

Census Tracts and Block Numbering Areas

Census tracts are small, relatively permanent geographic entities within counties (or the statistical equivalents of counties) delineated by a committee of local data users. Generally, census tracts have between 2,500 and 8,000 residents and boundaries that follow visible features. When first established, census tracts are to be as homogeneous as possible with respect to population characteristics, economic status, and living conditions.

Block numbering areas (BNAs) are geographic entities similar to census tracts, and delineated in counties (or the statistical equivalents of counties) without census tracts. For the 1990 census, the difference between census tracts and BNAs generally was the type of organization doing the delineation. Local census statistical areas committees (CSACs), often working at the county level, delineated or reviewed census tracts. State agencies and American Indian tribal authorities, sometimes with extensive assistance from the Bureau of the Census, delineated BNAs.

The Census Bureau uses census tracts and BNAs to collect, organize, tabulate, and present the results of its decennial censuses. Both census tracts and BNAs are an important part of the Census Bureau's geographic hierarchy (see Figures 2-1 and 2-3 in Chapter 2). For the 1990 decennial census, the Census Bureau recognized 50,690 census tracts in the United States and Puerto Rico, and 11,586 BNAs in the United States, Puerto Rico, and the Outlying Areas under U.S. jurisdiction. Six States (California, Connecticut, Delaware, Hawaii, New Jersey, and Rhode Island) and the District of Columbia are covered completely by census tracts.

Background

The first recorded instances of the delineation of small geographic entities based on population, topography, and housing characteristics were the sanitary districts of a special vital statistics study associated with the 1890 census. The Census Office, predecessor of the Census Bureau, worked with local officials in a number of cities to delineate a network of small geographic areas.

These sanitary districts then were used to analyze and compare the effect of population, topography, and housing on the mortality rate of the inhabitants. The delineation of these sanitary districts was an important step in the evolution of geographic statistical entities. This may have been the first instance of Federal and local cooperation in designing a set of small geographic units based on population and housing characteristics.

Census Tracts

In 1906 Dr. Walter Laidlaw, Director of the Population Research Bureau of the New York Federation of Churches, published an article putting forth the idea of delineating and using small geographic areas as a method of studying neighborhoods in New York city.¹ Dr. Laidlaw had been studying neighborhoods by using the 1900 census data for assembly districts (subdivisions of New York city's boroughs) together with information from other sources. In 1905, the State of New York changed the boundaries of the assembly districts, thereby altering the geographic framework and impairing the usefulness of all his information.

In search of a solution, Dr. Laidlaw proposed a scheme that did away with both ward and assembly districts as data tabulation units. Instead of these, he suggested the delineation of permanent small areas that would retain their boundaries from census to census. His plan was to subdivide each square mile of New York city into quarter sections of about 160 acres. In 1909, he persuaded the Census Office to adopt the concept, and they collected the 1910 census data in a manner that allowed for these tabulations by small area. Interested data users then could purchase the data summaries and arrange for their tabulation and publication. The Census Office also delineated similar *districts*, later called *census tracts*, in seven other cities: Baltimore, Boston, Cleveland, Chicago, Philadelphia, Pittsburgh, and St. Louis.²

The Census Bureau collected data by census tract for these eight cities in 1910 and 1920; however, only New York city made immediate use of the data. In the mid-1920s, Chicago and Cleveland purchased and published their census tract data. By the end of the decade, 18 cities (the same 8,

and 10 new ones) were reviewing or delineating census tracts for the 1930 census.

