity map series, the place map series, the place and vicinity map series, the county map series, and the American Indian reservation map series.

All 1980 Census Maps fall into one of two categories based upon the level of the geographic hierarchy portrayed on each map; the two levels are the block level and the enumeration district level. Maps that portray the block level (maps for block numbered areas) cover approximately 10 percent of the total land area of the United States, encompassing approximately 90 percent of the total population. These maps will be available in a printed format.

For the remainder of the United States, maps were prepared that carry the geographic hierarchy to the level of the enumeration district. Generally, this map coverage is provided for the less populated areas of the country. These maps are available through the Census Bureau but not, however, in a printed form.

In the published reports for block-numbered areas, two index map series have been produced--the state index to block-numbered areas map series and the standard metropolitan statistical area index to block numbered areas map series. These two indexes are summary reference maps, but are mentioned here because of their relationship to 1980 Census Maps for block numbered areas.

Summary Reference Maps

The second major category of maps include the summary reference maps. Unlike the 1980 Census Maps, which contain all aspects of the census geographical hierarchy, each of these map series focuses on a specific level of information. For example, one map series focuses on urbanized areas, another on census tracts. As the title implies, their purpose is to summarize information from the decennial census and/or to provide reference maps. They are generally at much smaller scales than the 1980 Census Maps, and were prepared to accompany the major report series prepared at the Bureau.

Special Purpose Maps

The final category, special purpose maps, consists of those maps prepared to present a specific subject or set of data. Unlike the maps of the two major categories previously discussed, these maps are generally prepared only upon the special request of a sponsoring division within the Census Bureau. They are mainly thematic maps of the United States. The unclear funding situation at the Bureau, as well as the entire Federal government, renders it difficult to predict which of these maps will be produced for the 1980 Decennial Census. In past years, published maps falling into this category include the GE50, GE70, and GE80 map

series, the several United States summaries, Congressional District Data Books, and individual special purpose maps.

All the maps described above constitute the mapping products for the 1980 Decennial Census. These maps have initially been presented in the three major categories to provide a basic framework for census mapping. From this point on, however, the discussion will deviate from the three major categories where necessary, in order to provide a cartographer's viewpoint. This viewpoint focuses on the interrelationships between the major series by examining the multiple uses of base maps to produce subsequent map series. In gaining an understanding of census map products, it is important to realize that each map series is the derivative of another. The good points of each series, as well as the flaws, are carried into each subsequent map series.

The census mapping program is complex; to gain a full understanding of it, a studied effort is required. The cartographer's viewpoint (or the derivative map approach) has been used in this paper specifically to simplify the volume of information necessary to understand the mapping system. Once the information for one map is understood it can be carried over into understanding the derivative maps.

1980 CENSUS MAPS

As stated before, the purpose of 1980 Census Maps is to provide the census data user with a detailed map to accompany census data, either published in the major report series or on summary tapes. Each of the five series that fall into this category are prepared independently of any other series produced at the Bureau; they are the maps from which all other series are derived.

The five map series show the same kinds of information and therefore serve the same basic purpose. While all of the block-numbered map series are identical in content, the areas covered are mutually exclusive. Each series was designed to accommodate one of three major levels of geographic complexity.

Metropolitan Map Series/Vicinity Map Series

The metropolitan map series and the vicinity map series provide coverage for the nation's major built-up areas. Those built-up areas falling within a standard metropolitan statistical area are covered by the metropolitan map series. Selected areas outside standard metropolitan statistical areas are covered by the vicinity map series.

The political and statistical information on these maps includes the entire census geographic hierarchy. The political information portrayed includes the following boundaries and names: international, state, county (or county equivalent), county subdivision (minor civil division or census county division), minor civil subdivision (where applicable), place (incorporated place or census designated

place), Alaska Native village, and American Indian reservation. Statistical areas represented on 1980 Census Maps include urbanized area, census tract, enumeration district, block (where appropriate), and identifiers. The predominant scale of the two series is 1 inch represents 1,600 feet. In selected densely settled areas a larger scale of 1 inch represents 800 feet is used; in less densely settled areas a smaller scale of 1 inch represents 3,200 feet is used.

The symbolization for these two series, as well as all other 1980 Census Maps is standard. Varying line patterns, symbols, and screen values provide the mode of symbolization for these predominantly black and white maps. The standard census typographic system is used for selected levels of information.

