# Processing Precinct Level Population Data using 2020 Census Blocks

**Updated: August 26, 2021**

**Software: ArcGIS Desktop 10.6.1 / Microsoft Excel / Microsoft Access Shell**

**Background**

In August 2021 the US Census Bureau released the legacy data for the 2020 Census. The data was provided within several components; GIS shapefiles for various geographies (States, Counties, Blocks, etc.) and textfiles. The shapefiles and text files were downloaded from the Census Bureau as well as instructions for creating the necessary tables to join with the shapefiles. The two main sets of geographies used for this process are Census Blocks and Voting Districts. While the Voting Districts provided by the Census Bureau are close, there are several discrepancies when comparing the boundaries to the county's official Voting Precinct geography. For this reason, data from Census Blocks were processed against the county Precinct geography to calculate population for each precinct.
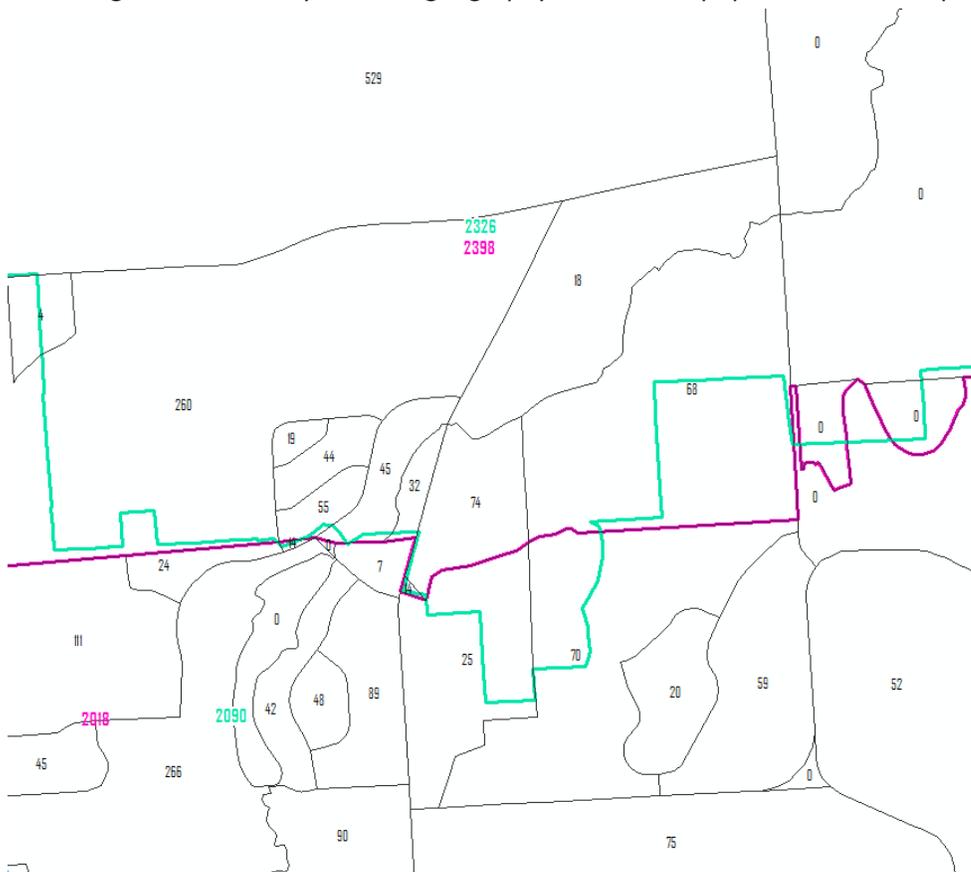


*Figure 1: Teal is the County Precincts, Pink is the Census Voting Districts*

**Procedure**

- Census data was downloaded from the US Census website.
- Tables were processed using the "How to use Microsoft Access to extract data from the 2020 Census P.L. 94-171 Legacy Format Summary Files" document
  - Data was exported for Census Blocks (SUMLEV = 750)
  - Data was exported for Voting Districts (SUMLEV = 630)
- Census tables for block geography was joined to the Census Block Shapefile
  - Population for each block is displayed



*Figure 2: Census Blocks with Population Per Block*

- Since the county precincts boundaries do not line up with the census blocks the census block features were converted to points.



*Figure 3: Census Blocks with County Precincts (Left), Census Block Points with County Precinct (Right)*

- The Census Block Points were then overlaid against the county precincts, calculating a SUM of total population for each Precinct.