This increased interest in census tracts was due largely to the promotional efforts of Howard Whipple Green, a statistical consultant working in Cleveland, Ohio. Having experienced data problems similar to those faced by Dr. Laidlaw, he found that census tracts were a solution. In 1931, the American Statistical Association appointed Mr. Green chairman of its newly formed Committee on Census Enumeration Areas. Along with this appointment came the unofficial assignment to promote the delineation of census tracts in large cities throughout the country. Over the next 25 years, he worked hard at this task, contacting interested people in other cities, encouraging the formation of local committees, and publicizing uses for census tract data in a newsletter.³

In his dealing with the local committees, Mr. Green often found it convenient to identify one individual in each city as a point of contact. He called these individuals *key persons*. The committees themselves became known as *census tract committees*. These were the forerunners of the present-day census statistical areas committees (see Chapter 3, “Local Census Statistical Areas Committees and Other Local Assistance”). For the 1940 census, the Census Bureau adopted the census tract as an official geographic entity to be included in data tables of the standard publications of the decennial census. This relieved the census tract committees of the need to purchase the data tabulations and to fund their publication. In 1955, upon Mr. Green’s retirement, the Census Bureau assumed the functions of promoting and coordinating the delineation of census tracts.

Block Numbering Areas

Both census tracts and BNAs provide the geographic framework for delineating block groups, assigning census block numbers, and tabulating and presenting the resultant data. In 1940, the Census Bureau began publishing census block data for all cities with 50,000 or more inhabitants. In cities that had census tracts, it assigned the block numbers by census tract; in

cities without census tracts, it devised *block areas* to control the numbering. These block areas, renamed *block numbering areas (BNAs)* in 1960, consisted of one or more enumeration districts, and sometimes city wards. Their boundaries were major streets, railroads, and other physical features. In 1970, the Census Bureau established its current procedure of numbering BNAs within a county (or statistically equivalent entity) beginning with the number 9501. In 1970 and 1980, there was an increase in the number of jurisdictions and areas receiving data by census block under the BNA program (see Chapter 11, “Census Blocks and Block Groups”). Beginning with the preparations for the 1980 census, the Census Bureau changed the BNA delineation criteria to make BNAs more comparable in size and shape to census tracts.

Census Tract and BNA Criteria

Over time, the Census Bureau and the census statistical areas committees have developed a set of standards to guide the establishment and revision of census tracts. Although not expressly mandated by any legislation, these practices have evolved through custom and usage, and are now an integral part of the principles, policies, guidelines, and criteria that the Census Bureau uses to create and maintain census tracts. These rules promote census tract consistency nationwide, and also serve to meet local needs for small-area data.

Eligibility

The eligibility criteria for the census tract program has evolved over time in response to user demand and the growth in metropolitan areas (MAs). Initially, only metropolitan counties (or statistically equivalent entities) and nonmetropolitan jurisdictions that met specified conditions could participate in the census tract program. Generally, local committees decided to delineate census tracts in nonmetropolitan counties because (1) the counties were likely to gain metropolitan status as a result of an upcoming census, (2) they had a population of at least 100,000, or (3) they contained a city having at least 40,000 people. In addition, committees could establish census tracts in nonmetropolitan counties adjacent to metropolitan areas

if the counties were part of the planning or jurisdictional region of an existing census statistical areas committee.

For the 1990 decennial census, the Census Bureau assigned block numbers to all parts of the United States and the Outlying Areas. It opened the census tract program to include all counties (and statistical equivalents) with sufficient local interest to form a census statistical areas committee. All other counties (or equivalents) were part of the BNA program. (For details, see the section in this chapter entitled “Census Tracts and BNAs for the 1990 Census.”)

Basic Attributes of Census Tracts and BNAs

Even though local participation in the census tract program evolved over time in response to user demand and the growth in MAs, the underlying rationale for delineating census tracts has remained constant. They define a set of small geographic areas for the enumeration, tabulation, and publication of census data.

For the 1990 census, the Census Bureau changed the concept of the BNA dramatically. By redefining the BNA from a geographic area delineated solely as the framework for assigning census block numbers (1940 through 1980), to an entity sharing the same basic attributes as the census tract (1990), the Census Bureau has established a nationwide set of comparable small geographic areas.

The census tract and BNA criteria recognized by the Census Bureau identify boundary, size, and demographic requirements, and establish conventions for numeric identification and stability.

