

Change in Urbanization and Built Area in Ohio

Depicted through changes in nighttime light and population data

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Purpose

- To map changing urbanization patterns in Ohio by visualizing the change in night time light data that occurred between the years 2000 and 2018.
- While our findings will not be able to demonstrate any causal relationships, they may certainly hint at real life growth patterns.
 - For example, once mostly unlit rural areas in 2000 which became well lit in 2018 could suggest increased levels of development.
 - Whereas decreased lighting in an area would suggest that the area is no longer serviced by electricity, which tells us the structures in that area are no longer in use.

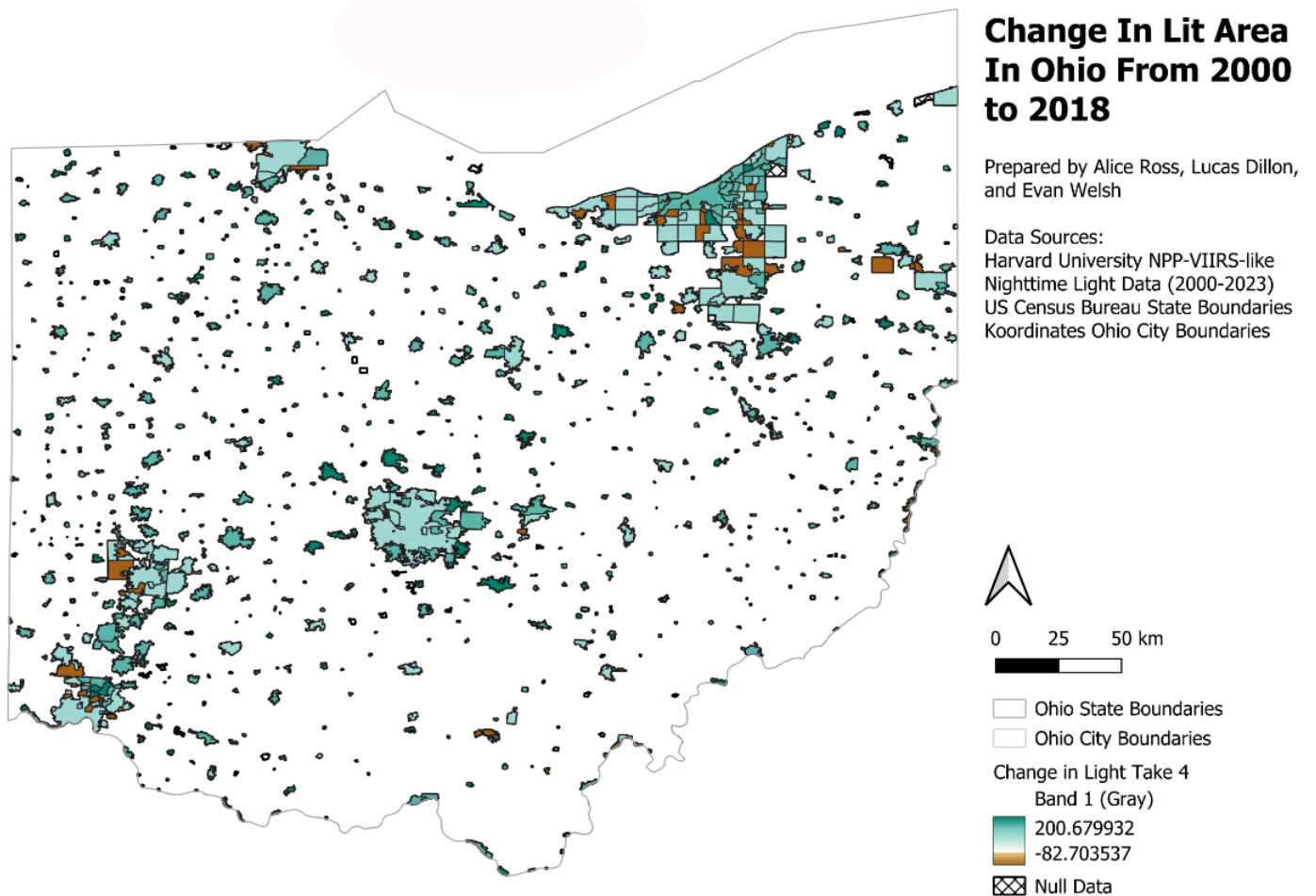


How was this Studied?

- Data sets used:
 - Harvard NPP-VIIRS-like nighttime light data
 - US Census Bureau state boundaries and decennial census data.
 - Coordinates Ohio city boundaries.
- Calculated and mapped the change in median values of lit area between the years 2000 and 2018.
- Calculated and mapped total percent change in population from the same aforementioned years.
 - This enables us to compare changes in nighttime light to population changes, which provides a clearer illustration of a possible relationship between nighttime light and development patterns.

Flaws

- Our project lacks a map which depicts how closely changes in population relate to changes in nighttime lit area.