1960

3153

2335

1637

1345

1755

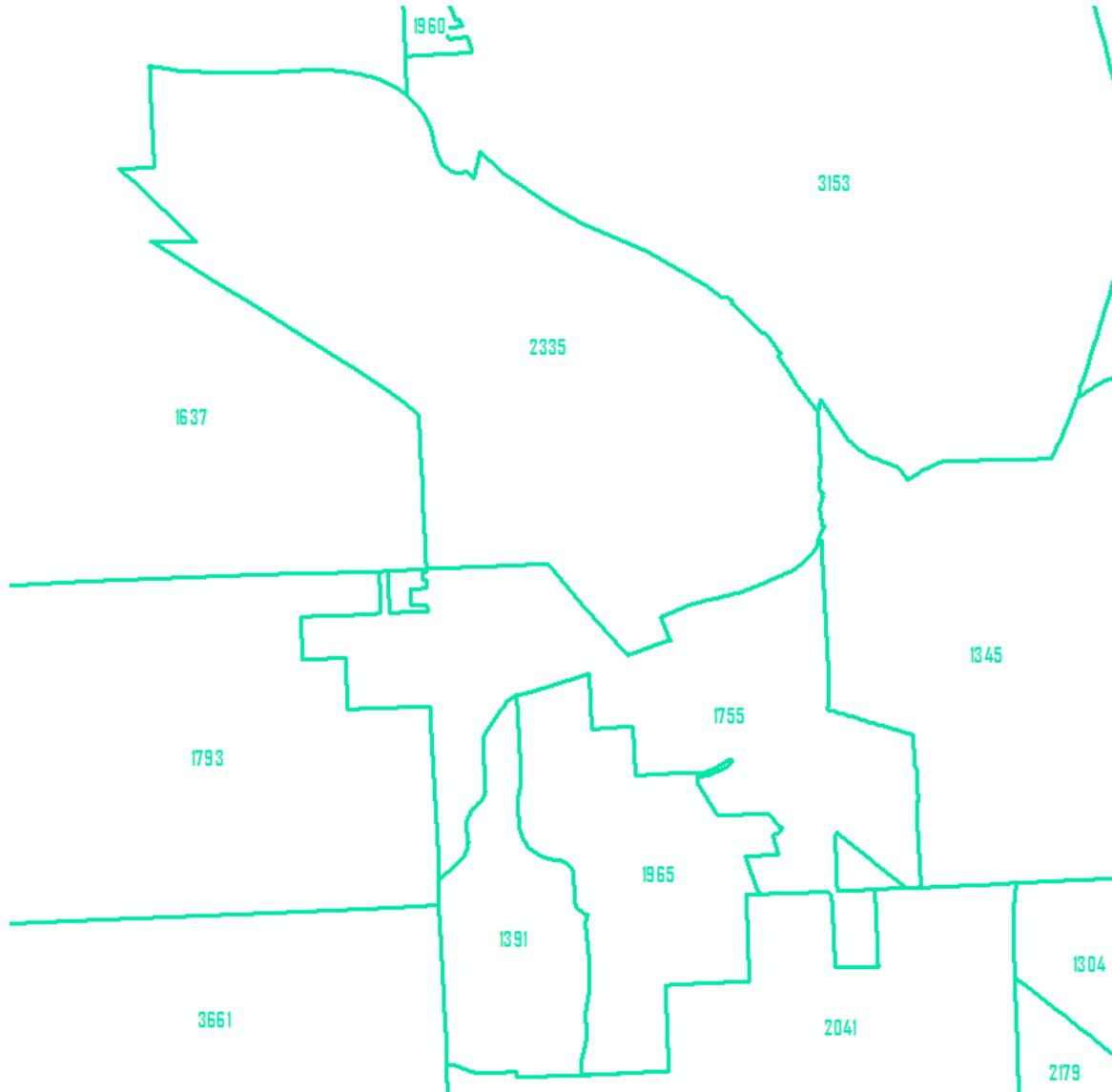1793

1965

1391

3661

2041

1304

2179

*Figure 4: Teal Numbers are Total Population for each Precinct*

- Population Numbers were then compared with Census Voting Districts to find differences