Boundary requirements The need for appropriate boundaries is a long-standing concern of census geography. Census tract and BNA boundaries generally follow permanent, visible features, such as streets, roads, highways, rivers, canals, railroads, and high-tension power lines. Pipelines and ridge lines may be acceptable when no other choice is available.

The most important attribute of census tract/BNA boundaries is that they be visible, that is, readily identifiable in the field.

The Census Bureau often is urged to accept the use of governmental unit boundaries as census tract and BNA boundaries. Census tract/BNA boundaries always follow the boundaries of States and counties (or their statistical equivalents). Census tract and BNA boundaries follow other governmental unit boundaries only in selected instances. Many early census tract plans covered only large cities; as a result, the city limits were census tract boundaries. This posed no problem at a time when governmental unit boundaries remained unchanged for long periods of time, and thus, their location was well known. Later, as annexations became more frequent and incorporated places expanded into surrounding areas, the governmental unit boundaries in many States became more irregular and subject to change, and fewer people knew their precise location. This lack of stability meant that the governmental unit boundaries became less suitable as census tract boundaries.

For the 1970 census, the Census Bureau began providing data for that portion of each census tract inside a governmental unit, and for the census tract as a whole. Until then, the only way to obtain census tract data within a governmental unit was by recognizing the governmental unit boundaries as census tract boundaries. Currently, the Census Bureau makes the full range of census data available for all governmental units and for census tracts/BNAs, thereby negating the need for census tract/BNA boundaries to follow governmental unit boundaries.

Demographic requirements When first delineating census tracts, the Census Bureau requests that the average population of all census tracts in a county (or statistically equivalent entity) be about 4,000 people (approximately 1,500 housing units), with individual census tracts ranging from 2,500 to 8,000 inhabitants (1,000 to 3,000 housing units). For the 1990 census, the Census Bureau requested that the average number of housing units in each BNA be around 1,500 (approximately 4,000 people), ranging from 600 to 3,000 housing units (1,500 to 8,000 inhabitants).

The Census Bureau also requests that at the time each census tract/BNA is established, it contain (if possible) a population whose housing and socio-economic characteristics are similar. Because the characteristics of neighborhoods and other small areas change with time, census tracts/BNAs may become less homogeneous in succeeding censuses.

Numeric identification To facilitate data processing and publication, the Census Bureau identifies census tracts and BNAs by number rather than name. Each census tract has a basic census tract number composed of no more than four digits, and may have an optional two-digit decimal suffix. (Leading zeroes appear in electronic media products, but do not appear on the Census Bureau's maps or in the printed reports.) All BNAs have a four-digit basic number and may have an optional two-digit decimal suffix. The Census Bureau uses the numbers 1 to 9499.99 to identify census tracts, and 9501 to 9989.99 to identify BNAs.

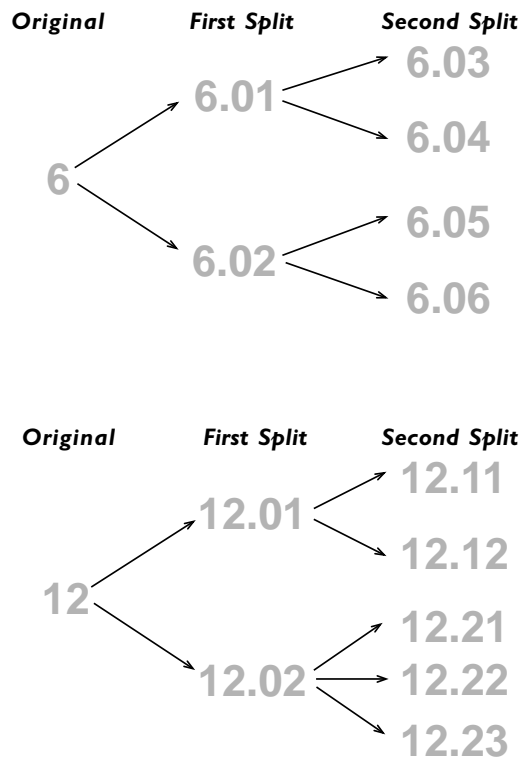
Sometimes the Census Bureau recommends a range or series of census tract/BNA numbers to the census statistical areas committee or agency participating in the BNA program to avoid duplication with adjoining counties. For example, if two counties in the same MA both contain census tracts numbered 101 through 110, the Census Bureau might recommend that one county renumber their census tracts 1101 through 1110, and the other renumber theirs 2101 through 2110.