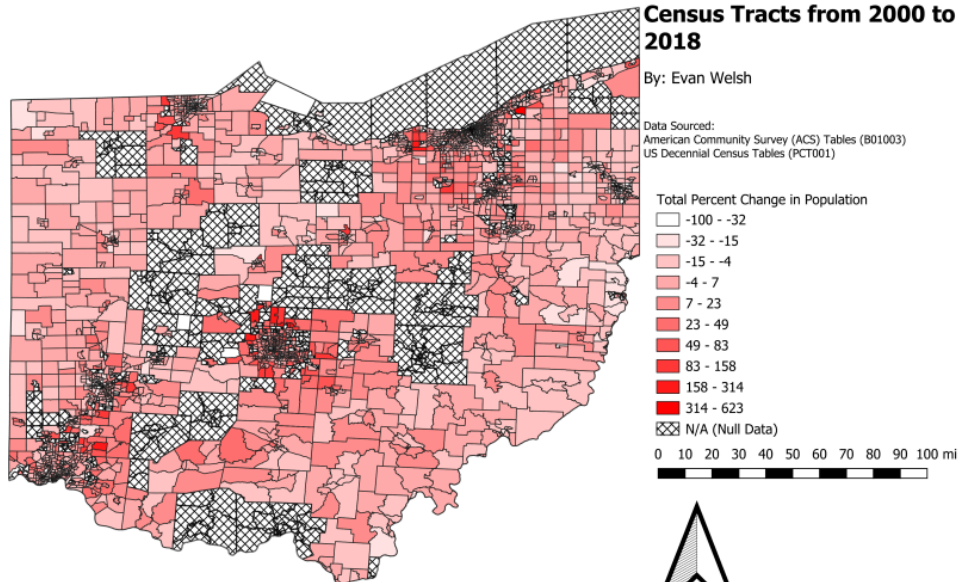


Finding 1:

- Changes in nighttime light data varied significantly depending on the urban area
 - Suburbs of Columbus had larger positive changes in lit area; whereas inner suburbs of Cleveland remained either stagnant, or saw decreases.
 - Most increases in percent population change occurred in suburban communities.

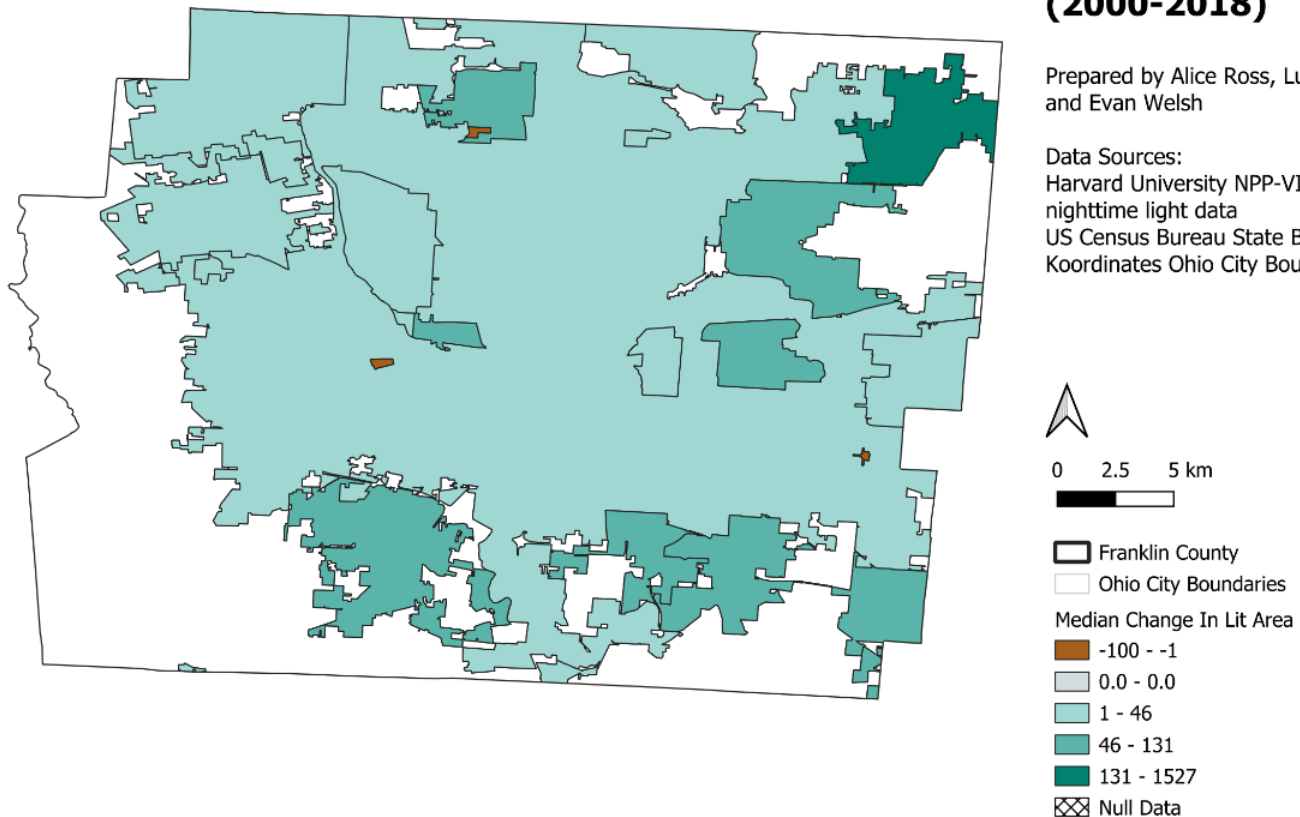
Total Percent Change in Ohio Population Between Census Tracts from 2000 to 2018

