

# A Screening Tool for Climate Change Population Vulnerability Assessments

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CALIFORNIA  
ENVIRONMENTAL  
HEALTH TRACKING  
PROGRAM

Funded by the U.S. Association of  
State & Territorial Health Officials

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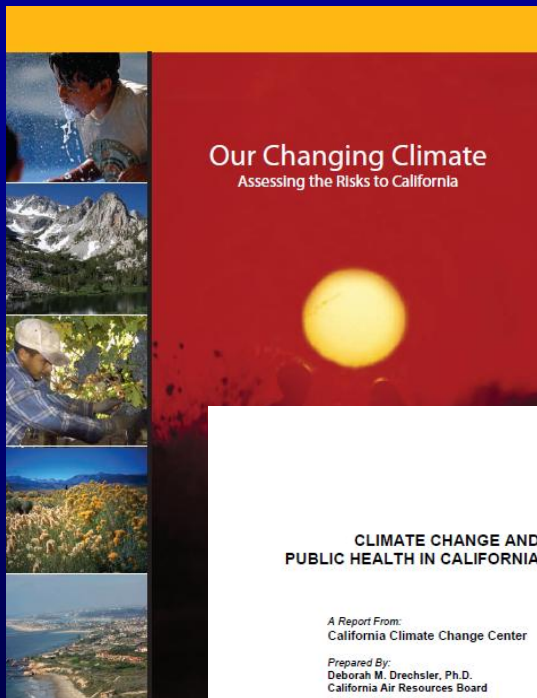
# Overview

- Background
- Methods
- Results in LA & Fresno Counties
- Conclusions
- Next Steps
- Discussion

# Climate Change, Public Health, & Population Vulnerability

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# Climate Change & Health in California



Our Changing Climate  
Assessing the Risks to California

## CLIMATE CHANGE AND PUBLIC HEALTH IN CALIFORNIA

A Report From:  
California Climate Change Center

Prepared By:  
Deborah M. Drechsler, Ph.D.  
California Air Resources Board

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California Environmental Protection Agency  
**AIR RESOURCES BOARD**

Arnold Schwarzenegger, Governor

FINAL PAPER

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**Air quality:** respiratory diseases, COPD

**Flooding:** injury, displacement, disease

**Heat:** heat-related illness, mortality

**Fire:** injury, displacement, eye & respiratory illness

**Vector-borne diseases:** West Nile, dengue & yellow fever

**Extreme weather:** displacement, injury

**Sea level rise:** displacement, water salinization

# What is Climate Change Population Vulnerability Screening?

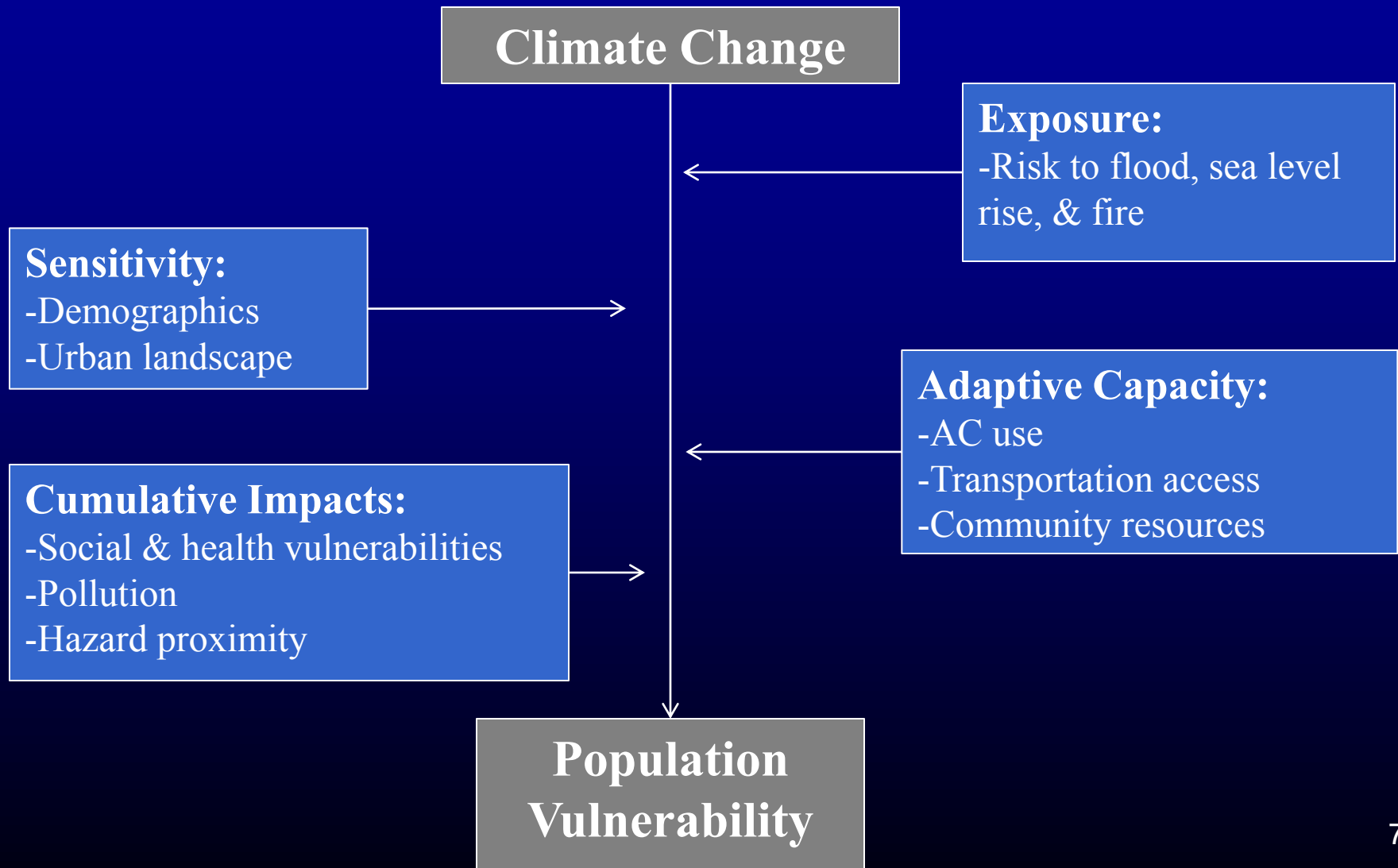
Determining the populations at highest risk for climate change threats based on:

- Demographics
- Geographic location

Why needed?

