

Inventory & Monitoring Division

National Park Service



Standard Operating Procedure 2.11.12

Processing Source Data to Derive Landscape Dynamics

Metrics: Population Source Data

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Summary

Obtaining and processing US Census data for later use in calculating Landscape Dynamics summary statistics for population total and density.

Contents

	Page
Summary	1
Overview.....	3
Processing Requirements	3
Processing Census Source Data	3
Update schedule.....	3
2010 Census Processing	5
2000 Census Processing	5
1990 Census Processing	7
Processing Seamless Population Total and Population Density Layers	8
Update schedule – Population Seamless Layers	8
Update schedule – Census Data	8
Update schedule – Protected Areas Data.....	8
Step 1: Run Population Density Total Tool	9
Step 2: Import/Edit Metadata	9
Post-Processing.....	10
Step 1: Move Processed Source Data and/or Seamless Data	10
Step 2: Publish Services	10
Step 3: Publish to Data Store.....	11
Literature Cited	13
Appendix 1: Data Availability and Known issues	14
Appendix 2: Census Values Table	16
Appendix 3: Seamless Layer Attribute Definitions	20

Overview

This SOP describes two processes; first, to create the spatial census block data that is the source data for the Population Density and Total summary statistics tool; second, to create seamless data layers of population total and population density, to be used in data visualization.

Population data is processed at the Census Block Group level for CONUS (incl. Puerto Rico), Alaska, and Hawaii for years 1990, 2000, and 2010. For 2010 only, population data is processed at the Census Block Groups level for US Virgin Islands, and at the Census Places level for Guam, CN Mariana Islands (Saipan), and American Samoa. Population data is also processed at the Census Subdivisions level for Guam only, 2010 only.

Processing of US Census Bureau data differs for each available decade of data due to changing technology and data formats. Each unique process is outlined herein.

It is assumed users of this SOP have prior knowledge of data paths, file locations, and repositories referenced in this SOP. Note: All population source processing scripts/files/etc. referenced here may be in the legacy repository.

Processing Requirements

- Internet connection
- ArcGIS 10.2+/ ArcGIS Pro
- Knowledge and understanding of ArcGIS concepts: projections, metadata
- Write access to X: drive
- Publishing rights to ArcGIS Server

Processing Census Source Data

Source data processing for US Census varies greatly between decades. This is in part due to the changes in technology and data formats used by US Census. The processing history described here may not apply to the next release of US Census data, but the steps may be helpful in guidance for developing newer processes. See Appendix 2 for more on Census parameters, by decade.

Update schedule

The U.S. Census bureau updates census information every 10 years. Interim corrections/updates are published to the American Fact Finder website at the state, county, tract, or block group level. At this time, no interim corrections/updates are incorporated into Landscape Dynamics population source data. No complete census updates are expected until the next decadal release.

2010 Source data

State-by-State Tabular and Spatial Data from U.S. Census

State-by-state delimited text 2010 summary files (tabular ‘Summary File 1’ source) are available here: ftp://ftp.census.gov/census_2010/04-Summary_File_1/

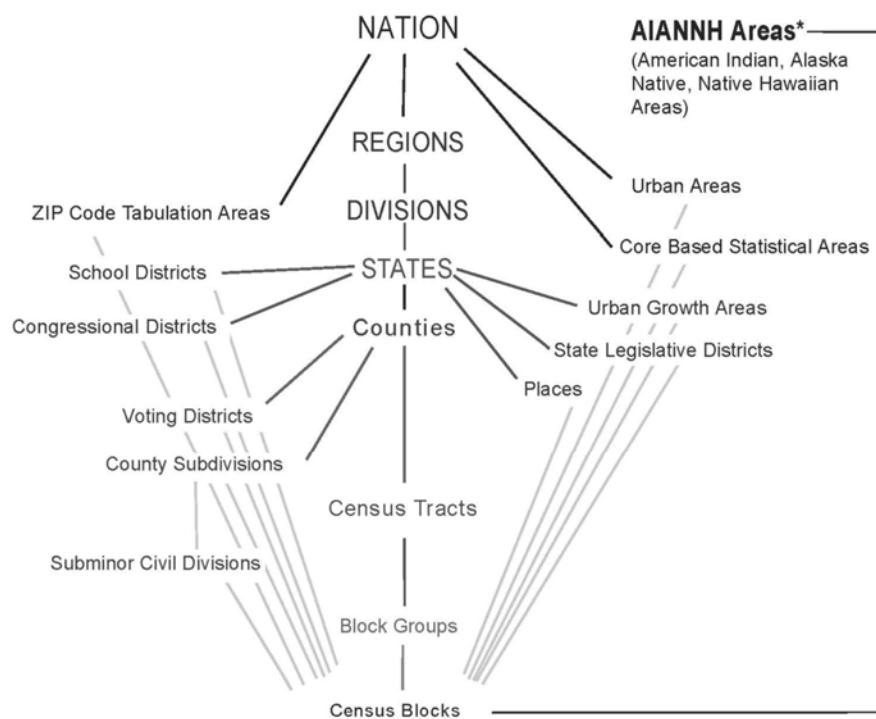
An Access 2003 template for 2010 tabular summary files available:

ftp://ftp.census.gov/census_2010/04-Summary_File_1/SF1_Access2003.mdb

2010 spatial data (state-by-state block group shapefile polygons from TIGER) titled with state FIPS codes are here: <ftp://ftp.census.gov/geo/tiger/TIGER2010/BG/2010>

U.S. Census documentation is available for download: [2010 Census of Population and Housing Summary File 1 Technical Documentation](#)

Complete and detailed description of the tabular Summary File 1 content and format: 2010 [File Structure for Summary File 1](#). See Figure 1 for a description of SF1 file structure.



* Refer to the "Hierarchy of American Indian, Alaska Native, and Native Hawaiian Areas"

Figure 1. Geographic Hierarchy for Census Data (from 2010 Census Summary File 1— Technical Documentation)

2010 Census Processing

1. A Python script was used to automate data loading steps (1a), and joining block group's polygons (1b). Script Census2010_ReProcess.py.
 - a. Data loading:
 - i. For each state, selected Summary File 1 and GEO_Header_SF1 delimited text files were imported into tables in a state-specific copy of a customized Access 2003 template using import specifications (see SF1_00001-04 tables, GEO_Header_SF1 table).
 - ii. For each state, the block group shapefile polygons were corrected for geometric errors and imported into the state-specific customized Access 2003 database as the 'BlockGroup2010' feature class.
 - iii. An Access SQL query (qry_Make_tblBG2010_Pop_Race_Age.sql) was used to create a block group-level summary table (tblBG2010_Pop_Race_Age).
 - b. Joining block group polygons to census attribute data and quality control:
 - i. The BlockGroup2010 feature class was joined to the summary table (tblBG2010_Pop_Race_Age) to create a state-specific feature class (<state abbreviation>_PopRaceAge_Geo.shp). This feature class was projected into the USA Contiguous Albers Equal Area Conic USGS spatial reference and geometry repaired.
 - ii. The total population Census attribute value (P0010001) was verified visually in ArcMap and compared against a master Census land use lookup spreadsheet. County summaries of total population were calculated and compared to values posted on the [Census QuickFacts](#) website.
2. Creating nationwide merged feature class. A python script automated these steps, Census2010_Merge.py:
 - a. State-level feature classes with shorelines were clipped with Terrestrial Area boundaries (GADM database of Global Administrative Areas). The clip eliminates remaining slivers and gaps between and among features along shorelines. All coastal states and states with lakeshore features can be affected.
 - b. State-level feature classes were merged into a file geodatabase feature class (Census2010.gdb).

2000 Census Processing

1. A Python script was used to automate data loading steps (1a), and joining block group's polygons (1b), Census2000_ReProcess.py.

- a. Data loading:
 - i. For each state, selected Summary File 1 and SF1GEO delimited text files were imported into tables in a state-specific copy of a customized Access 2003 template using import specifications (see SF1_00001-04 tables, SF1GEO table).
 - ii. For each state, the block group shapefile polygons were corrected for geometric errors (if needed) and imported into the state-specific customized Access 2003 database as the 'BlockGroupShape' feature class.
 - iii. An Access SQL query was used to create a block group-level summary table (tblBG_PopAreaRaceAge).
 - b. Joining block group polygons to census attribute data and quality control:
 - i. The BlockGroup2000 feature class was joined to the summary table (tblBG_PopAreaRaceAge) to create a state-specific feature class (<state abbreviation>_PopAreaRaceAge_Geo.shp). This feature class was projected into the USA Contiguous Albers Equal Area Conic USGS spatial reference and its geometry was repaired.
 - ii. The total population Census attribute value (P010001) was verified visually in ArcMap. County summaries of total population were calculated and compared to values posted on the [Census QuickFacts](#) website.
2. Creating nationwide merged feature class. A Python script was used to automate these steps (Census2000_Merge.py):
- a. State-level feature classes with shorelines were clipped with Terrestrial Area boundaries (GADM database of Global Administrative Areas). The clip is necessary to eliminate remaining slight buffers and mis-registration of block group features along shorelines. All coastal states (particularly Alaska) and states with lakeshore features are affected by this problem.
 - b. State-level feature classes were merged into a file geodatabase feature class (Census2000.gdb).