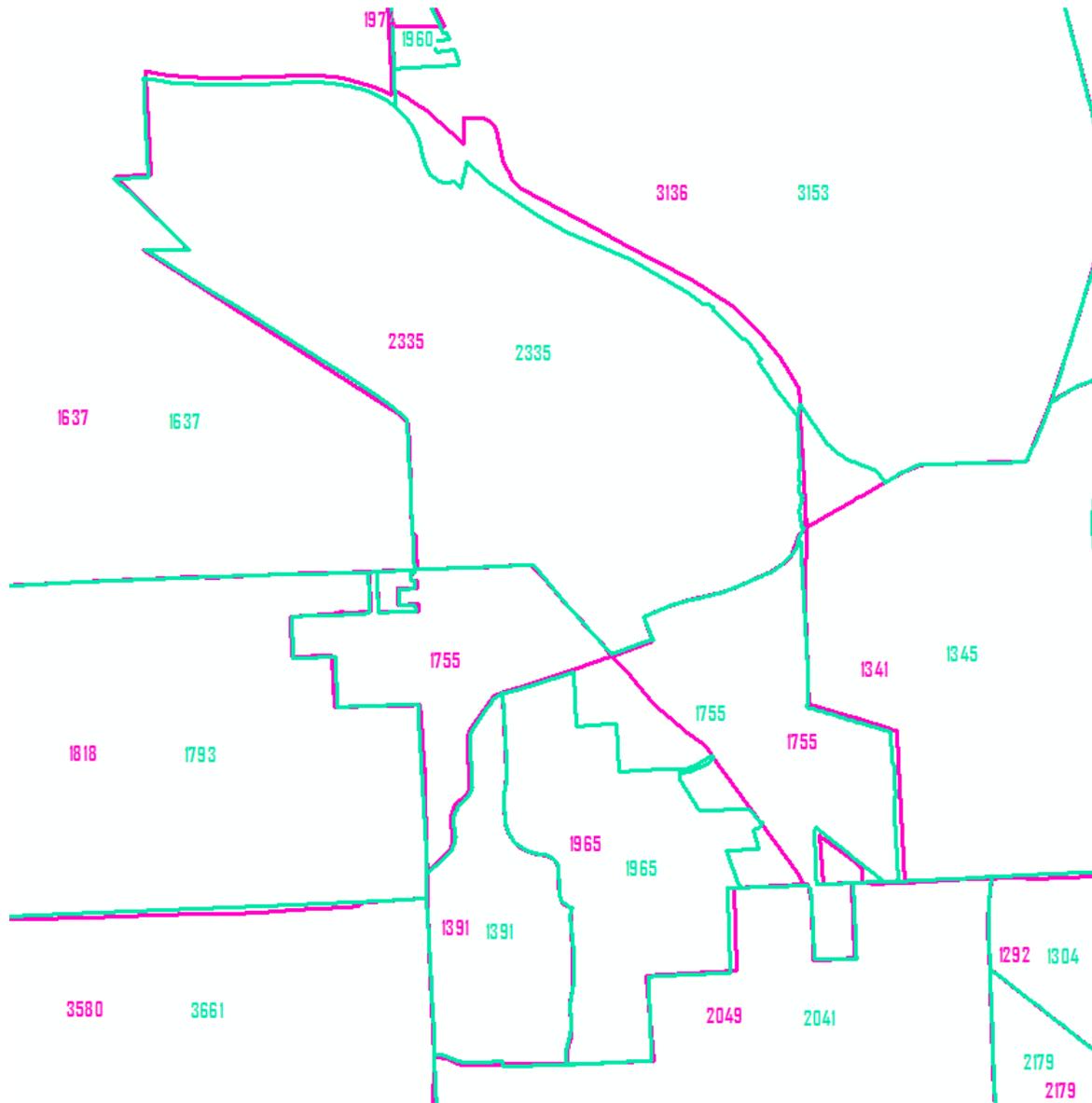


*Figure 5: County Precincts (Teal) with Census Voting Districts (Pink)*

- While population numbers between the two datasets are different in some precincts, the total population for each layer was identical.