- To develop public health adaptation strategies for local communities
- To target specific mitigation activities (e.g. tree cover) in targeted areas

# Population Vulnerability Model



# Methods

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# Study Areas



# Core Method

- Based on Sadd, et al\* method, which:
  - Maps cumulative impacts and social vulnerability
    - 23 indicators
    - Census tract level
  - Has 3 components
    - Hazard proximity and land use
    - Air pollution exposure and health risk
    - Social and health vulnerabilities
- We developed an additional component assessing climate change vulnerability
- Piloted for 2 counties

\*Sadd et al. *Playing It Safe: Assessing Cumulative Impact and Social Vulnerability through an Environmental Justice Screening Method in the South Coast Air Basin, California*. Int J Environ Res Public Health. May 2011; 8(5):1441-59.

# Climate Change Vulnerability Data

Metric	Source
Central air conditioning	CA Energy Commission (2009)
Tree canopy	National Land Cover Database (2001)
Impervious surface	National Land Cover Database (2001)
Public transit routes	SCAG 2011; Fresno COG 2011
Elderly living alone	Census 2000
Household car access	Census 2000
Wildfire risk	CAL FIRE 2003
Flood risk	FEMA (Fresno 2009; LA 2008)
Sea rise inundation	Pacific Institute 2009 (LA only)

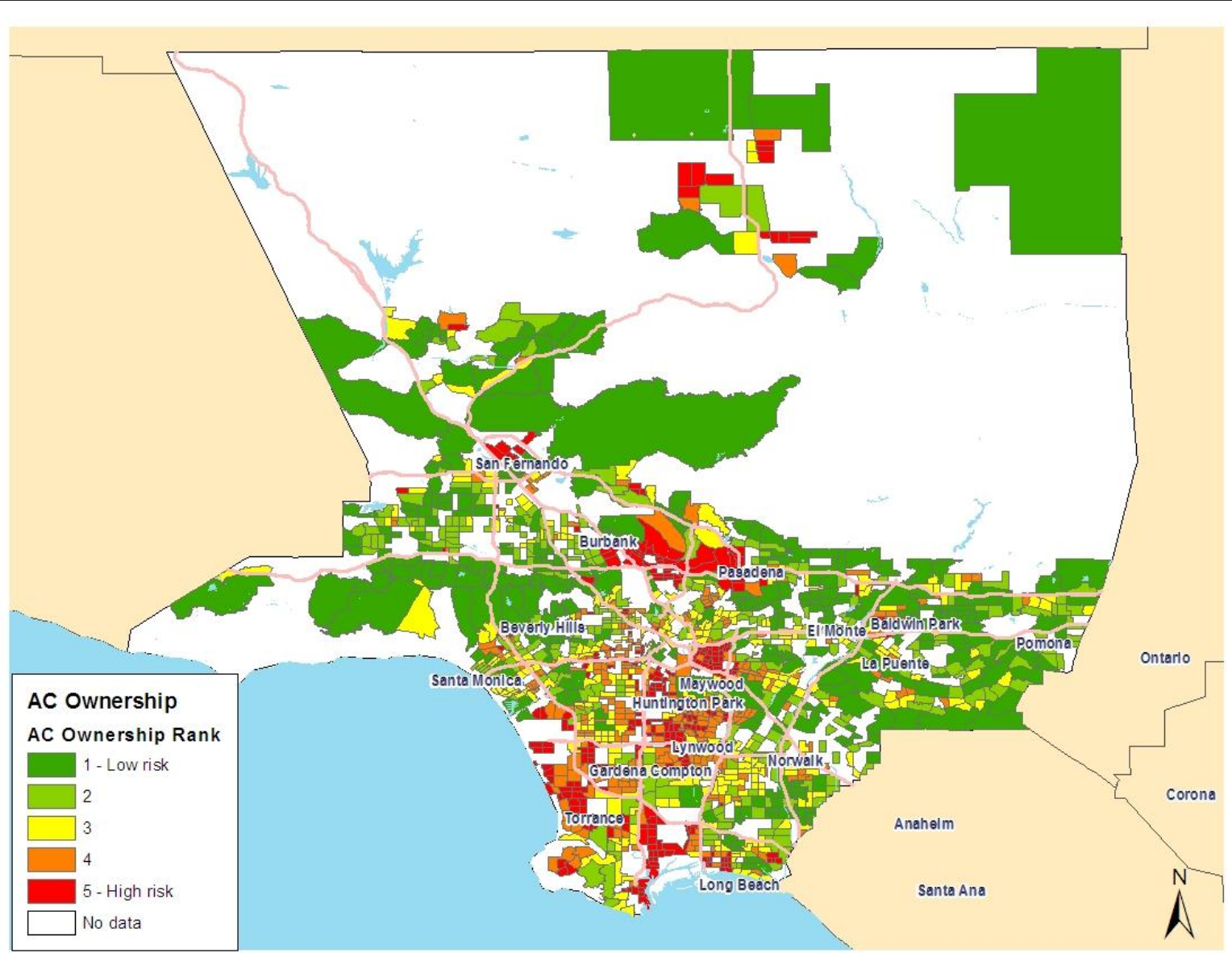
- Data were ranked by quintiles and mapped for census tracts
- Final vulnerability score a sum & re-ranking across all metric ranks

# Results

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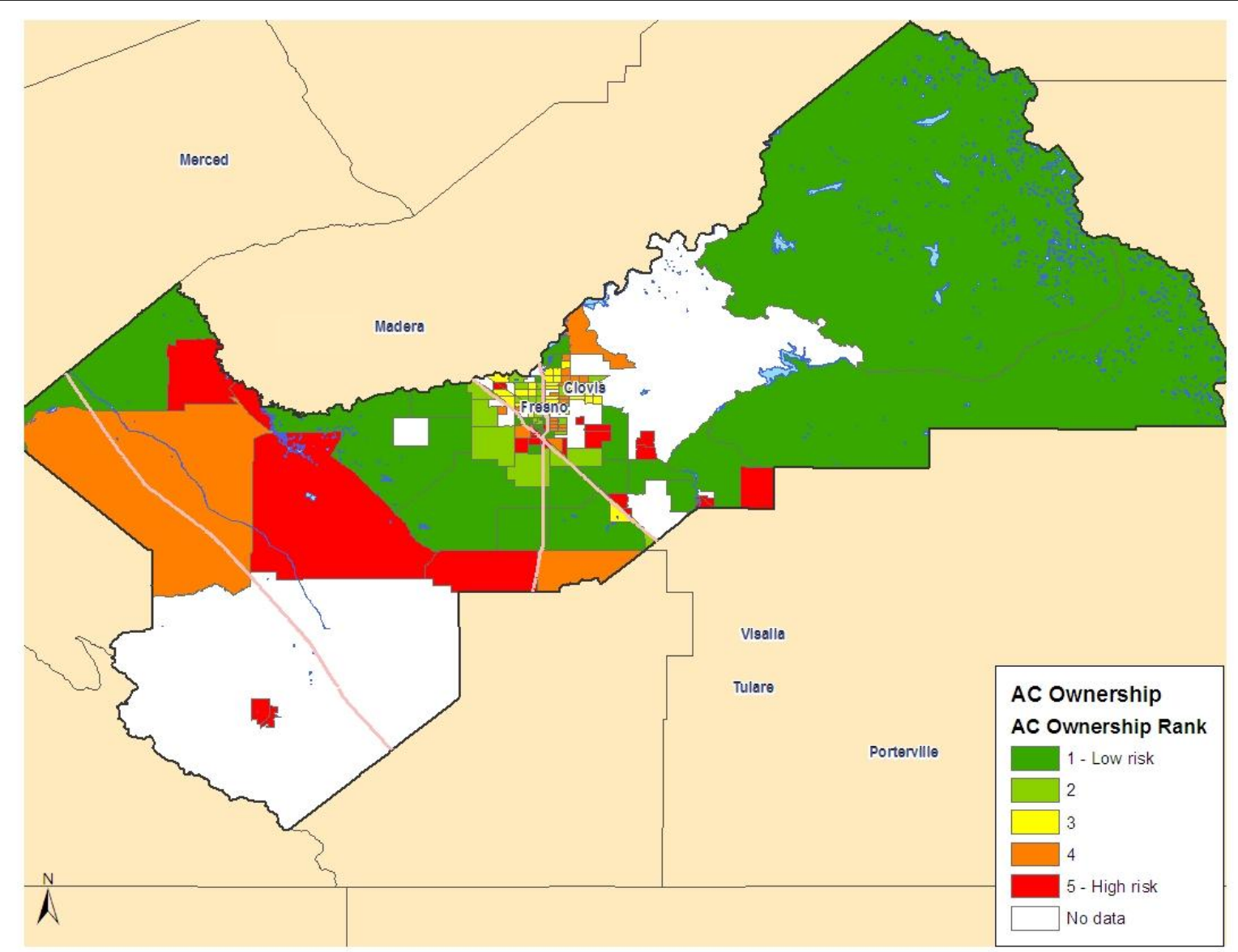
# LA County Climate Change Vulnerability