All maps in the metropolitan map series and vicinity map series were designed and produced entirely by the Census Bureau from base information depicted on United States Geological Survey quadrangle maps. Modern production techniques were used to produce the approximately 10,700 map sheets in these series. A typical map sheet covering roughly 30 square miles measures 14 inches by 24 inches. For selected sheets within the 19 most complex standard metropolitan statistical areas, color area tints were used to aid the map reader in distinguishing intricate corporate boundaries.

Place Map Series and Place and Vicinity Map Series

The next major level of map coverage includes the place map series and the place and vicinity map series. Place maps were designed to provide detailed map coverage for built-up places not covered by the metropolitan map series/vicinity map series. The place and vicinity map series is basically identical except for minor distinctions in coverage. There are approximately 12,000 place maps and 4,200 place and vicinity maps.

Place and vicinity map coverage is used wherever the development of an area extended beyond legally or census defined place limits. They also provide coverage for those places that have large out-parcels of unincorporated land surrounded by the subject place. Where two or more places fall on the same map sheet, place and vicinity map coverage is used.

The place and place and vicinity map series make use of base maps provided primarily by local or state governments. Some unnecessary information was deleted from these base maps and census information was superimposed upon the base. In selected cases, the Census Bureau prepared its own base map using these local maps as source material only.

The use of a variety of base maps for these series necessarily implies a variety of scales and formats, depending upon the source agency. The base map symbolization also varies from map to map. All census information was symbolized using the standard 1980 Decennial Census map typographic and symbolization systems.

County Map Series

The third level of coverage of the 1980 Census Maps is provided by the county map series. This series covers all areas of the United States not covered by either the metropolitan or vicinity map series or the place and place and vicinity map series. There are approximately 6,100 county maps. The county map series was created in a manner similar to the place and place and vicinity map series. Maps from state agencies, usually state highway departments, were used as bases. The scales of these maps were standardized to a scale of 1 inch represents 1 mile. Map format varies depending upon the base map used. The symbolization and typographic systems for information added to the base use the standard 1980 census conventions.

American Indian Reservation Map Series

The final map series within the 1980 Census Map category, the American Indian reservation map series, provides map coverage for selected American Indian reservations. There are approximately 84 map sheets in this series. These sheets are similar to county map series sheets in format and content; the major difference is the exclusive coverage of American Indian reservations.

The two map series which provide indexes for 1980 Census Maps for block-numbered areas will be discussed in the following section.

SUMMARY REFERENCE MAPS

The summary reference map category includes the following major map series: county subdivision, state standard consolidated statistical area/standard metropolitan statistical area outline, urbanized area outline, census tract outline, state index to block-numbered areas, and standard metropolitan statistical area index to block-numbered areas map series.

The county subdivision map series serves as a base for the state standard consolidated statistical area/standard metropolitan statistical area outline map series and for the state index to block-numbered areas map series.

The second distinct set of derivative maps uses the standard metropolitan statistical area index to block-numbered areas map as a base. The urbanized area outline and census tract outline maps are derivative map series.

COUNTY SUBDIVISION MAP SERIES AND DERIVATIVES

The county subdivision map series presents page-size maps for every state, the District of Columbia, Puerto Rico, and other outlying areas within the jurisdiction of the United States. Depending upon the geographical complexity of a state, the information may be presented on one page or, in most cases, is divided into sections appearing on

several pages. To aid in using the multi-page state maps, all sections within a state are at the same scale. In total, the 50 states are shown on 220 pages.

In comparison to the 1980 Census Maps, the county subdivision maps are much less detailed and at a much smaller scale. County subdivision map scales fall into a range from 1 inch represents 8 miles to 1 inch represents 100 miles; one-half the states are at scales of 1 inch represents 18 or 20 miles.

The county subdivision map series provides a simplified framework of census geography in an easy-to-use format. The political information within the census hierarchy is retained on these maps, while the lower-level statistical hierarchy has been eliminated. The information portrayed on the county subdivision map series includes the following boundaries and names: international, state, county, county subdivision, minor civil subdivision, and place. Adjacent state boundary ticks and names, and adjacent county boundary ticks within sectionalized states are shown.

The 1:500,000 state map series produced by the United States Geological Survey was selected as the base map for the entire county subdivision series. Census information (e.g., county, minor civil division, census county division, and place boundaries) was obtained from 1980 Census Maps to complete the compilation phase. New artwork was constructed, resulting in this multipurpose map series.