1990 Source data

State-by-State Tabular and Spatial Data from U.S. Census

State-by-state DBF-format text summary files (tabular 'Summary File 1' source) are available here: http://www2.census.gov/census_1990/1990STF1.html

Spatial data (state-by-state block group shapefile polygons) titled with state FIPS codes are here: <http://www.census.gov/geo/www/cob/bg1990.html>

U.S. Census documentation is available for download: [1990 Census of Population and Housing Summary File 1 Technical Documentation](#)

Complete and detailed description of the tabular Summary File 1 content and format. [1990 Summary File 1 Census Data - Quick Reference Table](#). See Figure one for a description of SF1 file structure.

1990 Census Processing

1. A Python script was used to automate these data loading steps (Census1990_ReProcess.py).
 - a. Data loading:
 - i. For each state, selected Summary File 1 and SF1GEO delimited text files were imported into tables in a state-specific copy of a customized Access 2003 template using import specifications (see SF1_00001-04 tables, SF1GEO table).
 - ii. For each state, the block group shapefile polygons were corrected for geometric errors (if needed) and imported into the state-specific customized Access 2003 database as the 'BlockGroupShape' feature class.
 - iii. An Access SQL query was used to create a block group-level summary table (tblBG_PopAreaRaceAge).
 - b. Joining block group polygons to census attribute data and quality control:
 - i. The BlockGroup1990 feature class was joined to the summary table (tblBG_PopAreaRaceAge) to create a state-specific feature class (<state abbreviation>_PopAreaRaceAge_Geo.shp). This feature class was projected into the USA Contiguous Albers Equal Area Conic USGS spatial reference and its geometry was repaired.
 - ii. The total population Census attribute value (P010001) was verified visually in ArcMap. Finally, county summaries of total population were calculated and compared to values posted on the [Census QuickFacts](#) website.
2. Creating nationwide merged feature class. A Python script was used to automate these steps (Census1990_Merge.py).
 - a. State-level feature classes with shorelines were clipped with Terrestrial Area boundaries (GADM database of Global Administrative Areas). The clip is necessary to eliminate remaining slight buffers and mis-registration of block group features along shorelines. All coastal states (particularly Alaska) and states with lakeshore features are affected by this problem.
 - b. State-level feature classes were merged into a file geodatabase feature class (Census1990.gdb).

Processing Seamless Population Total and Population Density Layers

Seamless layers for population total and population density for all available Census dates and geographic extents were processed using the following logic.

Source data

Census data produced as noted above were used as processing targets. In addition to Census data, population density and total layers require the most current Protected Areas data (PADUS – Protected Areas Database of the US).

Update schedule – Population Seamless Layers

New population density and population total seamless layers will be created for the entire extent of available data when 1) new Census data is released (see Update schedule – Census Data); or, 2) new protected areas data is released (see Update schedule – Protected Areas Data).

Update schedule – Census Data

US Census (and Territories) data is made available every 10 years. No updates will occur for CONUS, AK, HI, USVI/PR, and other outlying islands until the next official US Census update, dependent upon data availability. At that time, new seamless layers will be created using the current version of PADUS; additionally, all previous seamless population density and total layers will be recreated using updated PADUS data (if necessary, see Update schedule – Protected Areas Data).

Update schedule – Protected Areas Data

Population seamless data will be created with each release of new protected areas data. Current source of protected areas data is the Protected Areas Database of the US – PADUS (USGS). When new Protected Area data becomes available, it should be processed immediately; see Processing Protected Area Data SOP (SOP 2.11.19; Kinseth and Nelson 2018a) for processing PADUS data. Population seamless data is dependent on PADUS data. If there is an update to the PADUS data, new population total, and population density seamless layers will be created for all available census years and geographical extents. There is no regular interval of updates for PADUS data at this time. It is unknown when the next update will be released.