## Proportion of households with central AC



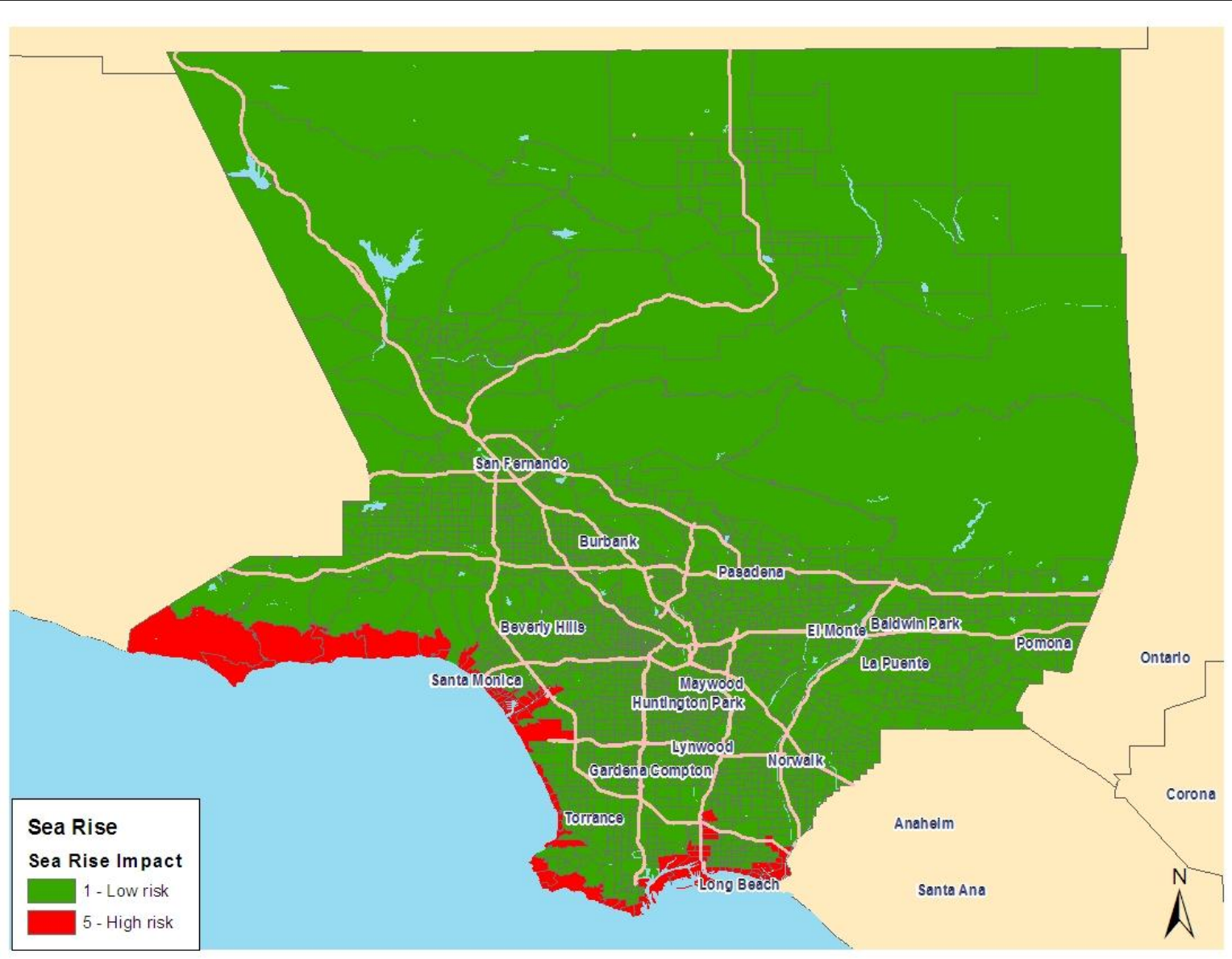
# Fresno County Climate Change Vulnerability