A special version of the county subdivision map series was prepared showing American Indian reservation and Alaska Native village boundaries and names. This information was superimposed, where appropriate, directly onto the county subdivision map described above. These maps will accompany those report series which contain data for American Indian reservations and/or Alaska Native villages.

State Index to Block Numbered Areas Map Series

The county subdivision map series is used, directly as described above, as the base for the state index to block-numbered areas map series. The index information is superimposed upon the county subdivision map base to create this entirely different series.

The state index to block-numbered areas map series was designed and created for use with the block statistics reports which include all 1980 Census Maps with block numbers. The extent of block-numbered area for each state is symbolized, thereby providing a state index. Two different screen values are used to represent area block-numbered as a part of the urbanized area program and area block-numbered beyond the limits of the urbanized area program. In addition, standard metropolitan statistical area boundaries, symbolized as screened bands, allow the map user to determine the proper report series in which to find census block statistics information.

State Standard Consolidated Statistical Area/Standard Metropolitan Statistical Area Outline Map Series

The second map series derived from the county subdivision map series, the state standard consolidated statistical area/standard metropolitan statistical area outline map series is the least complex of the major 1980 census mapping products. It was prepared by reducing the county subdivision base and preparing an entirely new set of artwork showing selected categories of information.

In final form, each state is presented on a single page showing standard consolidated statistical area and standard metropolitan statistical area boundaries and names using solid and screened bands, respectively. Boundaries and names shown include international, state, county, place (of more than 25,000 inhabitants), and any other central city of a standard metropolitan statistical area regardless of size. Places are symbolized with four dot symbols representing four population classes. Adjacent state names and boundary ticks and adjacent county boundary ticks are provided. The scale for each map in this series is based entirely upon the single page format.

STANDARD METROPOLITAN STATISTICAL AREA INDEX TO BLOCK NUMBERED AREAS MAP SERIES AND DERIVATIVES

The second major grouping of derivative maps includes the standard metropolitan statistical area index to block-numbered areas map series, the urbanized area outline map series, and the census tract outline map series. The base common to these three series was originally prepared for the standard metropolitan statistical area index to block-numbered areas map series, and was then adapted for the remaining two.

Standard Metropolitan Statistical Area Index to Block-Numbered Areas Map Series

The original base maps were formatted by individual standard metropolitan statistical areas at artwork scales of 1 inch represents 2, 4, or 8 miles, the predominant scale being 1 inch represents 2 miles. Map sheets range in size from 21 inches by 25 inches to 40 inches by 57 inches. Approximately 350 map sheets were prepared for all 323 standard metropolitan statistical areas determined as a result of the 1980 Decennial Census.

The political information portrayed on the base map for the standard metropolitan statistical area index to block-numbered areas map series includes international, state, county, county subdivision, and place boundaries and names.

The standard metropolitan statistical area index to block-numbered areas map series uses this political base information combined with additional information to provide a detailed index for block-numbered map sheets within standard metropolitan statistical areas.

The information added to the political base includes metropolitan map series sheet limit lines and numbers, and

block-numbered area information. Block-numbered areas are symbolized with two different screen values representing area block-numbered as a part of, and beyond the limits of, the urbanized area program.

Census Tract Outline Map Series

The census tract outline map series is based upon the standard metropolitan statistical area index to block-numbered areas map series. Maps are being prepared for 323 standard metropolitan statistical areas, selected areas within the balance of 48 states, and Puerto Rico. In total, approximately 548 map sheets will be prepared.

For the 323 standard metropolitan statistical areas, the actual political base artwork from the standard metropolitan statistical area index to block-numbered areas map series is being used. Census tract boundaries, tract boundary identifiers, and tract numbers are added to this political base to create the census tract outline map.

Political base artwork for the selected areas within the balance of 48 states and Puerto Rico is being created, because the standard metropolitan statistical area index to block-numbered areas map series does not provide coverage for these nonstandard metropolitan statistical areas. The final map, although prepared differently, is identical in design and content to that described above.

For the majority of standard metropolitan statistical areas, parent map scales are identical to those of the standard metropolitan index to block-numbered areas base map sheets. In congested areas, either the entire base map scale was changed to accommodate the level of density, or insets were prepared for selected groups of tracts. For the balance of state areas, the original scale was selected to accommodate each area.