- In order to better understand the reason behind these differences, I ran this same process against the Census Voting Districts geography. Comparing the Census data created through a basic table join with the Voting Districts data created through my spatial join process yielded identical results.

| NAMELSAD20 | Census Data | Processed Data |
|---|---|---|
| Voting District 0933186000004 | 1637 | 1637 |
| Voting District 0933186000003 | 2247 | 2247 |
| Voting District 0933704000002 | 3570 | 3570 |
| Voting District 0933956000002 | 2976 | 2976 |
| Voting District 0933506000005 | 2179 | 2179 |
| Voting District 0933506000003 | 2720 | 2720 |
| Voting District 0933186000006 | 2534 | 2534 |
| Voting District 0933610000007 | 1798 | 1798 |
| Voting District 0933186000008 | 1818 | 1818 |
| Voting District 0936012000002 | 3237 | 3237 |
| Voting District 0933506000001 | 2716 | 2716 |
| Voting District 0936654000003 | 2413 | 2413 |
| Voting District 0934090000001 | 1680 | 1680 |
| Voting District 0933186000013 | 1010 | 1010 |
| Voting District 0933506000008 | 2374 | 2374 |
| Voting District 0933186000010 | 1875 | 1875 |
| Voting District 0933506000009 | 1274 | 1274 |
| Voting District 0933610000005 | 2594 | 2594 |
| Voting District 0933704000004 | 3120 | 3120 |
| Voting District 0936012000001 | 3093 | 3093 |
| Voting District 0933634000001 | 2420 | 2420 |
| Voting District 0931062000003 | 1965 | 1965 |
| Voting District 0938116000003 | 2721 | 2721 |
| Voting District 0933506000004 | 2535 | 2535 |
| Voting District 0931064000002 | 1974 | 1974 |

*Figure 6: Table showing population for each Voting District using both processes*

- I also ran a process comparing the Census Voting Districts and the County Precincts to find areas where districts/precincts overlapped. Those overlapping areas were then run through the same process as the Precincts and Voting Districts to determine the population effected by those boundary differences.
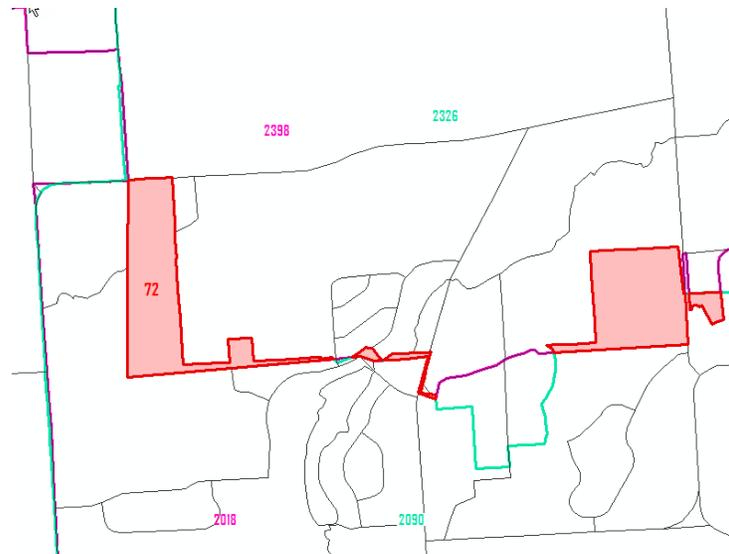