## Proportion of households with central AC



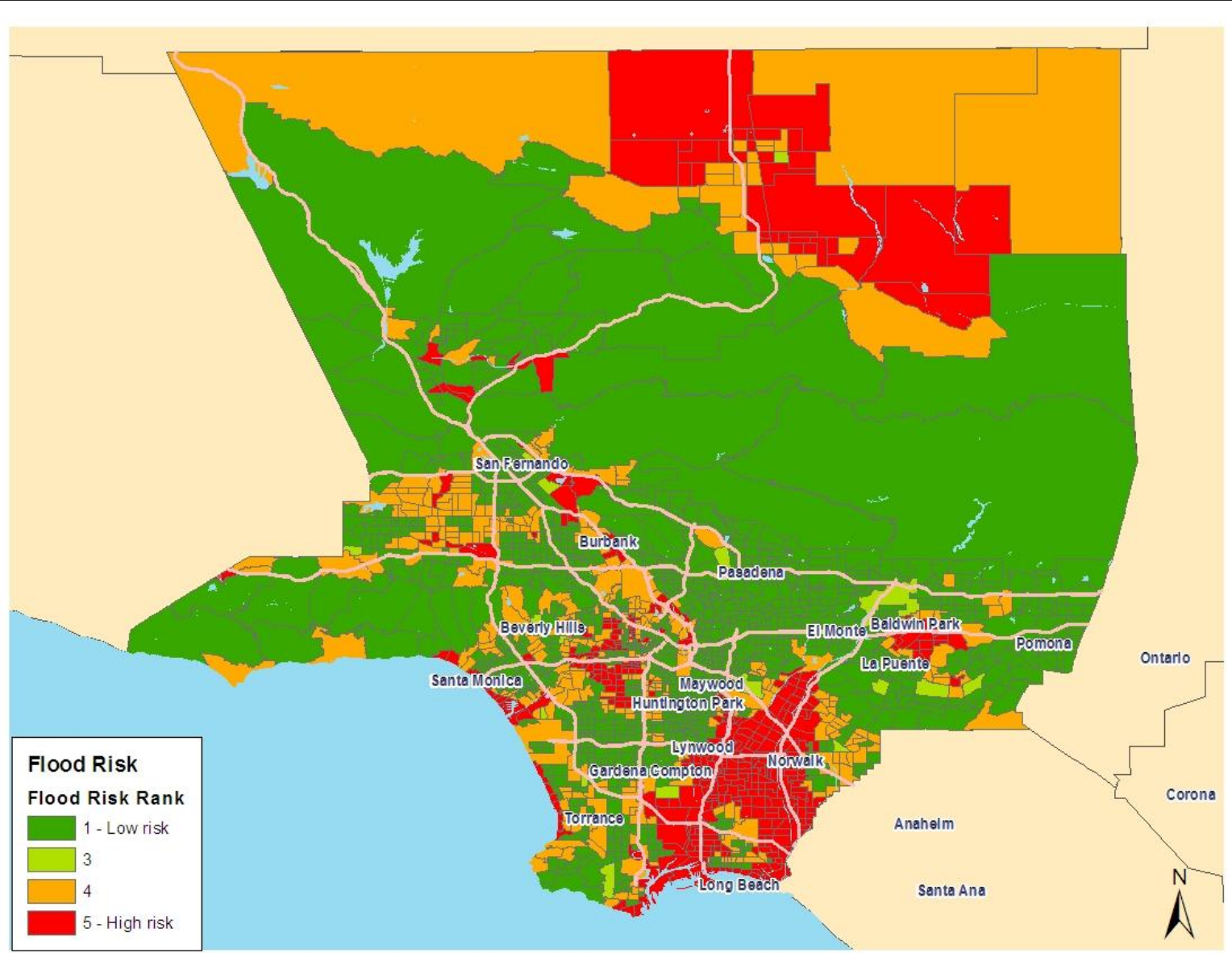
# LA County Climate Change Vulnerability