A permanent numbering system is desirable since it helps data users make intercensal comparisons of information by census tract. Census tract updates often involve the subdivision of an existing census tract (or census tracts) into two or more new units. When new census tracts (splits) occur within an established set of census tracts, the Census Bureau recommends retaining the original four-digit census tract number and adding a two-digit decimal suffix. As a result, Census Tract 101 may be split into Census Tracts 101.01, 101.02, and so forth, depending upon how many new census tracts are created. If a census tract identified by a suffixed number is subsequently split, the census statistical areas committee usually drops the existing suffix and utilizes the next available suffixes.

Figure 10-1 depicts the most common scheme for numbering split census tracts (represented by Census Tract 6) and an alternative numbering scheme that some census statistical areas committees have chosen to use (represented by Census Tract 12). If two census tracts merge, the Census Bureau recommends that the census statistical areas committee retain the number of the more populous census tract.

The Census Bureau provides a unique census tract/BNA identifier (a numeric suffix of .99) to report statistics about people aboard civilian or military ships. These *crews of vessels* census tracts/BNAs refer to the water near the piers, docks, or onshore facilities associated with the ships; they do not represent any land area or any specific area of water.

Figure 10-1. **Recommended Renumbering of Split Census Tracts**



Census Tracts and BNAs for the 1990 Census

The 1990 BNA Delineations

In preparation for the 1990 decennial census, the Census Bureau expanded the delineation of BNAs so that all counties (or statistically equivalent entities) not in the 1990 census tract program would have BNAs. To do this, it developed a program for the governments of States, American Indian tribes, Puerto Rico, and the Outlying Areas to participate in the delineation of BNAs and block groups. This effort paralleled the delineation, or review and update, of census tracts and block groups being undertaken by the census statistical areas committees.

The Census Bureau contacted State/territorial governors and requested that they designate an agency to coordinate the delineation of BNAs for the 1990 census. It offered them two options for participation in the 1990 BNA program. Under the first option, the State/territorial agency delineated the BNAs (in some instances, with assistance from interested county or local agencies). Under the second option, the Census Bureau delineated the BNAs and sent the delineations to the designated State/territorial agency for review and concurrence. Although many States chose one option or the other, several combined both approaches. In Florida and Illinois, the State governor declined to participate in the BNA program and the Census Bureau delineated the 1990 BNAs.

For the 1990 census, the Census Bureau recognized some census tracts and BNAs that did not conform completely to established criteria. This was due to a number of factors, including Census Bureau enumeration and tabulation requirements, TIGER System constraints, and special arrangements reflecting the unique needs of data users.

Census Tract/BNA Boundary Discrepancies

Data users first saw geographic products showing the 1990 census tracts and BNAs on the Precensus Local Review Maps. In some instances, they discovered a discrepancy between the location of the census tract or

