

# Using Socio-economic Status and Greenspace to Locate Potential Survey Sites for Bat Foraging

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## Introduction

- ❖ Bats perform the critical ecosystem service of pest control in urban areas (Maslo et al. 2022).
- ❖ In order for humans to benefit from this ecosystem services, suitable foraging sites must be provided.
- ❖ Bats are known to roost and forage in urban areas (Aguilar et al. 2021).
- ❖ Prey abundance and diversity creates suitable foraging sites for bats (Nelson et al. 2017).
- ❖ However, human activity influences invertebrate abundance, most notably through pesticides (Lewis et al. 2024).
- ❖ Higher household income is associated with more pesticide use (Locke et al. 2019).
- ❖ To address this, we intend to conduct invertebrate sampling surveys in areas with low and high household incomes.
- ❖ This project focuses on the mapping process for potential survey sites that will provide insight into the influence of pesticides on prey abundance and availability for bats in Tarrant County, Texas.



## Results

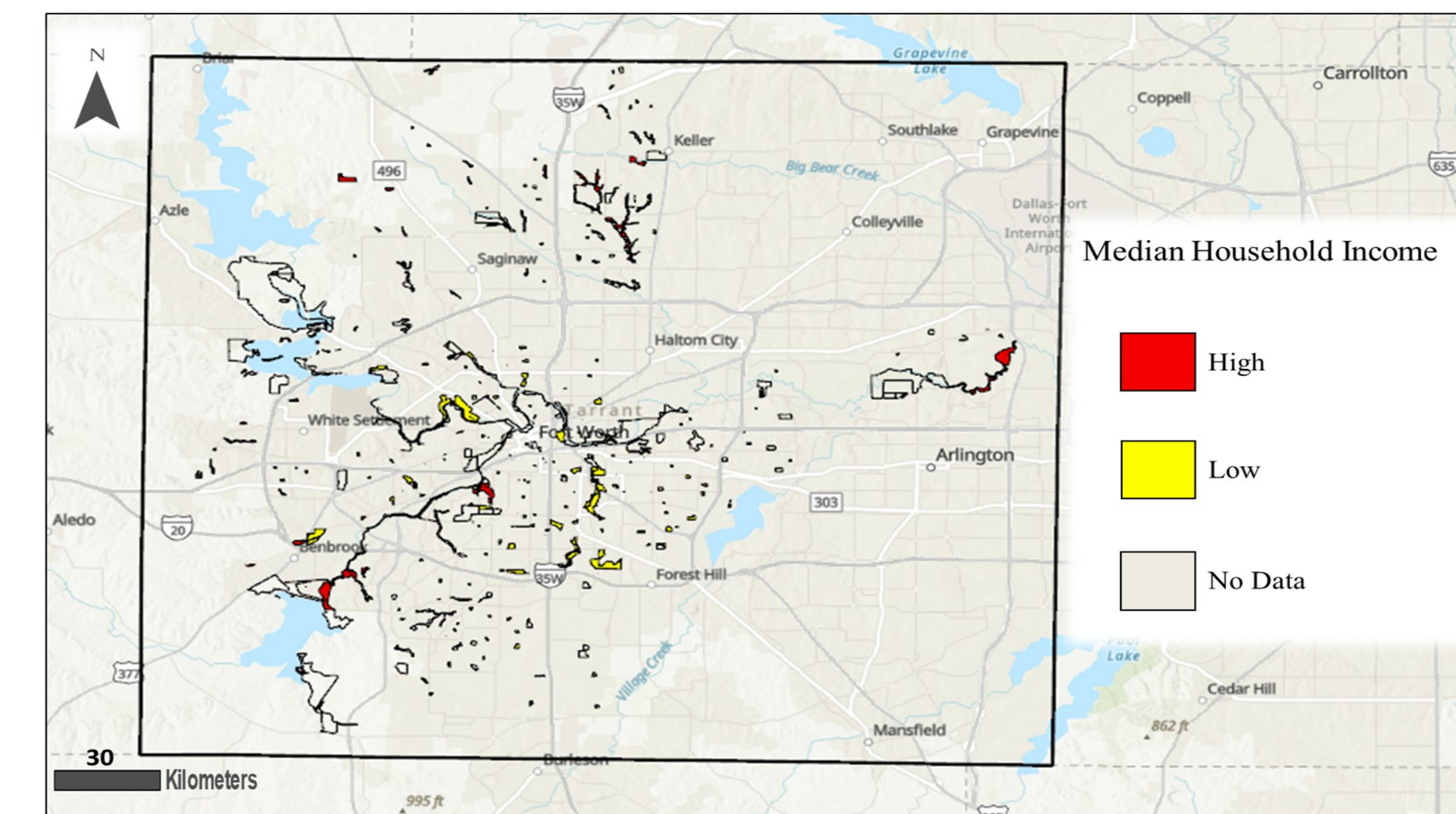


Figure 4. High (\$150,000-\$250,000) and low (\$1-\$50,000) median Household income in Tarrant County clipped to surveyable areas.