## Risk from sea level rise



# LA County Climate Change Vulnerability

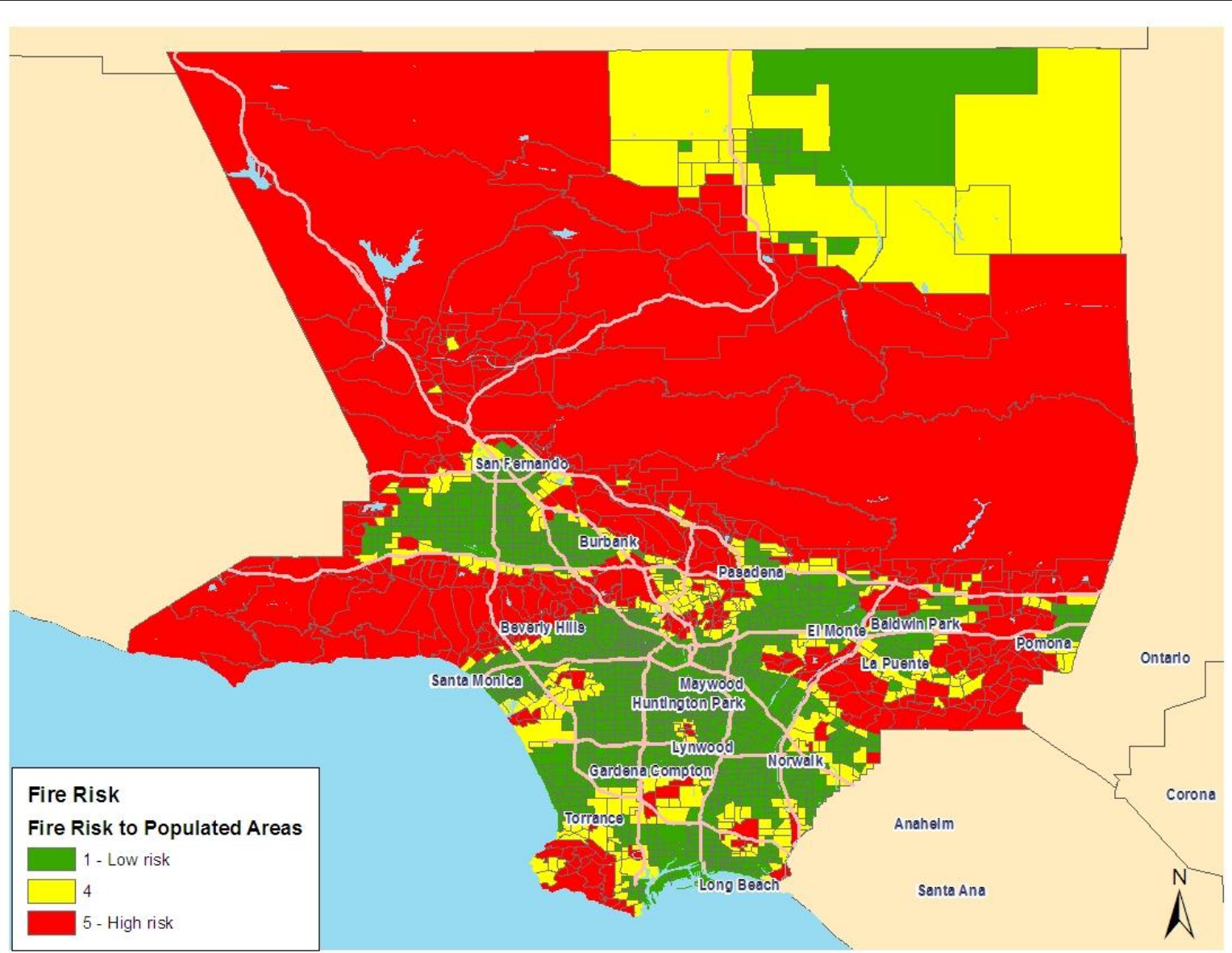
## Average FEMA flood risk





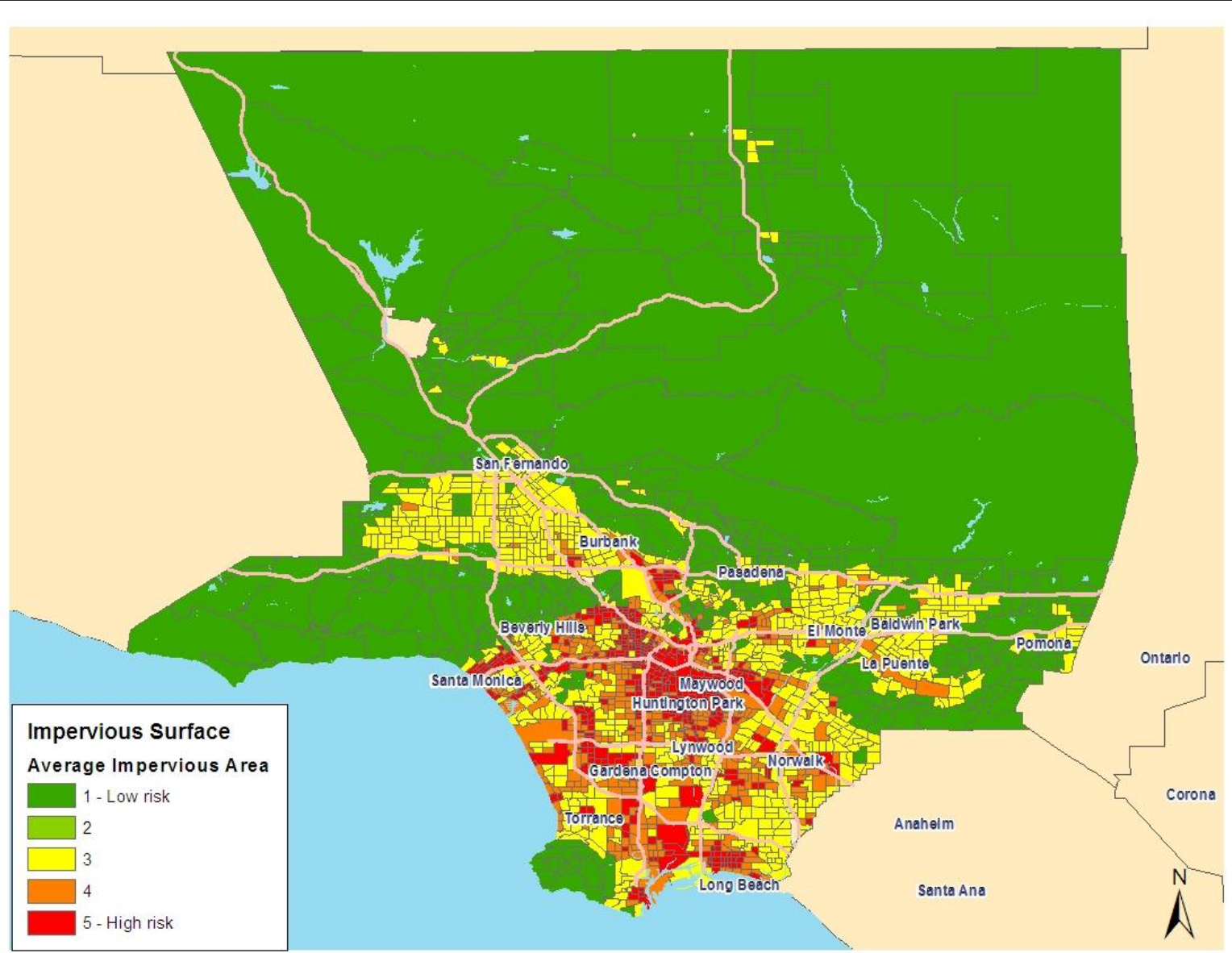
# LA County Climate Change Vulnerability

## Average risk of wildfire-urban interface



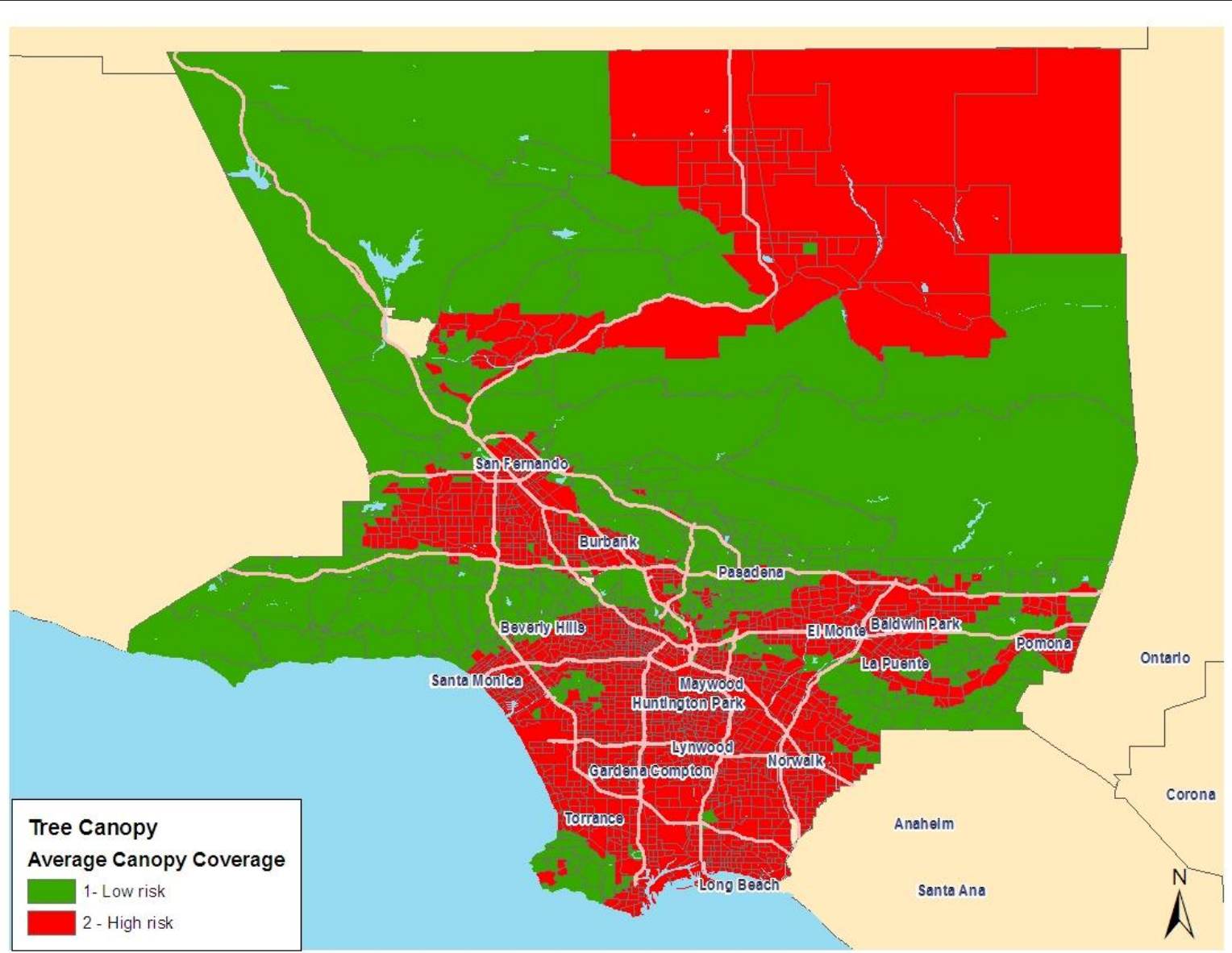
# LA County Climate Change Vulnerability