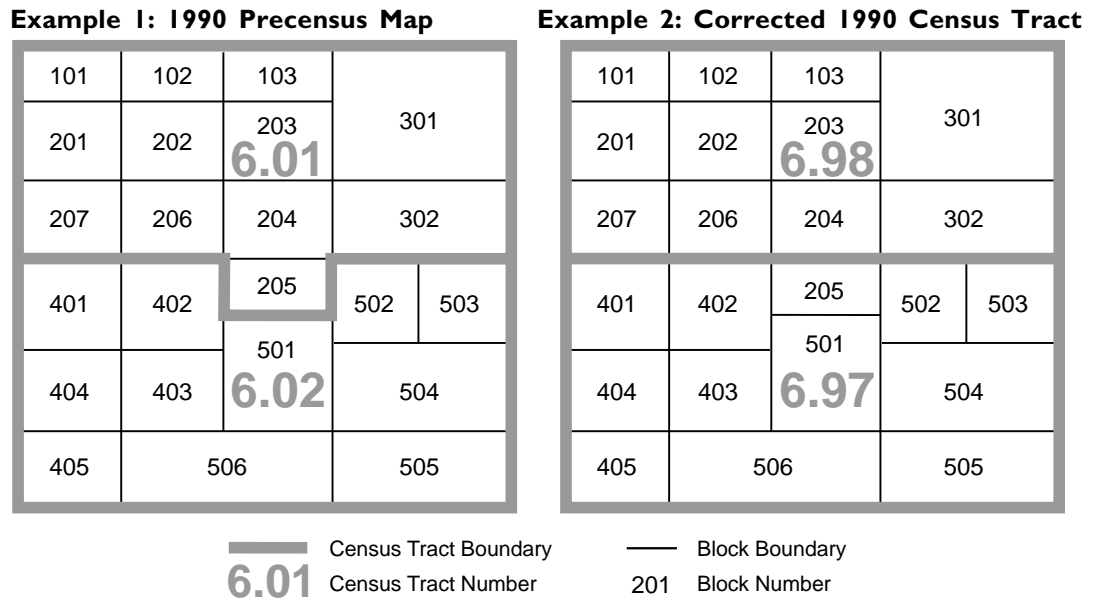
BNA boundary that the Census Bureau had previously agreed to recognize, and the location shown on the precensus maps. If the census statistical areas committee or the BNA participant notified the Census Bureau of a census tract or BNA boundary discrepancy and requested a correction, the Census Bureau corrected the discrepancy.

Resolving census tract/BNA boundary discrepancies was complicated further by an additional commitment made to data users. Following the 1980 census, many data users complained about two types of geographic inconsistencies that made using the 1980 census data difficult for a majority of data users—duplicate block numbers in a census tract/BNA and block groups consisting of more than one contiguous cluster of blocks (discontiguous block groups). The Census Bureau agreed to correct this for the 1990 census.

When resolving census tract/BNA boundary discrepancies, the Census Bureau expanded the area of a census tract/BNA wherever possible. After expanding the census tract/BNA, Census Bureau staff flagged the census tract/BNA gaining area and the census tract/BNA losing area. This was accomplished by retaining the basic census tract/BNA number of the changed census tracts/BNAs and adding a special two-digit suffix. When assigning the special suffixes, Census Bureau staff began with .98 and assigned subsequent numbers in descending sequence, .97, .96, .95, and so forth (see Figure 10-2).

As a result of the promise not to create discontiguous block groups or duplicate 1990 census block numbers, the Census Bureau did not expand the area of a census tract/BNA if such a revision caused the expanding census tract/BNA to include a census block that was discontiguous with other blocks sharing the same block group identifier, or if resolving the census tract/BNA boundary discrepancy created duplicate 1990 census block numbers. Under these circumstances, the Census Bureau created a separate census tract/BNA composed of the census block(s) in question. The Census Bureau assigned a new census tract/BNA number to the newly created census tract/BNA by retaining the basic number of the

Figure 10-2. Expanding a Census Tract or BNA for Boundary Resolution



When resolving census tract/BNA boundary discrepancies, the Census Bureau expanded the area of a census tract/BNA wherever possible. In Example 1 above, Block 205 was included in Census Tract 6.01 even though the approved census tract plan had included it in Census Tract 6.02. Because Census Tract 6.02 does not contain a Block Group 2, expanding Census Tract 6.02 does not create a discontinuous block group or duplicate any 1990 census block number in that census tract; thus, Block 205 simply becomes part of Census Tract 6.02.