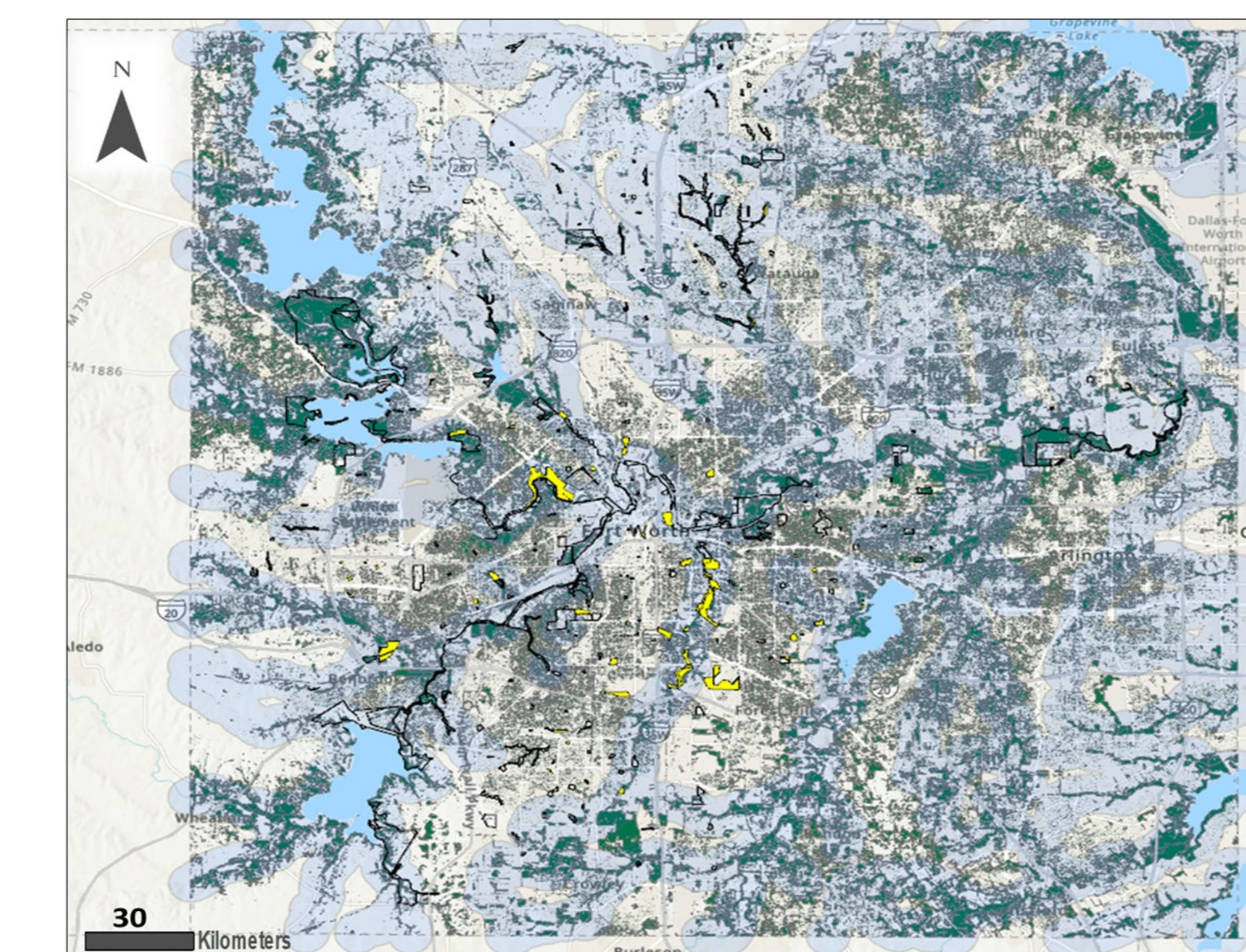


Figure 5. High income parks (yellow) with tree canopy (green) and bodies of water (blue) in Tarrant County.