By: Evan Welsh

Data Sourced:
American Community Survey (ACS) Tables (B01003)
US Decennial Census Tables (PCT001)

Median Change in Lit Area in Franklin County, Ohio (2000-2018)

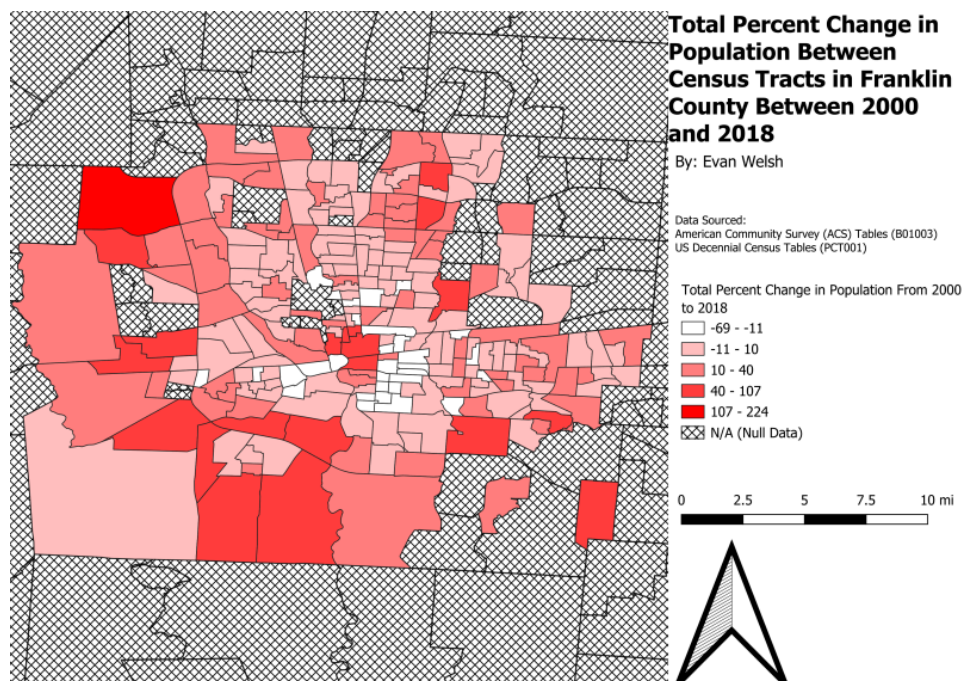
Prepared by Alice Ross, Lucas Dillon, and Evan Welsh

Data Sources:
Harvard University NPP-VIIRS-like nighttime light data
US Census Bureau State Boudaries
Koordinates Ohio City Boundaries

Finding 2

- Franklin County was chosen due to it being the location of Columbus, OH, the most populous city in Ohio

- This gives us the ability to see population change on a more relatable scale
- Largest positive median changes in nighttime light data occurred in suburban municipalities
 - Slight to large changes across the county are likely indicative of fast paced growth in the county.



Possible uncertainties

- While it might seem intuitive that population changes would explain variations in nighttime light data, it is also very likely there are other variables which impact light.
 - For example, nighttime light in a municipality in an area might have been decreased by implementation of light pollution regulations
 - Whereas increases in urban nighttime light data might not be caused by population increases, but instead by phenomena such as increasingly bright lights and or by municipal efforts to decrease crime by increasing light coverage.

Summary

- Our project set out to demonstrate changes in built area by depicting changes in median nighttime lit area, and then to compare this with percent changes in population.
- Between the time period of 2000 and 2018 there was a trend of increasing nighttime light area, and this trend often transcended urban, suburban, and rural boundaries.
- We cannot establish a causal relationship between population change and either increasing or decreasing nighttime lit area.

Citations

- An extended time-series (2000-2023) of global NPP-VIIRS-like nighttime light data (Harvard University)
 - <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/YGIVCD>
- US Census Bureau
 - American Community Survey (ACS) Tables (B01003)
 - <https://data.census.gov/table?q=B01003>
 - US Decennial Census Tables (PCT001)
 - <https://data.census.gov/table/DECENNIALSLDH.PCT001?q=PCT001>
- Ohio Municipal Boundaries
 - <https://koopordinates.com/layer/98575-ohio-city-boundaries>