Processing steps

For each Census year, the full geographical extent of census for each distinct area was used to create the seamless DensityTotalYYYY file geodatabase feature classes. Processing steps used:

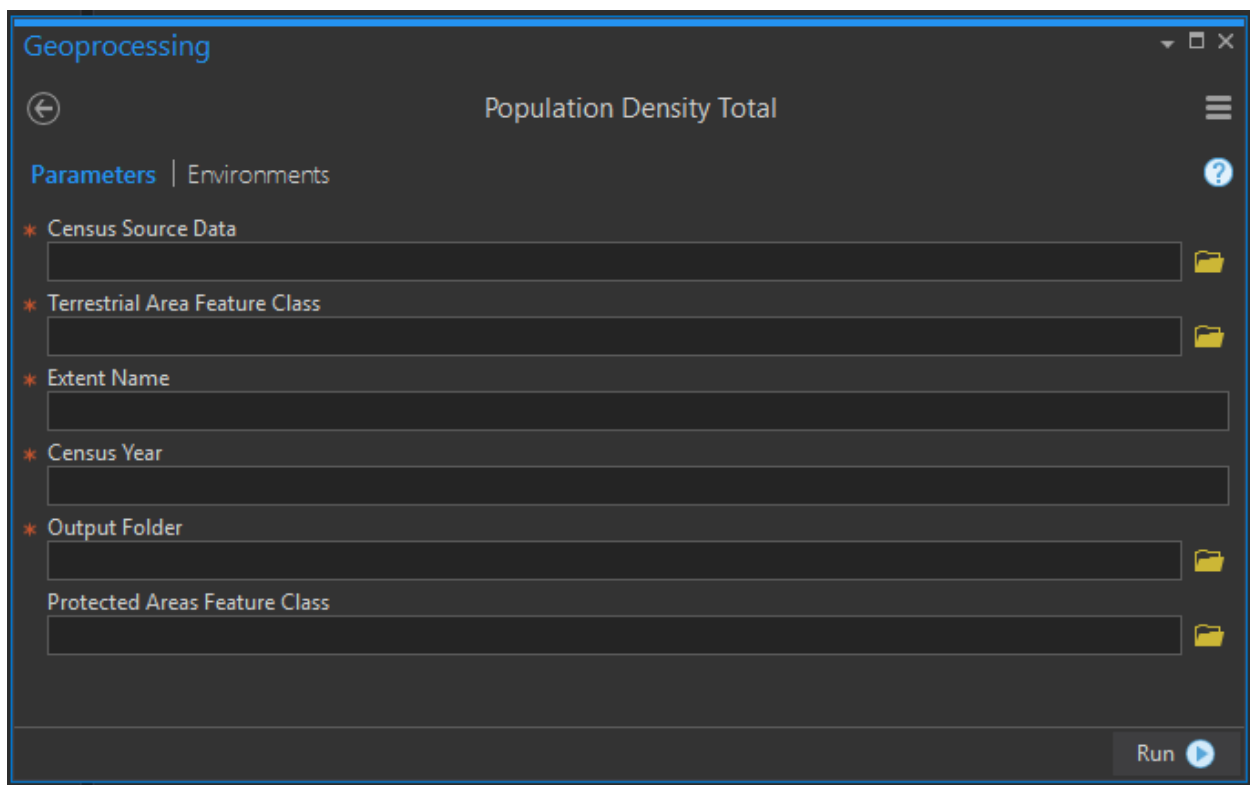
- Erasing PADUS Gap Status 1 and 2 (SOP 2.11.17; Kinseth and Nelson In Development)(SOP 2.11.17; Kinseth and Nelson In Development)(SOP 2.11.17; Kinseth and Nelson In Development)(SOP 2.11.17; Kinseth and Nelson In Development)(SOP 2.11.17; Kinseth and Nelson In Development)(SOP 2.11.19; Kinseth and Nelson 2018a) and calculating the adjusted block group area attribute(s) (polygon area minus protected area)

- Subtracting Census Water area from the previously adjusted area attribute
- Calculating population density (area-adjusted) using the total population for a block group

See Appendix 3 (Table 4) for details about seamless data attributes.

Step 1: Run Population Density Total Tool

To create new population density and population total seamless layers, run the Population Density Total Seamless tool found in Population.pyt. Note that if there is updated Protected Areas data, processing of that data must occur before new population seamless data can be created, See Processing Protected Area Data SOP (SOP 2.11.19; Kinseth and Nelson 2018a), then return to run this tool.



Step 2: Import/Edit Metadata

This section requires ArcCatalog.

For all Population Seamless layer, import the Metadata .xml.

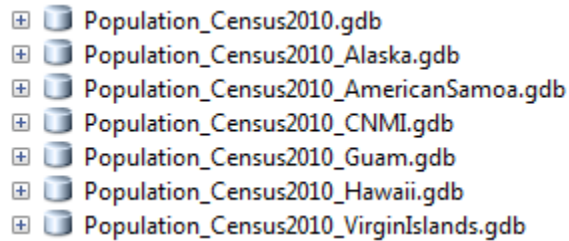
1. Edit Metadata to make any processing/data-related notes, as needed; be sure to include the version of PADUS used to create the seamless layers.
2. Use Metadata Importer to attach Source Metadata (edited xml) to the Seamless source(s) (Target).