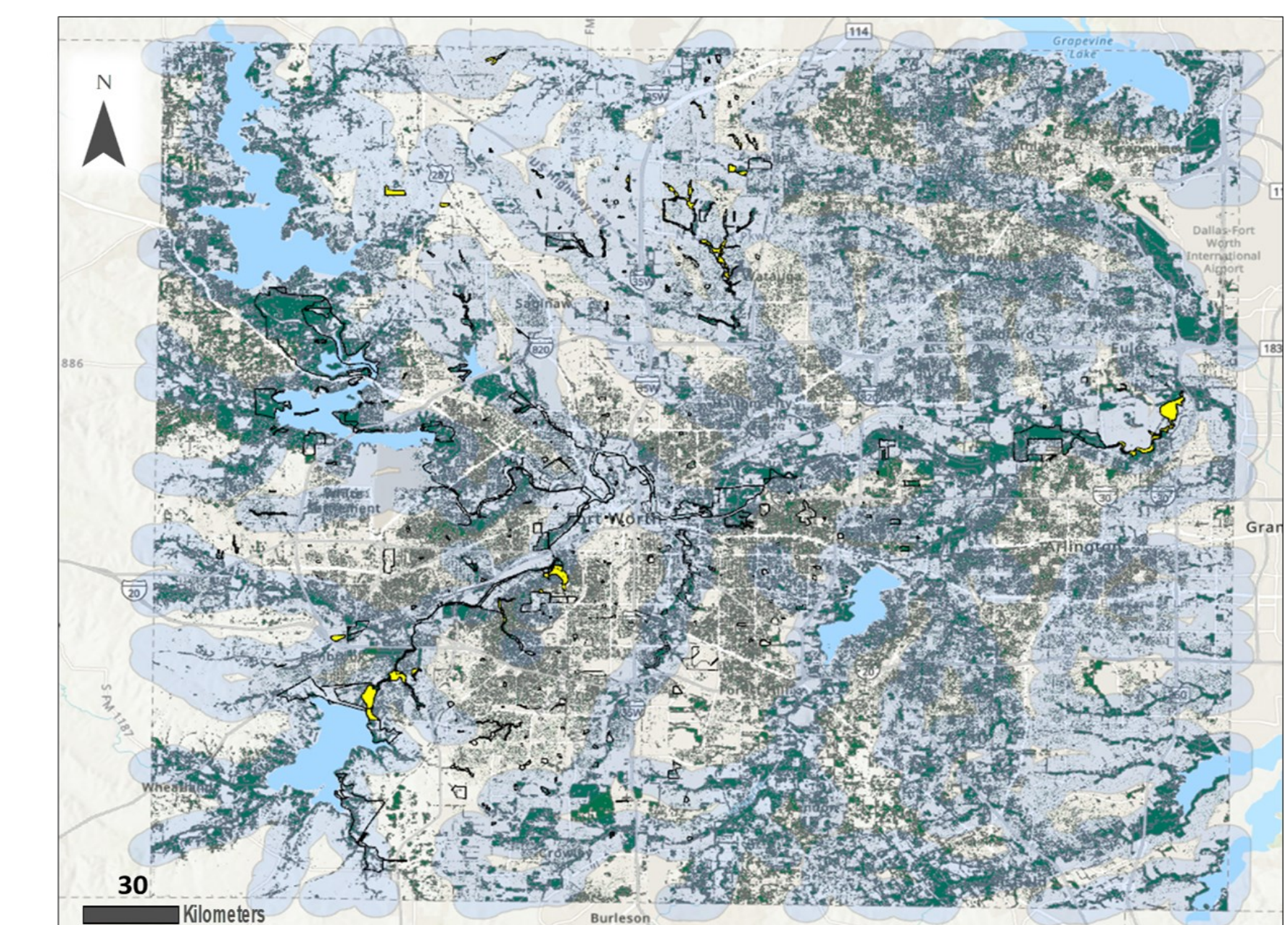


Figure 6. Low income parks (yellow) with tree canopy (green) and bodies of water (blue) in Tarrant County.

## Materials and Methods

### Socio-economic Status in Tarrant County:

- ❖ Median household income for Tarrant County was retrieved from 2022 U.S. census data (Fig. 1).
- ❖ The range of household incomes for Tarrant County was between \$13,654- \$250,000.
- ❖ Median household income was ranked by determining the smallest income bracket size for each rank that included suitable greenspace for survey sites (Fig 2).
- ❖ High: \$150,000 to \$250,000
- ❖ Low: \$1 to \$50,000