The majority of parent map sheets are at a scale of 1 inch represents 2, 4, or 8 miles. The predominant scale is 1 inch represents 2 miles; in special areas, scales range from 1 inch represents 1/2 mile to 1 inch represents 4 miles depending upon the complexity of information and the density of the area. Inset scales range from 1 inch represents 1/2 mile to 1 inch represents 1 mile.

The format of the census tract outline map series is similar to that of the standard metropolitan statistical area index to block-numbered areas map series; maps are produced for individual standard metropolitan statistical areas. Approximately 14 multisheet standard metropolitan statistical areas were reformatted; match lines between sheets were changed from arbitrary straight lines to county boundaries to avoid splitting tracts. The balance of state areas are formatted by county or groups of counties.

Census tract boundaries are symbolized with a narrow screened band; tract numbers and tract boundary identifiers are solid. The political base names are screened, but the remainder of the political base information (primarily

boundaries) is solid. Inset areas on the parent map are indicated with a light area screen.

Urbanized Area Outline Map Series

The second major map series to use the standard metropolitan statistical area index to block-numbered areas map series political base is the urbanized area outline map series. The purpose of this series is to show the extent of all urbanized areas defined as a result of the 1980 Decennial Census.

To show the individual urbanized areas effectively on page-size maps, the base artwork was standardized to a scale of 1 inch represents 4 miles, and reformatted. The majority of the urbanized areas were easily accommodated on page-size maps. However, in those cases where the urbanized area extended beyond a one-page limit, a multisheet format was used.

The actual extent of the urbanized area is portrayed on the political base through the use of three screen values. The three values portray the different components of an urbanized area, including incorporated places, census designated places, and other qualifying areas not falling into the first two categories.

SPECIAL PURPOSE MAPS

Special purpose maps, the final category of maps, are published on an individual basis pending special requests and funding. As of June 1982, the only maps in this category scheduled for production are those to be published in the several United States summary reports, and the Congressional District Data Books for the 98th Congress.

The maps for the United States summary reports are primarily color thematic maps that highlight different aspects of the 1980 Decennial Census results. These thematic maps appear either on two pages, one page, or one-half page, depending upon the topic of the maps.

Maps prepared for the Congressional District Data Books were designed to portray congressional district boundaries for the 98th Congress of the United States. Each state and the District of Columbia are represented on page-size maps. The state standard consolidated statistical area/standard metropolitan statistical area outline map series artwork was modified and used as a political base for the congressional district maps. Congressional district numbers and boundaries were added, symbolized as solid type and solid heavy lines, respectively. Insets were used where the geography of the area, in combination with the complexity of the district boundary, was too complex to show on the page-size map. The inset area on the parent map is indicated by a light area tint.

SUMMARY

Although the map series discussed in this paper have been presented as independent products and are, in fact, used frequently as independent cartographic products, their intended purpose is part of a much larger Bureau-wide effort. The series were designed to be integral parts of the major printed report and summary tape file series prepared by the Census Bureau. When published in original form, each map series accompanies an appropriate 1980 Decennial Census report. Together they fulfill the data dissemination function of the Bureau, by allowing the data user to focus on a specific level of data within the tables.

The overall function that maps serve for the Census Bureau will not change in the context of the 1990 Decennial Census; maps will provide a geographic framework for the data collection and data dissemination functions of the Bureau. The manner in which this function or goal is accomplished, however, will change dramatically.

The extent and form of the changes will depend upon the activities of the Census Bureau, and more specifically of the Geography Division, in preparation for the 1990 Decennial Census. In the recent past, the Geography Division has undertaken the development of a long-range geographic support plan, which will evolve throughout the decade. The basic premise of the plan is the development of a major computer file, allowing automation of most major geographic support activities.

At the optimum functioning level, this file will provide the ability to generate maps automatically within the framework of a fully integrated geographic system. Inherent in the development of this automated mapping system is the flexibility provided by, and limitations imposed by, any automated mapping system. The flexibility will allow the Census Bureau to reconsider every mapping variable discussed in this paper--map series, format, scale, coverage, symbolization, and content.

Early in the decade, the 1980 Decennial Census mapping products will be evaluated by the users, both from within the Census Bureau, and from the data user community outside the Census Bureau. This evaluation will be used to determine if the maps meet the needs of the users. The results of the evaluation will provide the framework around which 1990 Decennial Census mapping products will be designed. Automation will provide the means by which these changes can be effectively implemented.