## Average coverage of impervious surfaces



# LA County Climate Change Vulnerability

## Average tree canopy coverage

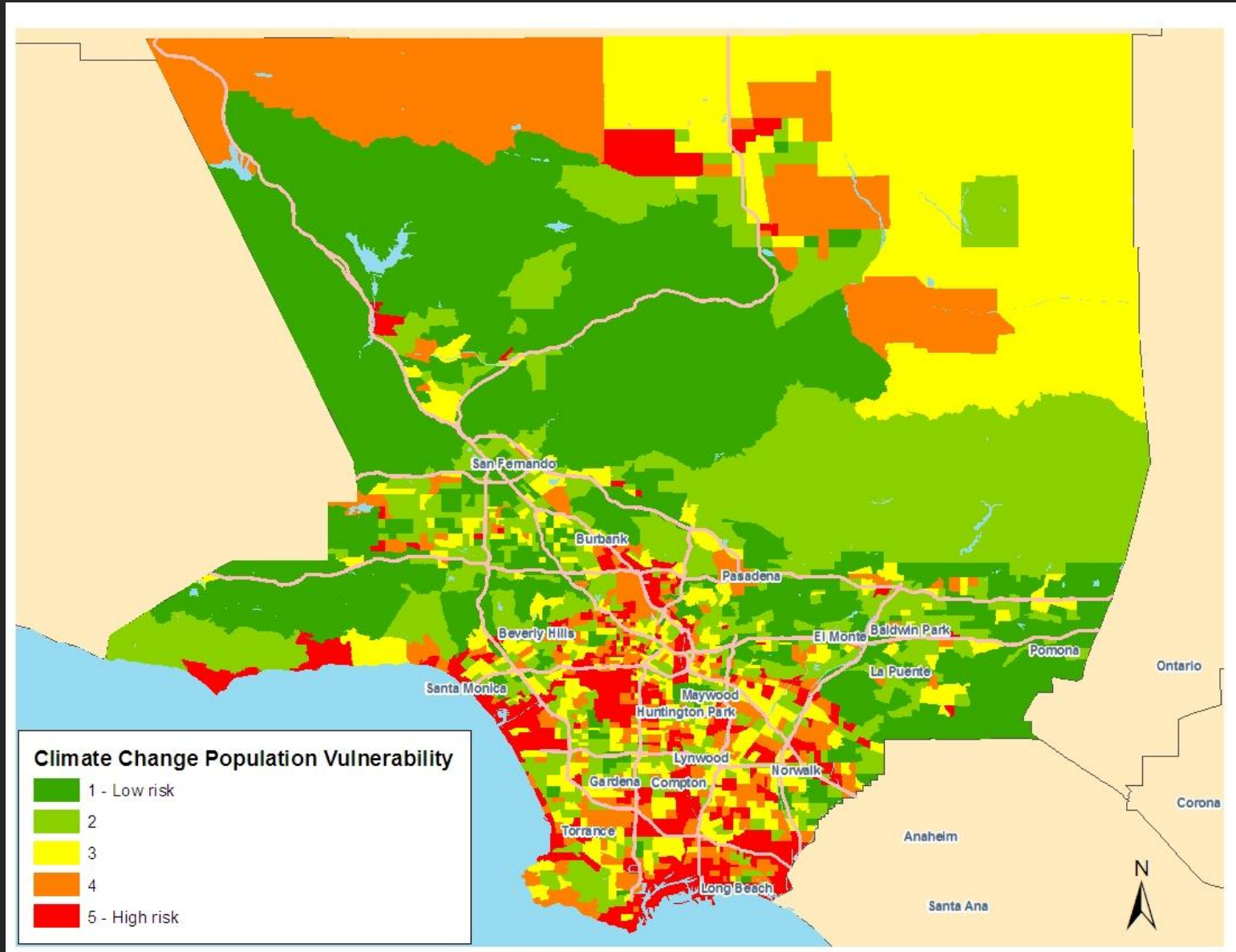


# Final Results LA County

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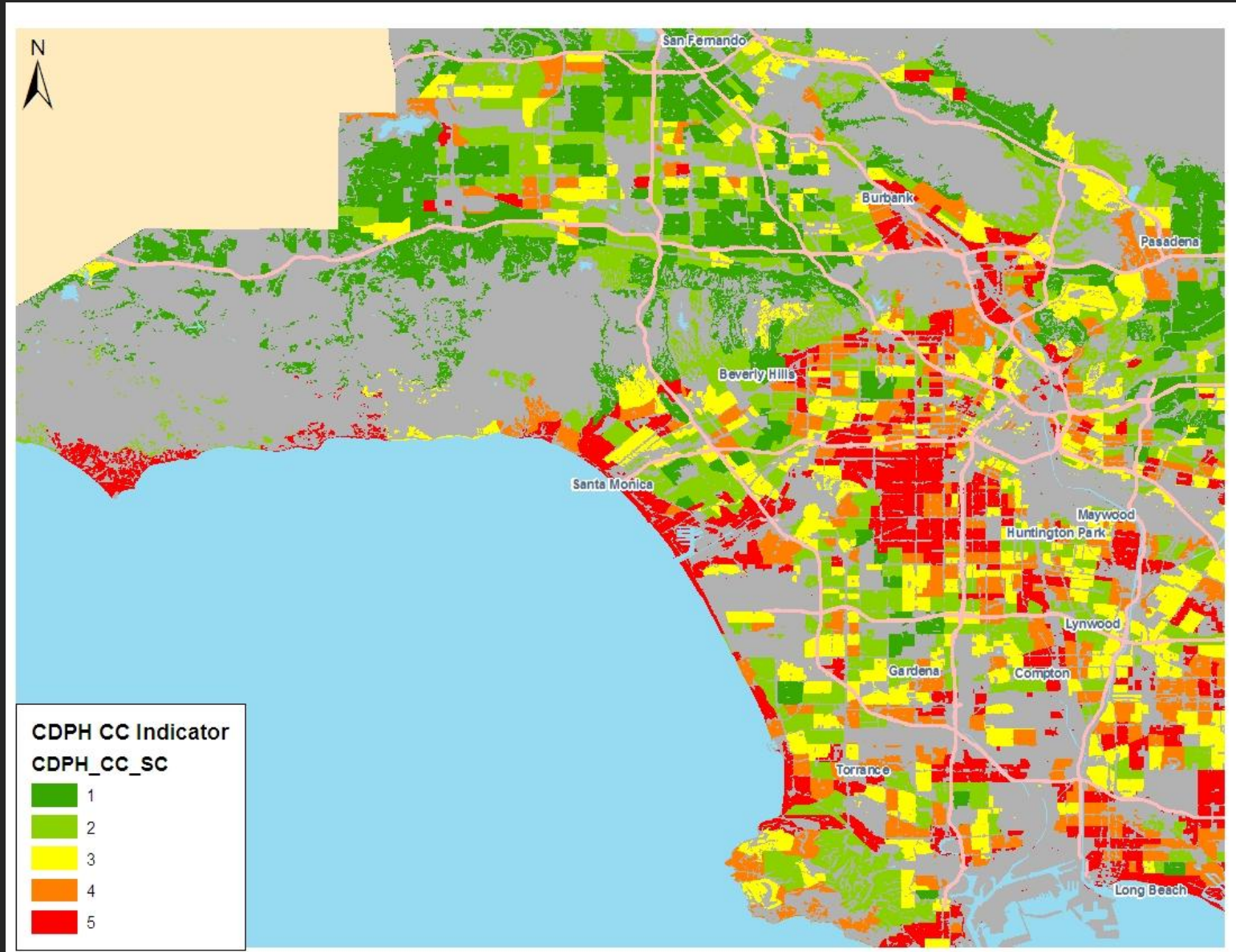
# Final CDPH Climate Scores