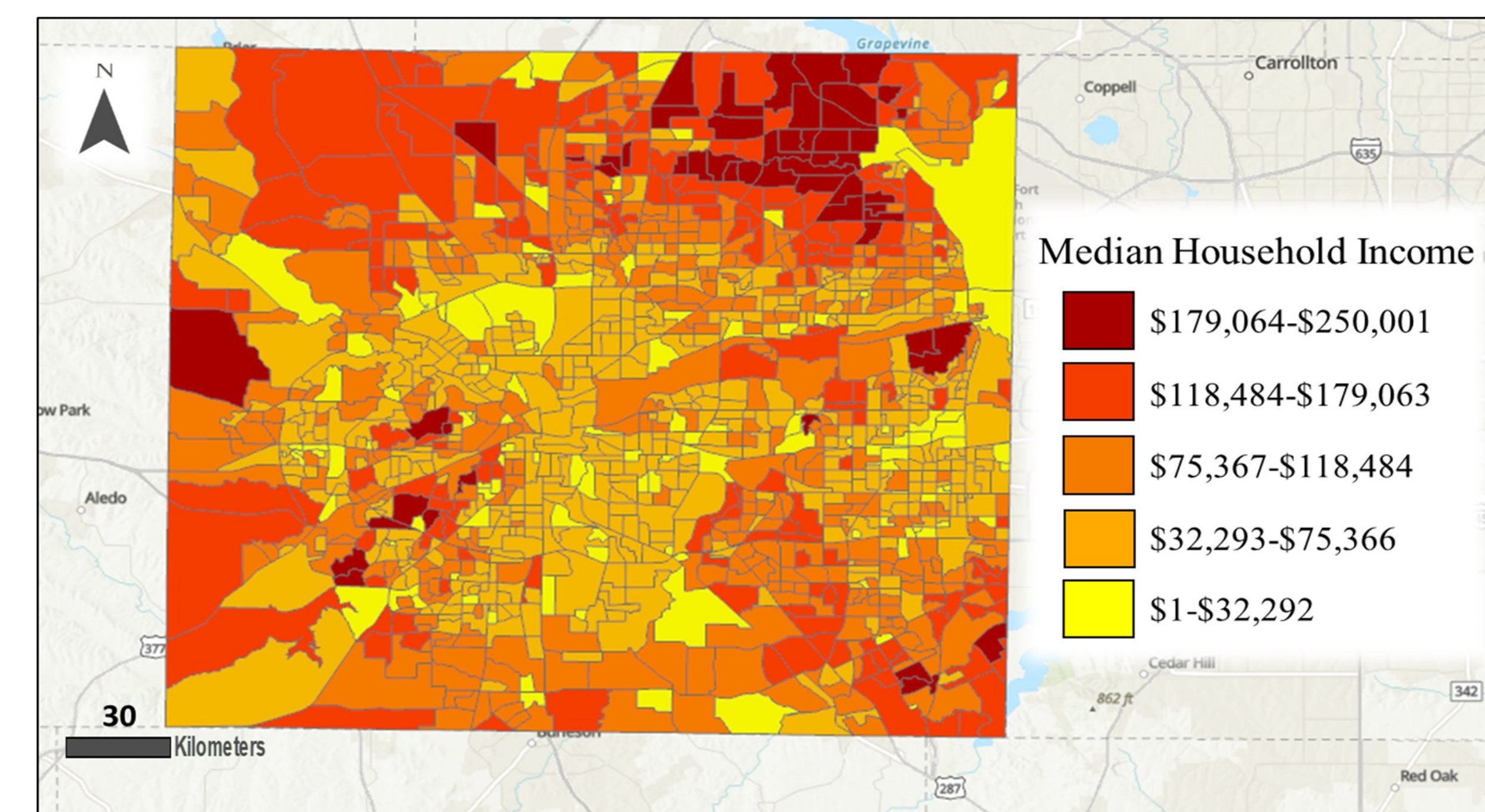


Figure 1: Map of census block groups in Tarrant County, TX depicting their median household incomes.