Post-Processing

Step 1: Move Processed Source Data and/or Seamless Data

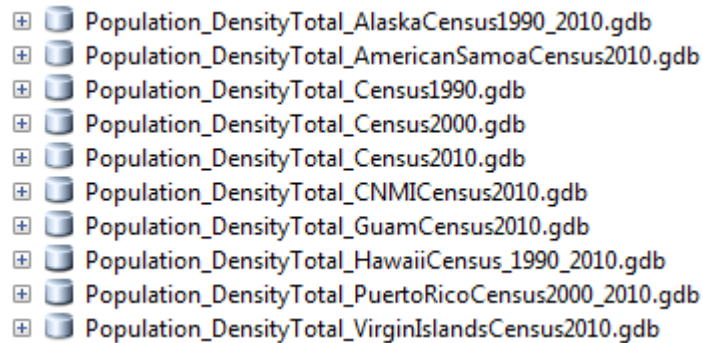
1. Move final GDB to the respective folder on X:\ProjectData\LandscapeDynamics\PopulationDensTot\Products\Seamless, following the naming conventions present.

Example Source GDB's:



Population_Census2010.gdb
Population_Census2010_Alaska.gdb
Population_Census2010_AmericanSamoa.gdb
Population_Census2010_CNMI.gdb
Population_Census2010_Guam.gdb
Population_Census2010_Hawaii.gdb
Population_Census2010_VirginIslands.gdb

Example Seamless GDB's:



Population_DensityTotal_AlaskaCensus1990_2010.gdb
Population_DensityTotal_AmericanSamoaCensus2010.gdb
Population_DensityTotal_Census1990.gdb
Population_DensityTotal_Census2000.gdb
Population_DensityTotal_Census2010.gdb
Population_DensityTotal_CNMICensus2010.gdb
Population_DensityTotal_GuamCensus2010.gdb
Population_DensityTotal_HawaiiCensus_1990_2010.gdb
Population_DensityTotal_PuertoRicoCensus2000_2010.gdb
Population_DensityTotal_VirginIslandsCensus2010.gdb

Step 2: Publish Services

See Environmental Settings Data Services SOP (SOP 4.1.2; Nelson and Kinseth 2018), and use the following information as a guide when creating and publishing the services; see Publishing, Publish Map, Feature, or Image Services to ArcGIS Server or NPS ArcGIS Online, “Landscape Dynamics” section for guidance.

Population Density, Total, Seamless

Publish Map Services for all Population Density and Total data, by extent, one service for each indicator (density, and total). Create map services for all geographic extents. For CONUS only, include feature services, and create a tile cache for each map/feature service.

When complete, check REST endpoint for update of any new, published services.

<http://irmaservices.nps.gov/arcgis/rest/services/LandscapeDynamics>

See Landscape Dynamics Viewer Maintenance SOP (2.11.18, Kinseth 2018) to add the new data to the viewer, if needed.

Step 3: Publish to Data Store

See Publishing to Data Store SOP (SOP 4.1.1; Kinseth and Nelson 2018b) and use the following information (Table 1) as a guide when uploading Population Source and Seamless Data to Data Store.

1. From Environmental Settings Program, <https://irma.nps.gov/DataStore/Reference/Profile/2244060>, go to Population Project.

Source Data:

2. Compress Census geodatabases by geographic extent (all years) into a .zip folder.

<GEOGRAPHY>_Census.zip

GEOGRAPHY = CONUS, Alaska, Hawaii, Guam, AmericanSamoa, Saipan,
USVirginIslands

Seamless Data:

3. By extent, zip each Pop Dens and Total geodatabase for all available years. Note: CONUS extent only, post seamless data individually by decade.

<GEOGRAPHY>_PopulationDensityTotal_Census<YYYY-YYYY>.zip

GEOGRAPHY = CONUS, Alaska, Hawaii, Guam, AmericanSamoa, Saipan,
USVirginIslands
YYYY = Census Year(s) (range, if multi-year)

Table 1. Required upload parameters for holdings: Landscape Dynamics Source Data – Population; Landscape Dynamics Seamless Data – Current Population

Parameter	Application
Notes (Version/Clone)	“New release of source data” if adding new data; or, “Updated source data” if seamless layers recreated b/c of new PAD, or a new Census.
Date of Issue/Publication	Reference Level; Date of upload
Description, Notes, Purpose	Reference Level; Make necessary edits to text in the reference for these fields. Update years of data, reasons for new reference, etc, as needed.
Permissions	Reference/Holding Level; Public, all
Description (Census Source Data)	Holding Level; “<Geography>, Census, <YYYY>, <YYYY>, <YYYY>, etc..., (File Geodatabase)”
Description (Pop Dens and Tot Seamless Data)	Holding Level; “<Geography> Population Density and Total, Census <YYYY> (File Geodatabase)”