## LA County Climate Change Vulnerability



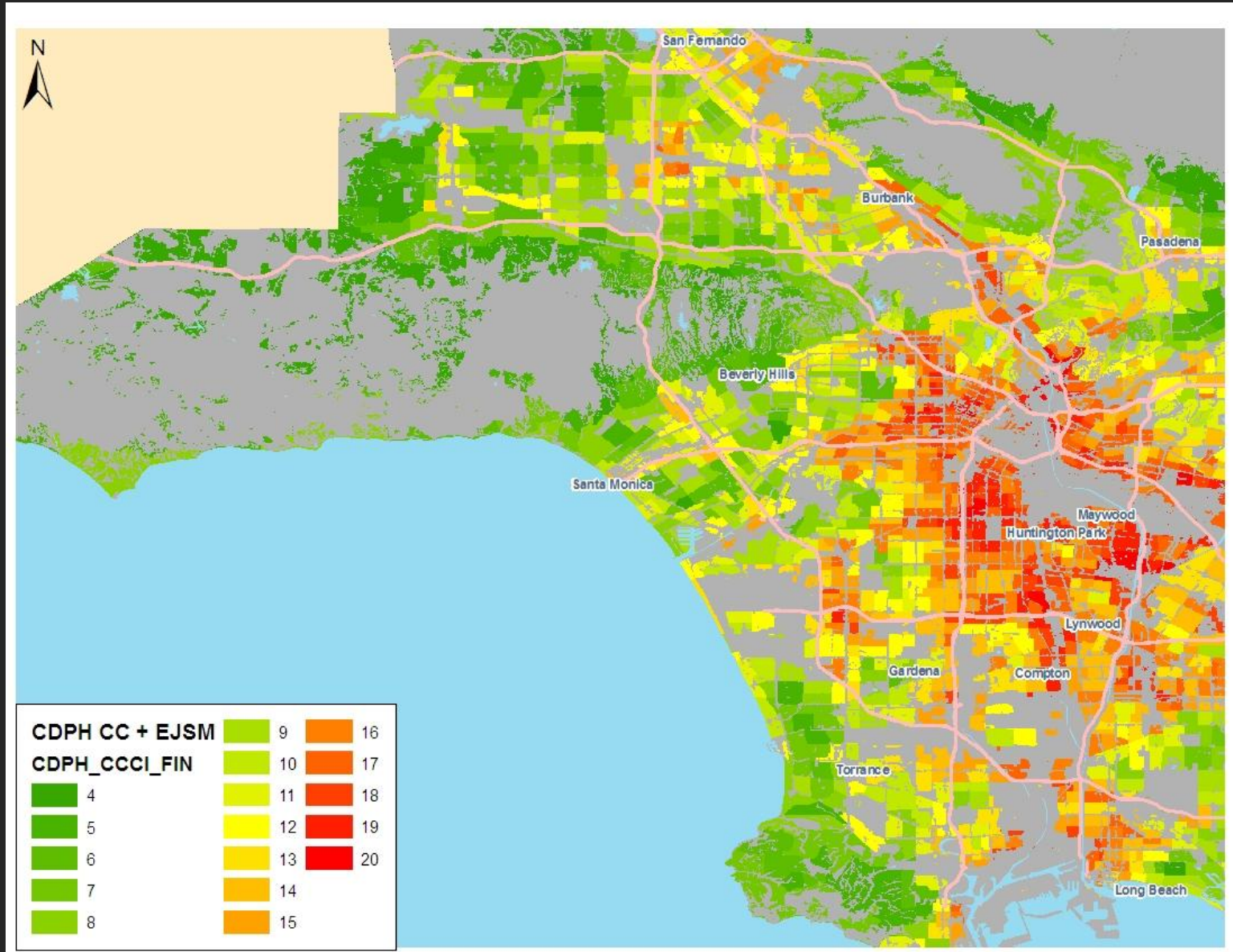
# Final CDPH Climate Scores

LA County (including residential & sensitive populations land use mask)



# Final CDPH Climate Scores + Cumulative Impacts Score

LA County (including residential & sensitive populations land use mask)