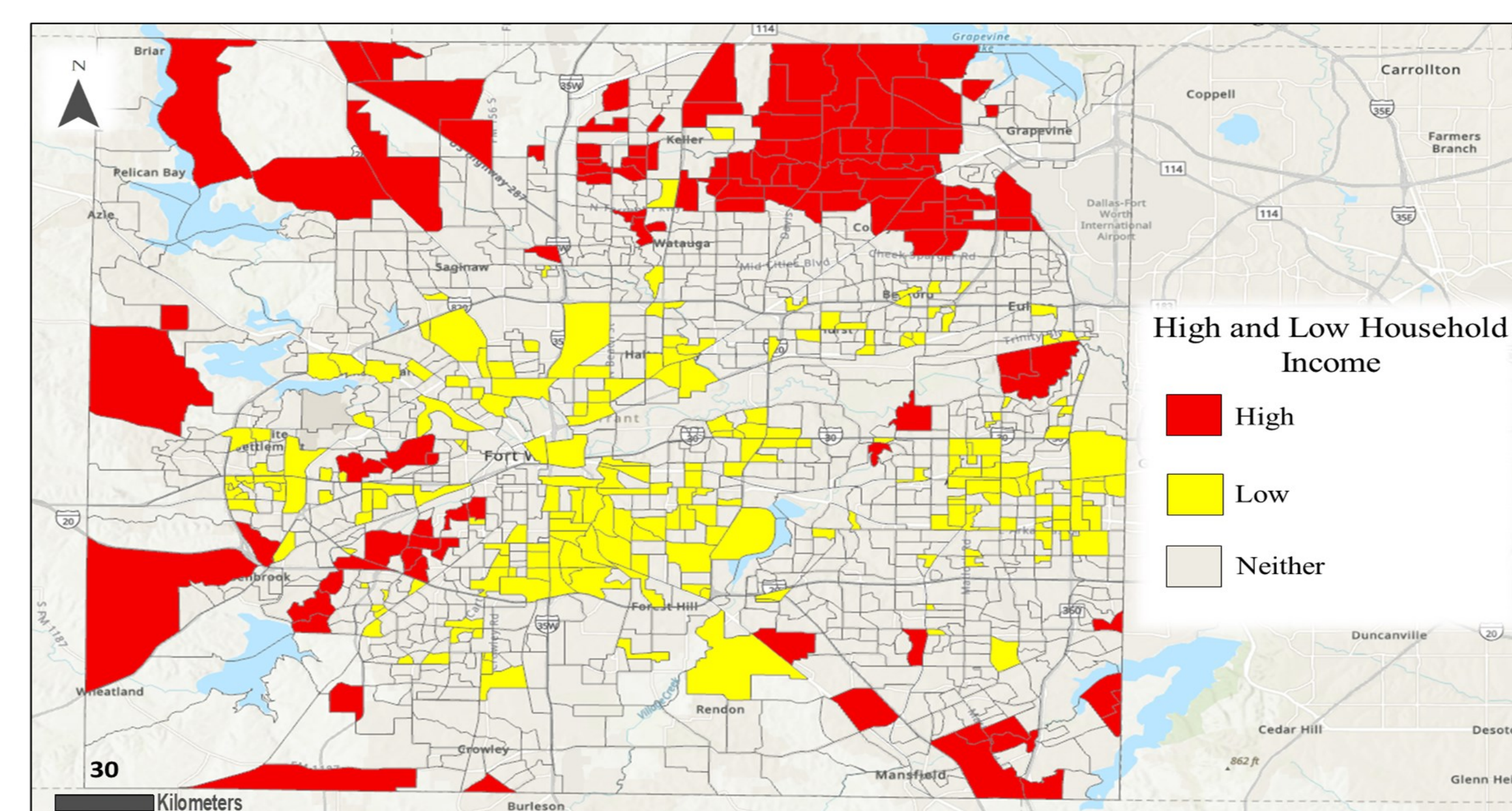


Figure 2: Map depicting high (\$150,000-\$250,000) and low (\$1-\$50,000) income brackets in Tarrant County.

### Study Site Selection:

- ❖ ArcGIS Pro version was used to locate surveyable sites within Tarrant County.
- ❖ A map of all accessible park space was created in ArcGIS Pro (Fig. 3).