After expanding a census tract/BNA, the Census Bureau flagged the affected census tracts/BNAs by adding special two-digit suffixes (beginning with .98 and then descending) to the basic census tract/BNA numbers. In Example 2, Census Tract 6.01 has been renumbered as 6.98 and Census Tract 6.02 as 6.97.

In Examples 1 and 2, it was possible to expand Census Tract 6.02 to include the affected census block (205). If expanding the census tract would have created discontinuous block groups or duplicate block numbers, the Census Bureau would have created a new, separate census tract/BNA as shown in Figure 10-3.

census tract/BNA losing area and appending the special suffix. The census tract/BNA losing area also was renumbered by assigning the special suffix (see Figure 10-3).



Figure 10-3. **Creating a New Census Tract or BNA for Boundary Resolution**

Example 1: 1990 Precensus Map

601	602	603	801	
701	702	703	802	
601	10.01 704		702	703
	602	10.02	704	
604	603	701	704	
605	706		705	

Example 2: Corrected 1990 Census Map

601	602	603	801	
701	702	703 10.98	802	
601	10.97 704		702	703
	602	10.02	704	
604	603	701	704	
605	706		705	

 Census Tract Boundary  Block Boundary
6.01 Census Tract Number 201 Block Number

The Census Bureau would not expand the area of a census tract/BNA when resolving a census tract/BNA boundary discrepancy if such a revision caused the census tract/BNA to include a census block that was discontinuous with other blocks in the same block group or created duplicate 1990 census block numbers. In Example 1, Block 704 was included in Census Tract 10.01, even though the approved census tract plan had included it in Census Tract 10.02. Because Census Tract 10.02 already contains a Block 704, the Census Bureau could not expand Census Tract 10.02 to include a second Block 704.

In resolving this type of census tract/BNA boundary discrepancy, the Census Bureau created a separate new census tract/BNA comprised of the block(s) in question. In Example 2, it created the new Census Tract 10.97, comprised of Block 704 from Census Tract 10.01. Additionally, the Census Bureau renumbered Census Tract 10.01 as 10.98 (because 10.01 is the census tract that lost area). Census Tract 10.02 was not renumbered because nothing in it changed.

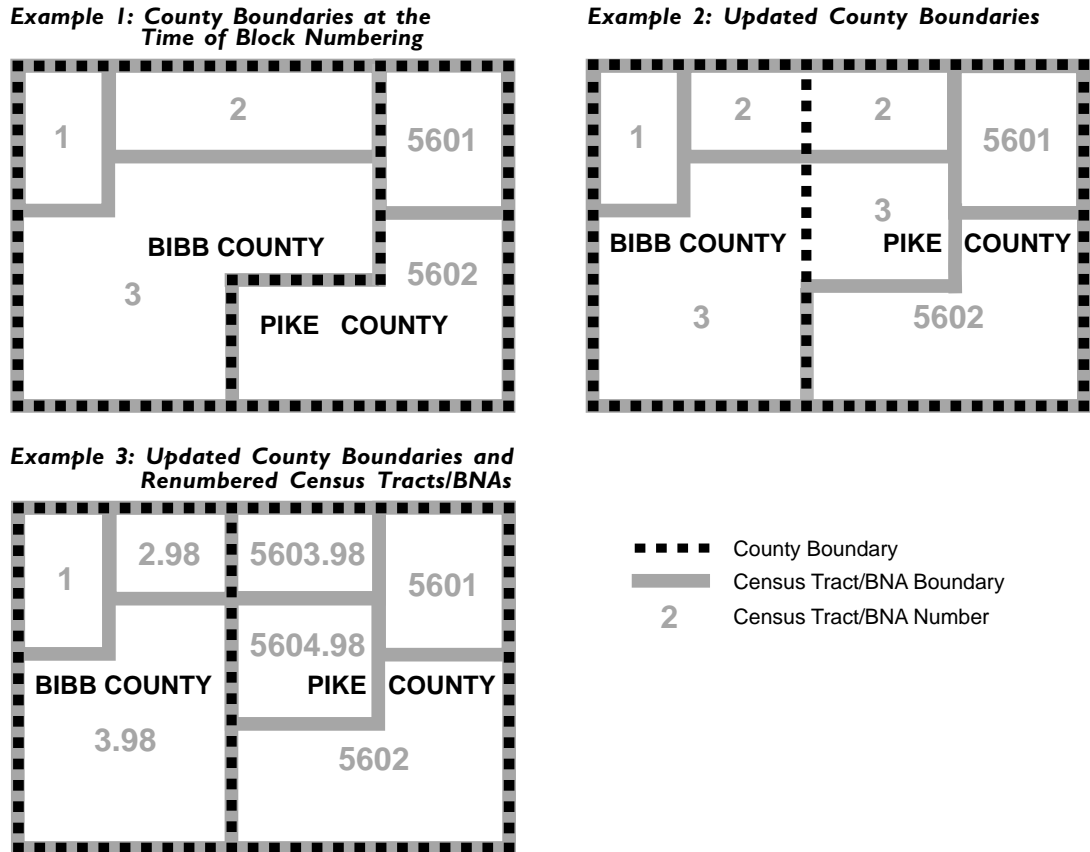
Census Tracts/BNAs and Governmental Unit Boundaries