4. Add external links to the source data (update url as needed).
 - a. US Census (<https://www2.census.gov/>)
 - b. Or, US Census (<https://www.census.gov/data/developers/data-sets/decennial-census.html>)

5. Add any data cross-references, as needed (such as Conservation Status/Protected Areas reference).

Literature Cited

- Kineth, M. and L. Nelson. 2018a. Processing land cover source data to derive landscape dynamics metrics: Protected area data. Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP—2.11.19. National Park Service, Fort Collins, Colorado.
- Kineth, M. and L. Nelson. 2018b. Publishing to Data Store. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—4.1.1. National Park Service, Fort Collins, Colorado.
- Kineth, M. and L. Nelson. In Development. Processing land cover source data to derive landscape dynamics metrics: Conservation status source data—Version 1.0 Inventory & Monitoring Program Standard Operating Procedure NPS/NRSS/IMD/SOP-2.11.17. National Park Service, Fort Collins, Colorado.
- Nelson, L. and M. Kineth. 2018. Creating and maintaining data services for the IMD Environmental Settings Monitoring Protocol. Inventory & Monitoring Division Standard Operating Procedure NPS/IMD/SOP—4.1.2. National Park Service, Fort Collins, Colorado.
- U.S. Census Bureau, 2010 Census of Population and Housing, Demographic Profile Summary File: Technical Documentation, 2011.
- U.S. Census Bureau, 2001. Census 2000 Summary File 1 Technical Documentation/prepared by the U.S. Census Bureau, 2001.
- U.S. Census Bureau, 1991. Census of Population and Housing, 1990: Summary Tape File 1 Technical Documentation/prepared by the Bureau of the Census, Washington: The Bureau, 1991.
- U.S. Census Bureau. 1990 Census Data Dictionary. <http://www.census.gov/geo/lv4help/censusdata.html>
Last accessed: 20120207.
- U.S. Geological Survey, Gap Analysis Program (GAP). 2016. Protected Areas Database of the United States (PAD-US), Combined Feature Class. <https://gapanalysis.usgs.gov/padus/>. Last accessed: 20181113.

Appendix 1: Data Availability and Known issues

Data availability

Data exists for the continental U.S., U.S. Virgin Islands, Puerto Rico, Alaska, Hawaii, and all outlying Pacific Island Territories.

Additional issues

- Area calculations for block groups along Census defined shorelines or other boundaries (Canada, Mexico) may not be coincident with the respective boundaries obtained from other data sources.
- In 2010 Census (possibly others), census data were either not produced or the data contain population total values equal to zero for areas where there is known populations; examples include some NWR's not being covered by Census block-group features, or some block-groups containing correctional facilities but had population totals set to zero. These cases were not observed to be consistent across states.
- Use of census water areas vs. other hydrological information; when census water area is used, the census-reported water area value is subtracted from the calculated area of each block group (where water is reported) and no part of the input spatial feature is removed.
- Using an erase feature layer (not hydrological) AND subtracting census water area could cause some areas of a block group to be removed from calculations twice (over-estimating, or "double counting", removed area values from the statistical processes). 'Double counting' of area for exclusion from calculated population density can sometimes result in negative remaining area for a block group (because census water removal is not a spatial operation). If a negative area results, census water area will be added back to the total area of the block group so the population density calculation can occur. This issue is particularly prevalent in block groups with both high area of water and high area of protected area (area of Gap Status 1 or 2).
- Census attribute value differences between decadal dates – see Appendix 2, Table 1

Spatial Reference - Data

Summary statistics are derived from source data in the spatial reference noted, by geographic extent (Table 2).

Table 2. Standard spatial references by processing extent

Processing Extent	Spatial Reference Name (datum)	Well-known ID (WKID)
North America (US, Canada, Mexico)	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
CONUS	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
Puerto Rico and USVI	USA Contiguous Albers Equal Area Conic USGS (NAD83)	WKID: 102039
Alaska	Alaska Albers Equal Area Conic (NAD83)	WKID: 3338
Hawaii	UTM Zone 5N (NAD83)	WKID: 26905
American Samoa	NAD_1983_HARN_UTM_Zone_2S (NAD83 HARN)	WKID: 2195
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983 + NAD_1983_HARN_To_WGS_1984_2	
Guam	WGS_1984_UTM_Zone_55N (WGS84)	WKID: 32655
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983	
CN Mariana Islands	WGS_1984_UTM_Zone_55N (WGS84)	WKID: 32655
<i>Transform (if needed):</i>	WGS_1984_(ITRF00)_To_NAD_1983	