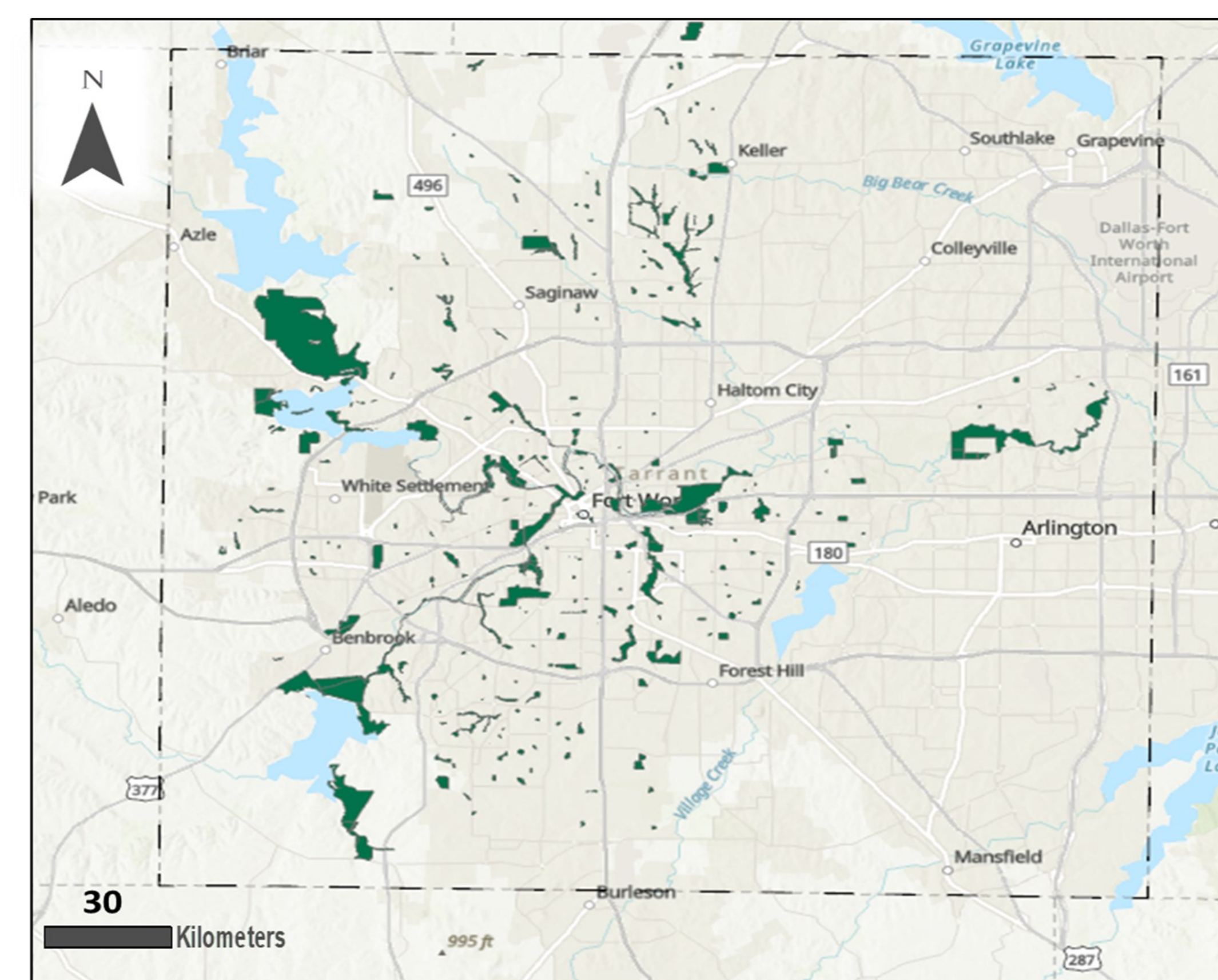


Figure 3: Map depicting all surveyable sites (green) within public and private areas in Tarrant County.

- ❖ We used the 'clip' tool in ArcGIS Pro to create a map depicting the median household income withing surveyable sites (Fig 4).
- ❖ We then identified sites that represented a suitable foraging area, had adequate roosting opportunities, had assessable and available water, and was assessable to bats.
- ❖ We used ArcGIS Pro to locate bodies of water and tree canopy that would indicate these factors were present (Fig 5 and 6).
- ❖ 1,000 m buffers were added to the available bodies of water to determine if they were accessible to bats from the sites (Fig 5 and 6).
- ❖ We then ground-truthed the best sites from the map to assess suitability.

- ❖ Using Figures 5 and 6 we selected five high and five low income sites that had canopy cover that extended to water and was within 1,000 m of a water source.
- ❖ We then ground-truthed these sites to determine if they had suitable areas of mature trees that surrounded an open area or water.
- ❖ Once we had determined their suitability, we selected ten sites (Fig 7) and began surveys.

