

Analyzing Urban Development in Federally-Overlooked and FEMA Flood Zones in Greater Houston, Texas

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INTRODUCTION

- Urbanization has exacerbated flood risk, with development in flood-prone areas contributing more to future flood exposure than climate change (Wing et al., 2022).
- Flood risk maps generated by the Federal Emergency Management Agency (FEMA) are often outdated and fail to recognize some high-risk areas (Tate et al., 2021).
- The Bates et al. (2021) model improves on FEMA flood maps by integrating advanced computational techniques that account for complex hydrological processes and land use changes.
- "Federally overlooked" flood zones (areas with 100-year flood risk that FEMA does not identify) are disproportionately home to marginalized communities (Flores et al., 2023).
- There is a limited understanding of urban development within these overlooked zones.
- To address this gap, this study explores the following research question: **How does urban development differ over time in FEMA-designated and federally overlooked flood zones?**

DATA AND METHODS

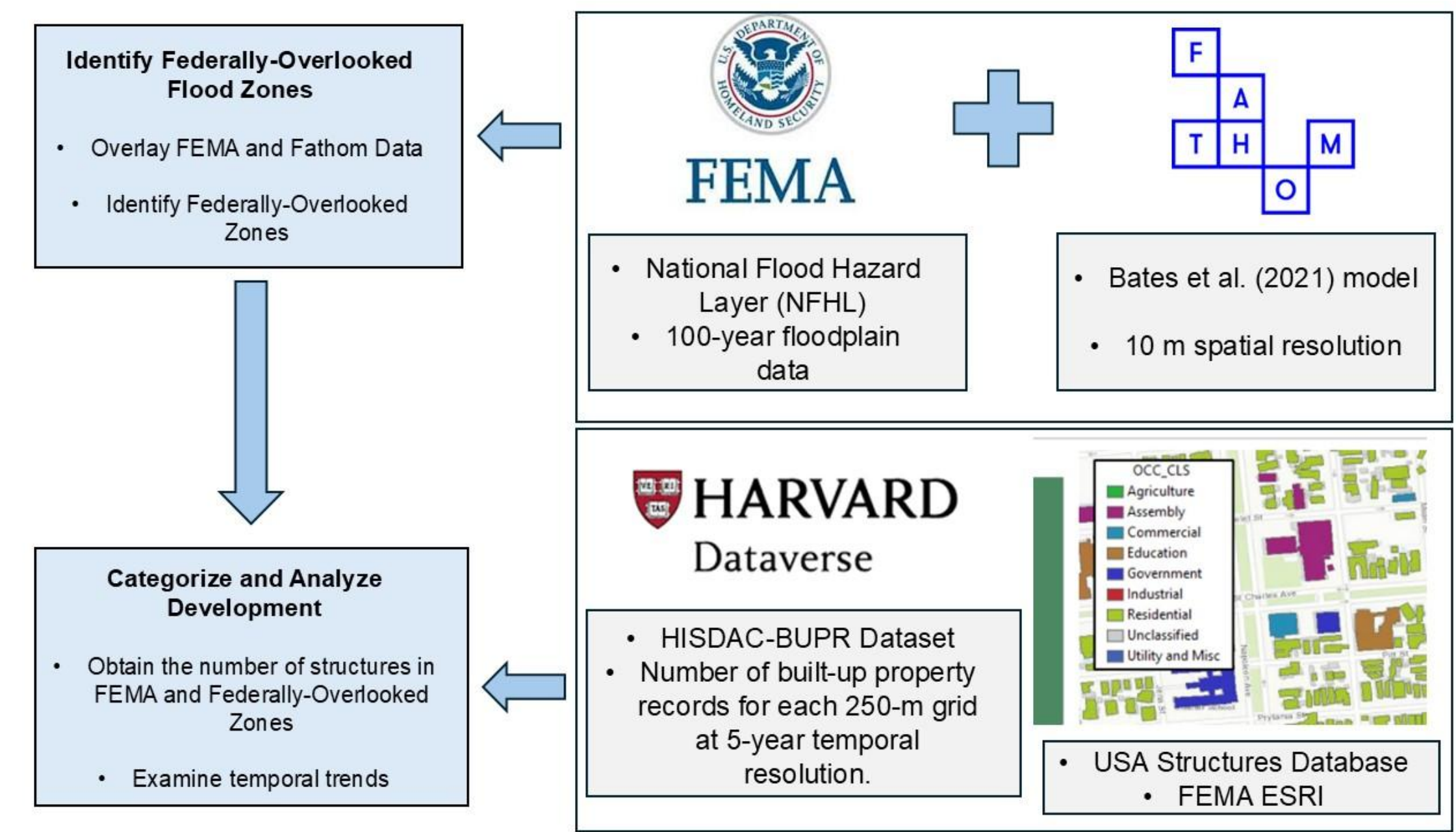


Figure 1: Workflow for Flood Zone Delineation and Development Analysis

RESULTS

- 278,080 residential structures in FEMA flood zones.
- 222,692 residential structures in federally overlooked flood zones.
- Peak development in both FEMA and overlooked zones occurred from the 1950s-1970s.