The Census Bureau discourages the use of governmental unit boundaries as census tract/BNA boundaries because of the need to freeze the census tract/BNA boundaries at the time of census block numbering, which occurs several years before a decennial census. Once the census tract/BNA boundaries are frozen, any changes to the governmental unit boundaries, whether as a result of annexations, detachments, or mapping corrections, result in the census tract/BNA boundaries continuing to follow the former (incorrect) location of the governmental unit boundary. The result can be the loss of the intended *nesting* relationship between census tracts/BNAs and the governmental unit.

County Boundary Updates

Holding the boundaries of counties (or statistically equivalent entities) as census tract/BNA boundaries is a fundamental requirement of the census tract/BNA programs. Census tracts and BNAs are subdivisions of counties, and they nest within counties. Because the Census Bureau needed to have the census tracts/BNAs delineated before numbering the 1990 census blocks, it had to approve the census tract/BNA plans several years beforehand. Knowing that it would be necessary to update some county or State boundaries after the establishment of census tracts/BNAs and the assignment of 1990 census block numbers (but before data tabulation), the Census Bureau designed a method to accommodate the latest (January 1, 1990) State and county boundary changes. Changes in the 1990 census tract/BNA boundaries ordinarily would require renumbering some census blocks, yet the Census Bureau had to design a method of updating State or county boundaries without changing any census block numbers. As a result, the Census Bureau recognized as census tract/BNA boundaries both the superseded and the corrected State or county boundaries. The result was the formation of (usually) small census tracts/BNAs, often containing little or no population or housing units, that represented the territory affected by the State or county boundary update (see Figure 10-4).

Figure 10-4. Effect of County Boundary Changes on Census Tracts and BNAs



Any changes to a county or State boundary that occur after census block numbering result in one county losing part of a census tract/BNA and another county gaining part of a census tract/BNA. Example 1 above shows the boundaries of Bibb County and Pike County, and the boundaries of their respective census tracts/BNAs at the time the Census Bureau assigned the census block numbers. When the Census Bureau updated the county boundaries, Bibb County lost area to Pike County; Pike County *gained* parts of Census Tracts 2 and 3 as shown in Example 2.

After updating the county boundary, the Census Bureau renumbered the affected census tracts/BNAs by adding the special suffix to the census tracts that *lost* area. As shown in Example 3, the Census Bureau renumbered Census Tracts 2 and 3 in Bibb County, creating Census Tracts 2.98 and 3.98. The Census Bureau then assigned new census tract/BNA numbers in the county *gaining* territory, using numbers that fit within the numbering scheme of that county. In Example 3, Pike County gained Census Tracts 5603.98 and 5604.98.