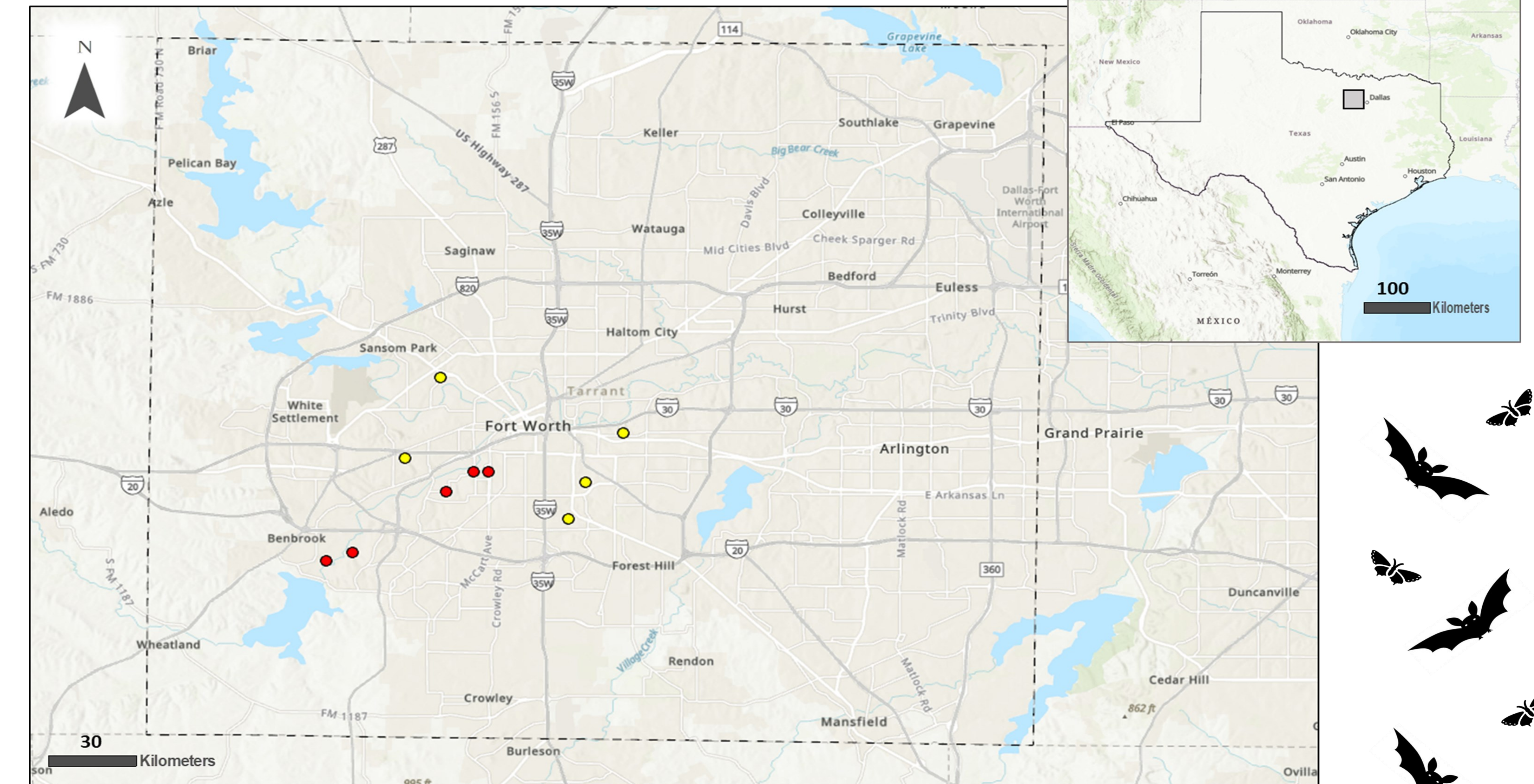


Figure 7. Map of Tarrant County (dotted line) in Texas, USA (see insert) with survey sites located in high income areas shown in red and low income areas in yellow.

## Future Direction

### Conducting Surveys

- ❖ Invertebrate sampling will be utilized to determine the abundance of prey as well as the diversity at the survey sites that were chosen.
- ❖ Bat acoustic sampling will be utilized to evaluate bat activity at the survey sites.



## Acknowledgements

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### References

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**Map Credits:** The City of Fort Worth (Fig 3, 5, and 6), 2022 U.S. Census Bureau (Fig 1).