Appendix 2: Census Values Table

Table 3. Census Population Parameter Values for 1990-2010. [All parameters represent counts of persons per block group except as noted. Note that 1990 Census attributes are somewhat different from 2000 and 2010; for temporal comparisons, some grouping of attributes may be required (e.g., grouping of 2000 and 2010 age categories to match those used in the 1990 Census). Also, the 1990 Census contains additional attributes. Only count-based parameters will generate density and total values when used in the Population Density and Total tool.]

Census Category and Definition	Parameter Name		
	1990	2000	2010
Population Total			
Total population	POP100	P010001	P0010001
Total urban and rural	-	P020001	P0020001
Total urban	PC_URBAN (est. percentage)	P002002	P0020002
Total urban, inside urbanized areas	-	P002003	P0020003
Total urban, inside urban clusters	-	P002004	P0020004
Total rural	PC_RURAL (est. percentage)	P002005	P0020005
Not defined	-	P002006	P0020006
Race			
Total population, race	-	P003001	P0030001
Total population, one race	-	P003002	-
White alone	WHITE (total) PC_WHITE (percent)	P003003	P0030002
Black/African American alone	BLACK (total) PC_BLACK (percent)	P003004	P0030003
Am Indian and AK Native alone	INDIAN	P003005	P0030004
Asian alone	ASIAN	P003006	P0030005
Native HI and other Pacific islander alone	-	P003007	P0030006
Some other race alone	OTHER	P003008	P0030007
Two or more races	-	-	P0030008
Minority, number of persons of non-White or Hispanic origin	MINORITY	-	-
Minority, percent of total population who are non-White or Hispanic origin	PC_MINORITY	-	-
Hispanic or Latino Origin			
Total population	-	P004001	P0040001
Not Hispanic or Latino	-	P004003	P0040002
Hispanic or Latino (count)	HISPANIC	P004002	P0040003
Sex by Age			
Total, sex by age	-	P012001	P0120001
Male, all ages	-	P012002	P0120002
Male, under 5 years	-	P012003	P0120003
Male, 5 to 9 years	-	P012004	P0120004

Census Category and Definition	<u>Parameter Name</u>		
	1990	2000	2010
Male, 10 to 14 years	-	P012005	P0120005
Male, 15 to 17 years	-	P012006	P0120006
		P012007	P0120007
Male, 18 to 19 years	-		
		P012008	P0120008
Male, 20 years	-		
		P012009	P0120009
Male, 21 years	-		
		P012010	P0120010
Male, 22 to 24 years	-		
		P012011	P0120011
Male, 25 to 29 years	-		
		P012012	P0120012
Male, 30 to 34 years	-		
		P012013	P0120013
Male, 35 to 39 years	-		
		P012014	P0120014
Male, 40 to 44 years	-		
		P012015	P0120015
Male, 45 to 49 years	-		
		P0120116	P0120016
Male, 50 to 54 years	-		
		P012017	P0120017
Male, 55 to 59 years	-		
		P012018	P0120018
Male, 60 to 61 years	-		
		P012019	P0120019
Male, 62 to 64 years	-		
		P012020	P0120020
Male, 65 to 66 years	-		
		P012021	P0120021
Male, 67 to 69 years	-		
		P012022	P0120022
Male, 70 to 74 years	-		
Male, 75 to 79 years	-	P012023	P0120023
		P012024	P0120024
Male, 80 to 84 years	-		
		P012025	P0120025
Male, 85+ years	-		
		P012026	P0120026
Female, all ages	-		
		P012027	P0120027
Female, under 5 years	-		
		P012028	P0120028
Female, 5 to 9 years	-		
		P012029	P0120029
Female, 10 to 14 years	-		
		P012030	P0120030
Female, 15 to 17 years	-		