To identify all census tracts/BNAs affected by a county boundary update, the Census Bureau added a special suffix in the range of .70 to .98 (starting with .98 and assigned in descending sequence) to the basic census tract/BNA number of each census tract/BNA that lost territory. The Census Bureau also assigned a new census tract/BNA number to the portion of the census tract/BNA in the county that gained territory. These new census tract/BNA numbers fit within the numbering scheme of each county, but were identifiable by the special suffix. The addition of these special suffixes fulfilled data user requests for a flag to identify any areas changed after the Census Bureau produced the products used in the early 1990 census operations. Because many census tracts/BNAs with this special suffix have very small areas with little or no population or housing, some users have chosen to aggregate one or more such census tracts/BNAs with an adjacent census tract/BNA for data analysis.

Default Census Tract/BNA Numbers

One of the changes brought about by the TIGER System was the need to include all area (land and water) within a census tract/BNA. Rather than extending the census tract/BNA boundaries into the Great Lakes or out to the three-mile limit in coastal waters, the Census Bureau decided to close off the census tract/BNA boundaries along the shoreline or just offshore. The Census Bureau then assigned a default census tract/BNA number 0000 to the coastal and Great Lakes waters not assigned to any other census tract/BNA.

Relationships to Other Geographic Entities

In the decennial census geographic hierarchy, census tracts/BNAs are subdivisions of, and nest within, counties (and their statistical equivalents). The block groups, the next lower level in the decennial census geographic hierarchy, are subdivisions of census tracts/BNAs and always nest within a specific census tract/BNA. The Census Bureau assigns census block numbers within block groups to identify the smallest geographic areas for which it collects and tabulates census data. It does this by using the block

group number as the first digit of the block number. Thus census blocks are subdivisions of, and nest within, a specific block group.

The relationship of census tract/BNAs to county subdivisions (census county divisions and minor civil divisions) and places (incorporated places and census designated places) varies. Many States have incorporated places such as cities, boroughs, and villages, and minor civil divisions (MCDs) such as towns and townships. The boundaries of some of these governmental units are not well known locally or shift frequently as a result of annexations. In these States, the Census Bureau discourages the use of these governmental unit boundaries as census tract/BNA boundaries; data users will find that the layout of the governmental units seldom corresponds to the census tract/BNA framework. In the New England States, where governmental unit boundaries change infrequently and are well known locally, data users generally will find a nesting relationship between census tracts/BNAs and governmental units. Wherever possible, the Census Bureau has continued the practice of encouraging congruency between census county divisions (CCDs) and census tracts/BNAs, and does so by revising the CCD boundaries when a census tract/BNA needs to change.

The areas and boundaries of other census geographic entities bear no geographic relationship to census tracts/BNAs because there are different reasons for their establishment. Their boundaries, therefore, may or may not conform to those of the census tracts/BNAs. Such entities include census designated places (CDPs), voting districts, school districts, American Indian reservation and subreservation areas, Alaska Native villages, and congressional districts. Many data users inquire about the geographic relationship between census tracts/BNAs and ZIP Code areas (geographic entities that approximate the assignment of ZIP Codes by the U.S. Postal Service)—census tracts/BNAs rarely correspond to ZIP Code areas.

Notes and References

- ¹ Laidlaw, Walter, "Federation Districts and a Suggestion for a Convenient and Scientific City Map System," The Federation of Churches and Christian Organizations in New York City, *Federation*, Vol. IV, No. 4, 1906.
- ² Swift, Arthur L., Jr., "Doctor Laidlaw's Vision, the Early Years: 1906-1926," American Statistical Association, *Golden Anniversary of Census Tracts. 1956*, Washington, DC: n.p., 1956.
- ³ Green, Howard Whipple, "A Period of Great Growth and Development: 1926-1946," American Statistical Association, *Golden Anniversary of Census Tracts. 1956*, Washington, DC: n.p., 1956 [reprinted in the Census Bureau's *Proceedings of the National Geographic Areas Conference, Putting It Together for 1990*, Washington, DC: U.S. Government Printing Office, 1984].