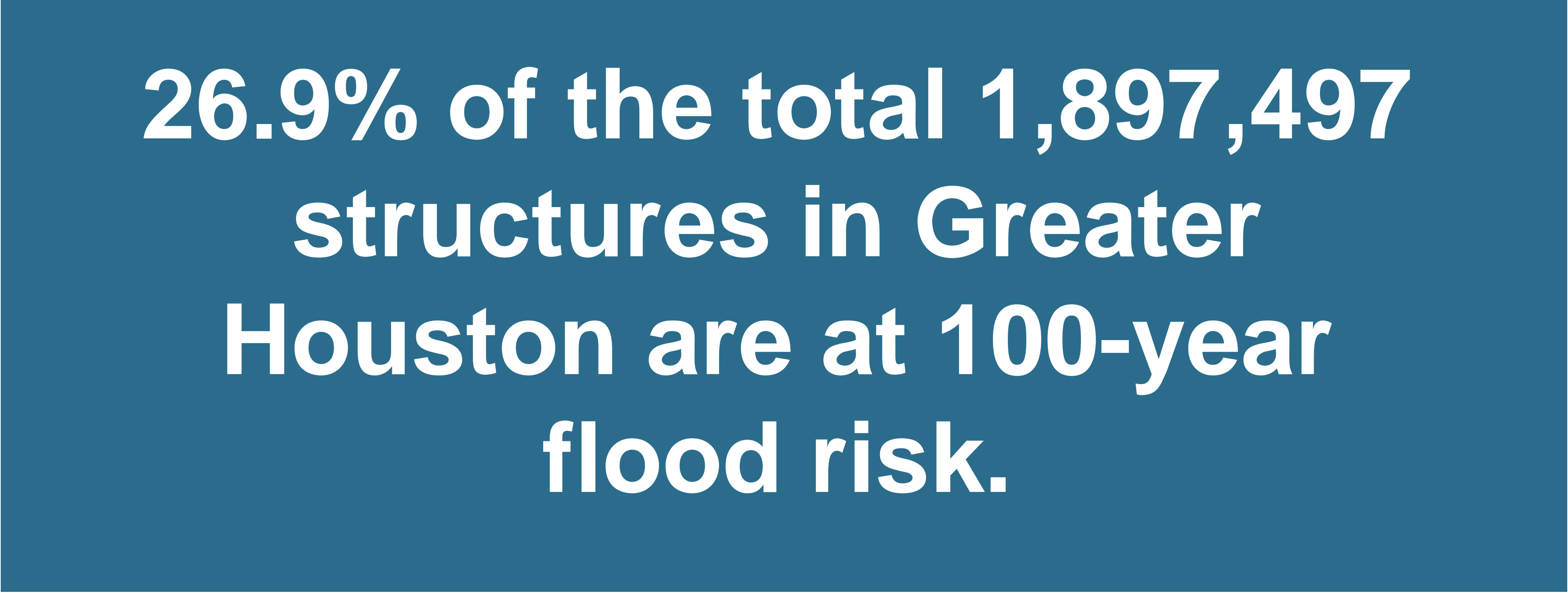
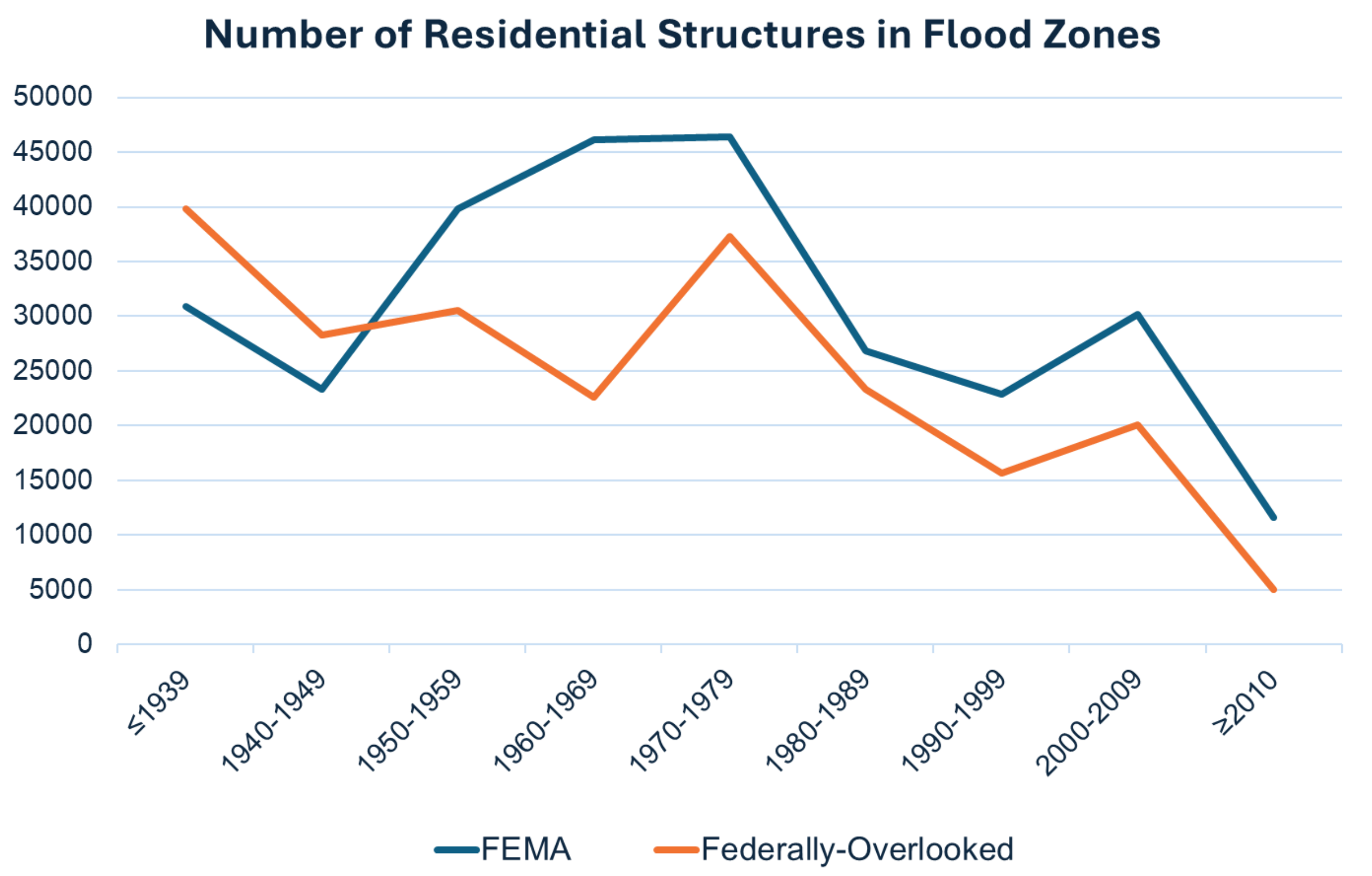
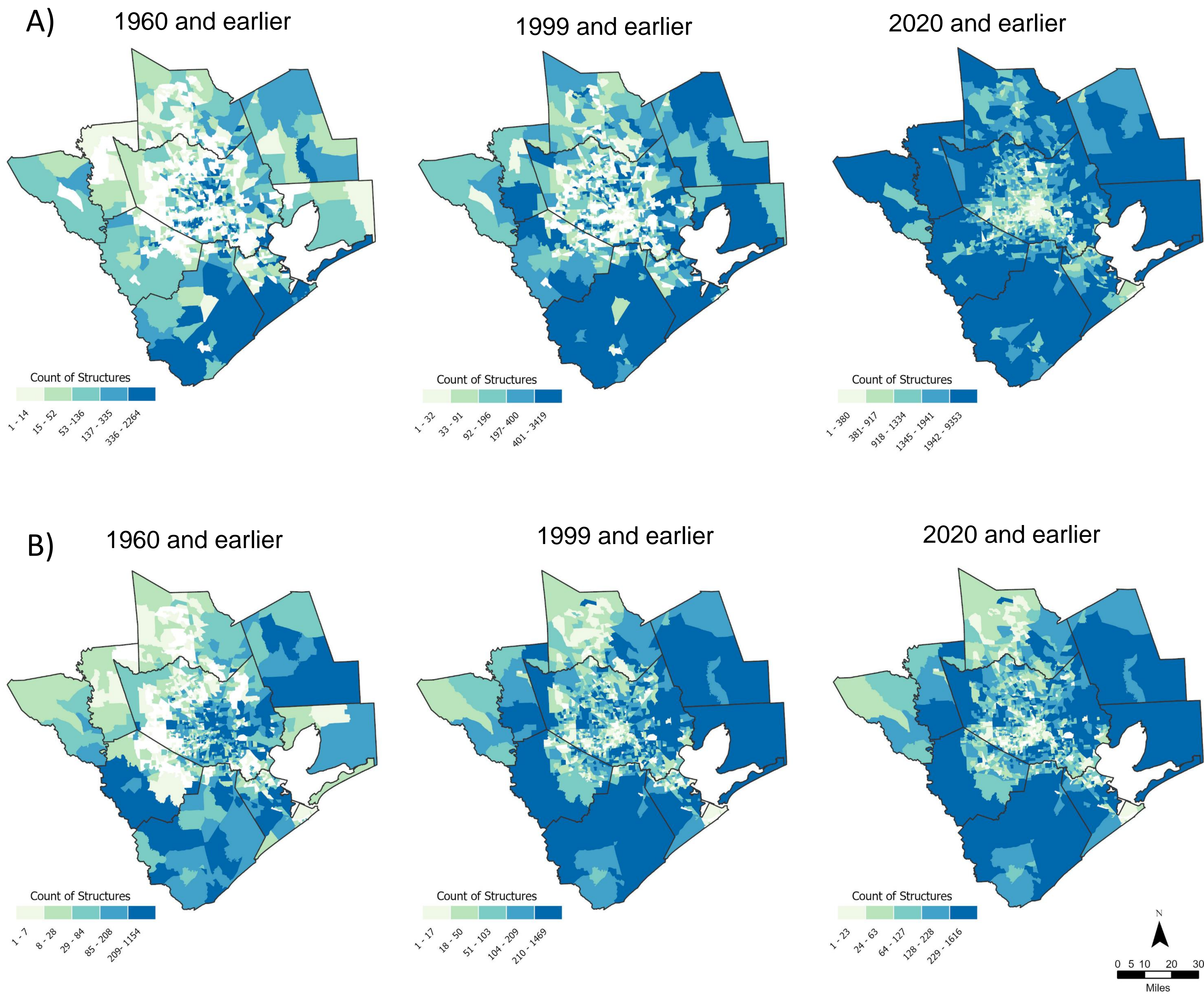
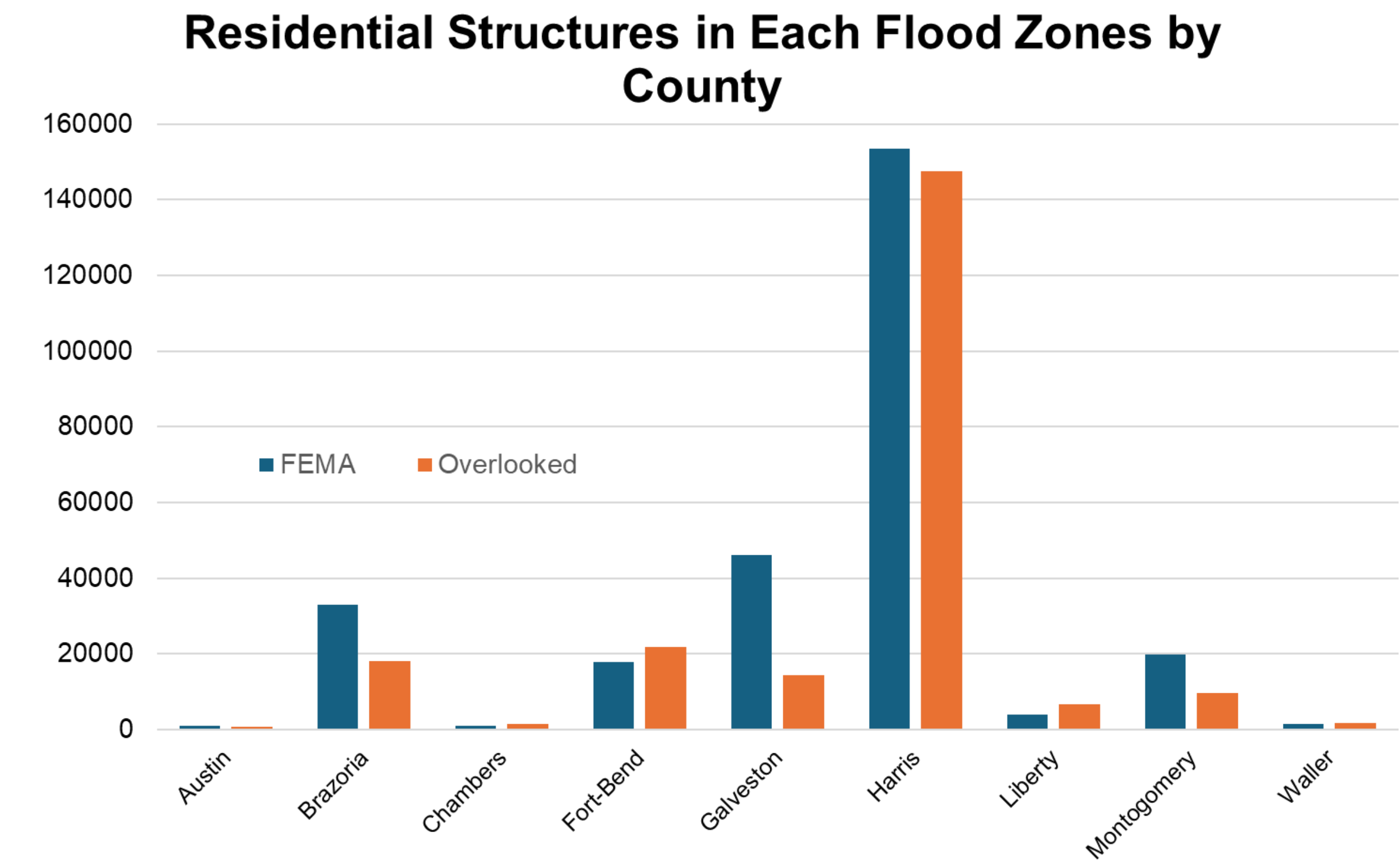


Figure 2: Map of Greater Houston showing the increase in the number of structures A) FEMA flood zones and B) Federally-Overlooked flood zones over time



- Decline in new structures from the 1980s-1990s. A resurgence in early 2000s, followed by a recent decline.



- Counties with more structures in federally overlooked flood zones: Chambers, Fort Bend, Liberty, and Waller. Remaining counties had more structures in FEMA flood zones.

CONCLUSION

- Development in flood-prone areas continues, including in zones unrecognized by FEMA.
- Federally overlooked flood zones lack flood insurance requirements and mitigation regulations, increasing flood vulnerability.
- Flood mapping limitations contribute to unchecked development, potentially disproportionately affecting marginalized communities.
- Improved flood risk mapping and comprehensive urban planning policies are essential to mitigate long-term economic and social impacts.