*Figure 7: Overlap Area and Population Highlighted in Red*

- In total 20 areas across the county are assigned to the incorrect precinct within the Census Voting Districts geography with an approximate effected population of 786.
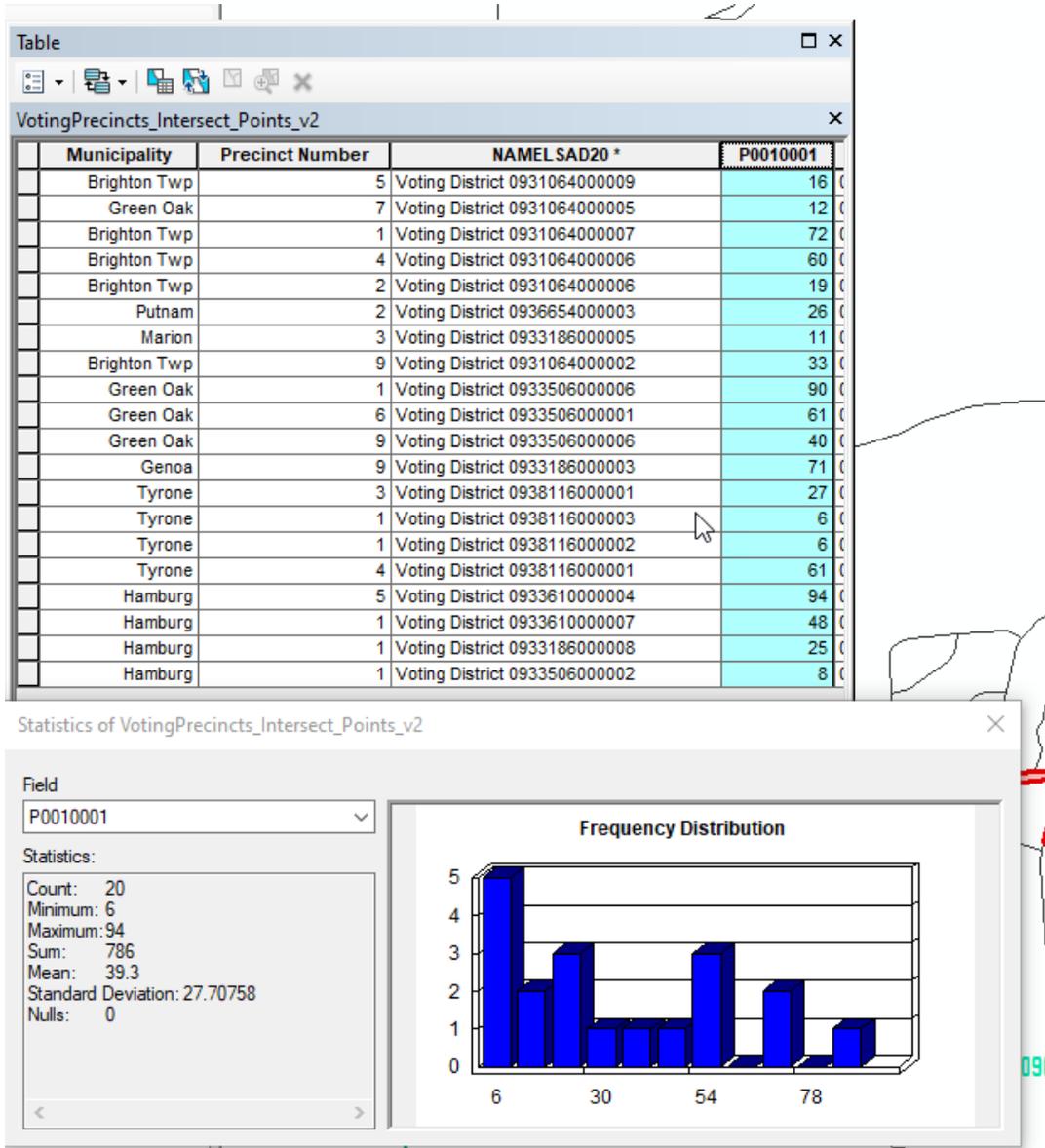


**Table**

VotingPrecincts_Intersect_Points_v2

| Municipality | Precinct Number | NAMELSAD20 * | P0010001 |
|---|---|---|---|
| Brighton Twp | 5 | Voting District 0931064000009 | 16 |
| Green Oak | 7 | Voting District 0931064000005 | 12 |
| Brighton Twp | 1 | Voting District 0931064000007 | 72 |
| Brighton Twp | 4 | Voting District 0931064000006 | 60 |
| Brighton Twp | 2 | Voting District 0931064000006 | 19 |
| Putnam | 2 | Voting District 0936654000003 | 26 |
| Marion | 3 | Voting District 0933186000005 | 11 |
| Brighton Twp | 9 | Voting District 0931064000002 | 33 |
| Green Oak | 1 | Voting District 0933506000006 | 90 |
| Green Oak | 6 | Voting District 0933506000001 | 61 |
| Green Oak | 9 | Voting District 0933506000006 | 40 |
| Genoa | 9 | Voting District 0933186000003 | 71 |
| Tyrone | 3 | Voting District 0938116000001 | 27 |
| Tyrone | 1 | Voting District 0938116000003 | 6 |
| Tyrone | 1 | Voting District 0938116000002 | 6 |
| Tyrone | 4 | Voting District 0938116000001 | 61 |
| Hamburg | 5 | Voting District 0933610000004 | 94 |
| Hamburg | 1 | Voting District 0933610000007 | 48 |
| Hamburg | 1 | Voting District 0933186000008 | 25 |
| Hamburg | 1 | Voting District 0933506000002 | 8 |

Statistics of VotingPrecincts_Intersect_Points_v2

Field

P0010001

Statistics:

Count: 20
Minimum: 6
Maximum: 94
Sum: 786
Mean: 39.3
Standard Deviation: 27.70758
Nulls: 0

*Figure 8: Table of Areas in Wrong Precinct based on Census Voting Districts*

**Conclusion**

- Based on this analysis, it is my recommendation that the processed County Precincts be used for determining the population count for each Precinct.