Census Category and Definition	Parameter Name		
	1990	2000	2010
Female, 18 to 19 years	-	P012031	P0120031
Female, 20 years	-	P012032	P0120032
Female, 21 years	-	P012033	P0120033
Female, 22 to 24 years	-	P012034	P0120034
Female, 25 to 29 years	-	P012035	P0120035
Female, 30 to 34 years	-	P012036	P0120036
Female, 35 to 39 years	-	P012037	P0120037
Female, 40 to 44 years	-	P012038	P0120038
Female, 45 to 49 years	-	P012039	P0120039
Female, 50 to 54 years	-	P012040	P0120040
Female, 55 to 59 years	-	P012041	P0120041
Female, 60 to 61 years	-	P012042	P0120042
Female, 62 to 64 years	-	P012043	P0120043
Female, 65 to 66 years	-	P012044	P0120044
Female, 67 to 69 years	-	P012045	P0120045
Female, 70 to 74 years	-	P012046	P0120046
Female, 75 to 79 years	-	P012047	P0120047
Female, 80 to 84 years	-	P012048	P0120048
Female, 85+ years	-	P012049	P0120049
Median Age by Sex **			
Both Sexes (all)	-	P013001	P0130001
Male	-	P013002	P0130002
Female	-	P013003	P0130003
Age			
0-4 years (count)	AGE_0_4 (total)		
	PC_0_4 (percent)	-	-
5-9 years	AGE_5_9 (total)		
	PC_5_9 (percent)	-	-
10-19 years	AGE_10_19 (total)		
	PC_10_19 (percent)	-	-
20-49 years	AGE_20_49 (total)		
	PC_20_49 (percent)	-	-
50-64 years	AGE_50_64 (total)		
	PC_50_64 (percent)	-	-
65+ years	AGE_65_UP (total)		
	PC_65_UP (percent)	-	-
Education			
School enrollment, estimate of persons 3 years or older enrolled in elementary through high school	SCH_ENROLL	-	-
Estimated percentage of persons 18 or older who graduated from high school	PC_HIGHSCH	-	-
Estimated percentage of persons 18 or older that have a Bachelor's Degree	PC_BACHDEG	-	-

Census Category and Definition	<u>Parameter Name</u>		
	1990	2000	2010
Families			
Count of families	FAMILIES	-	-
Income			
Median household income estimate **	INCOME	-	-
Estimate of persons living below poverty level	POVERTY	-	-
Estimated percentage of persons living below poverty level **	PC_POVERTY	-	-
Housing/Occupancy			
Owner-occupied households (count)	OWNER_OCC	-	-
Renter-occupied households (count)	RENTER_OCC	-	-
Owner occupied, percent **	PC_OWNER (percent)	-	-
Renter occupied, percent **	PC_RENTER (percent)	-	-
Estimated percentage of owner-occupied households where shelter costs are 30% or more of income **	HIGHMORTG	-	-
Estimated percentage of renter-occupied households where shelter costs are 30% or more of income **	HIGHRENT	-	-
Percentage of population 5 years or older that lived in the same house in 1985 **	SAMEHOUSE	-	-
Estimated median year built **	MEDYRBUILT	-	-
Number of Households, total	HOUSEHOLDS	-	-

** Values other than counts of persons per block group.

Appendix 3: Seamless Layer Attribute Definitions

Attributes in Seamless Feature Classes

Table 4: Description and distinctions between feature attributes for the seamless layer.

ATTRIBUTE	DESCRIPTION
CBPOP_TOT	Population total of Census Block
CBA_TOT	Calculated total area of census block group polygon (km ²) – no adjustments made
CCBAP_TOT	Corrected block group area (km ²); <i>area reduced by protected areas erase process</i>
CCBAF_TOT**	(CCBAP_TOT – CBA_W) Corrected block group area (km ²); <i>area reduced by protected areas erase process</i> AND <i>area reduced by Census water area subtraction</i>
AWPD_P	(CBPOP_TOT / CCBAP_TOT) area-weighted population density for corrected block group area; <i>area reduced by protected areas erase process</i>
AWPD_F	(CBPOP_TOT / CCBAF_TOT) area-weighted population density for corrected block group area <i>area reduced by protected areas erase process</i> AND <i>area reduced by Census water area subtraction</i>
AWP_P	(CBPOP_TOT * (CCBAP / CBA_TOT)) area-weighted population for corrected block group area <i>area reduced by protected areas erase process</i>
AWP_F	(CBPOP_TOT * (CCBAF / CBA_TOT)) area-weighted population for corrected block group area <i>area reduced by protected areas erase process</i> AND <i>area reduced by Census water area subtraction</i>
CBA_W	Census-reported area of water in block group (km ²)

**In some census blocks, Census Water area can be larger than the census block land area (after protected areas are erased, CBA_W > CBA_TOT/CCBAP_TOT). In these cases, the tool will produce negative area values which then result in negative population densities. To prevent this from occurring, in those areas where “CCBAP_TOT - CBA_W” results in a negative CCBAF_TOT value, the negative CCBAF_TOT value is automatically replaced by the CCBAP_TOT value (Census water is added back to the area). This method will slightly inflate population density results, but removes the negative population densities (which aren’t possible in reality).