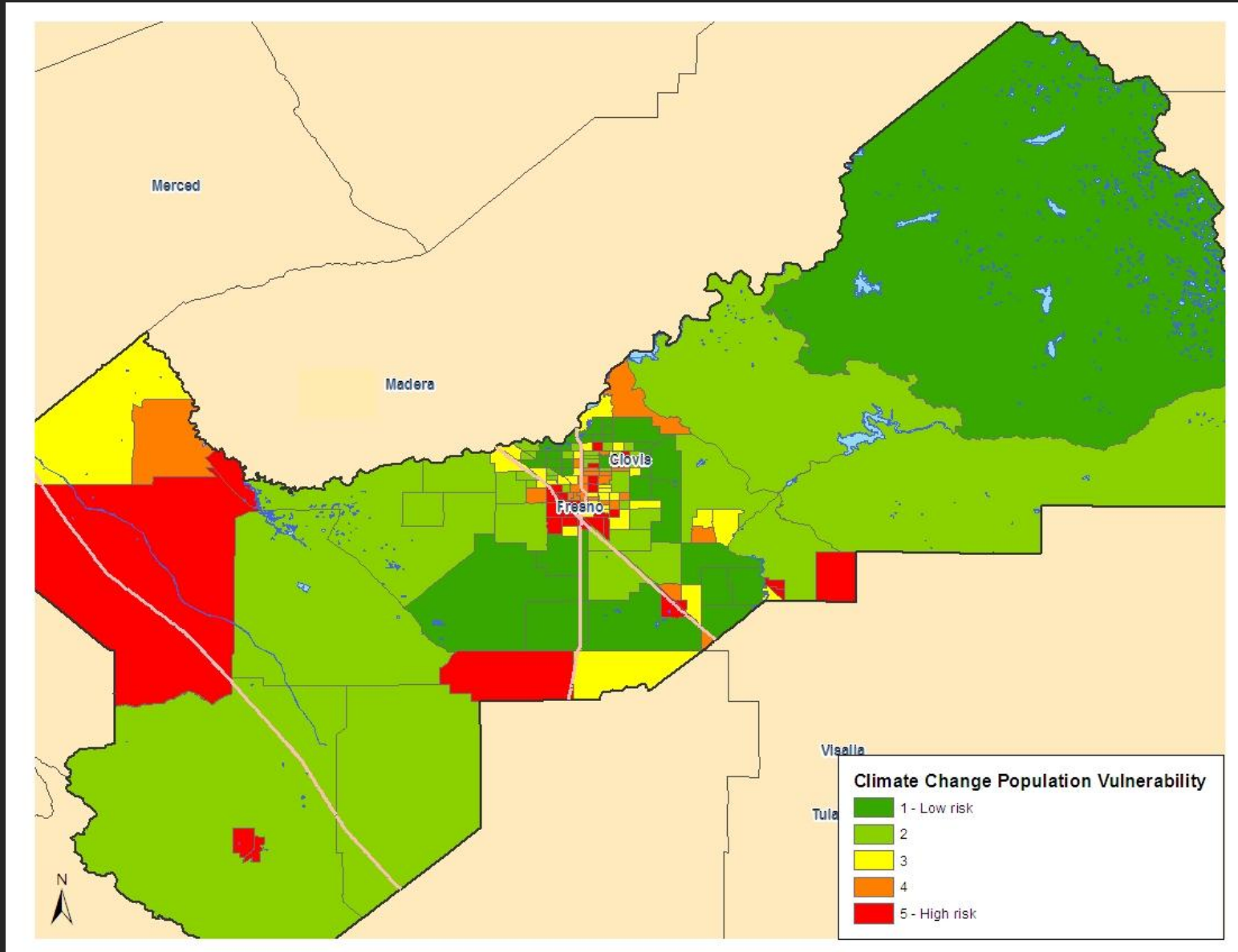
# Final Results Fresno County

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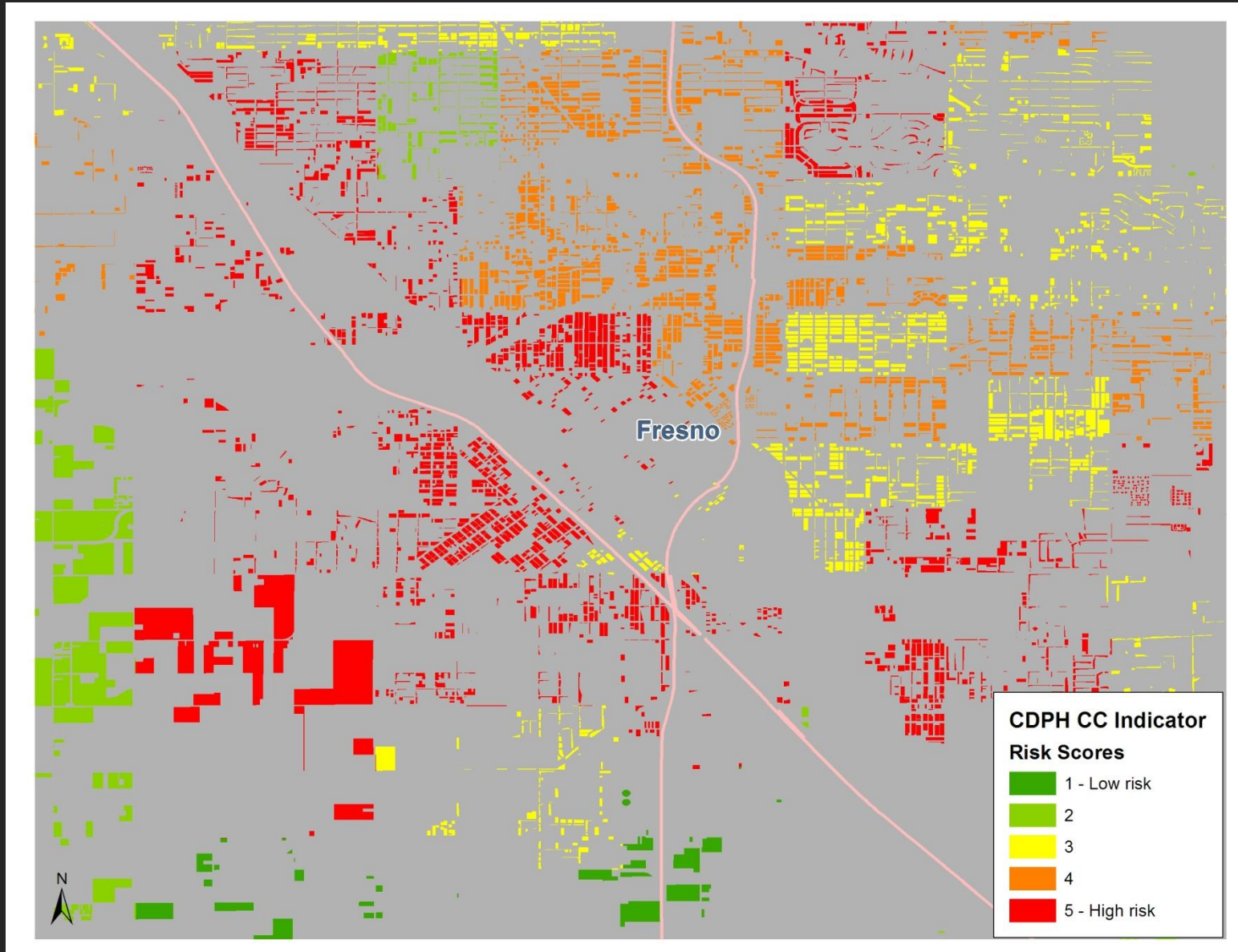
# Final CDPH Climate Scores

## Fresno County Climate Change Vulnerability



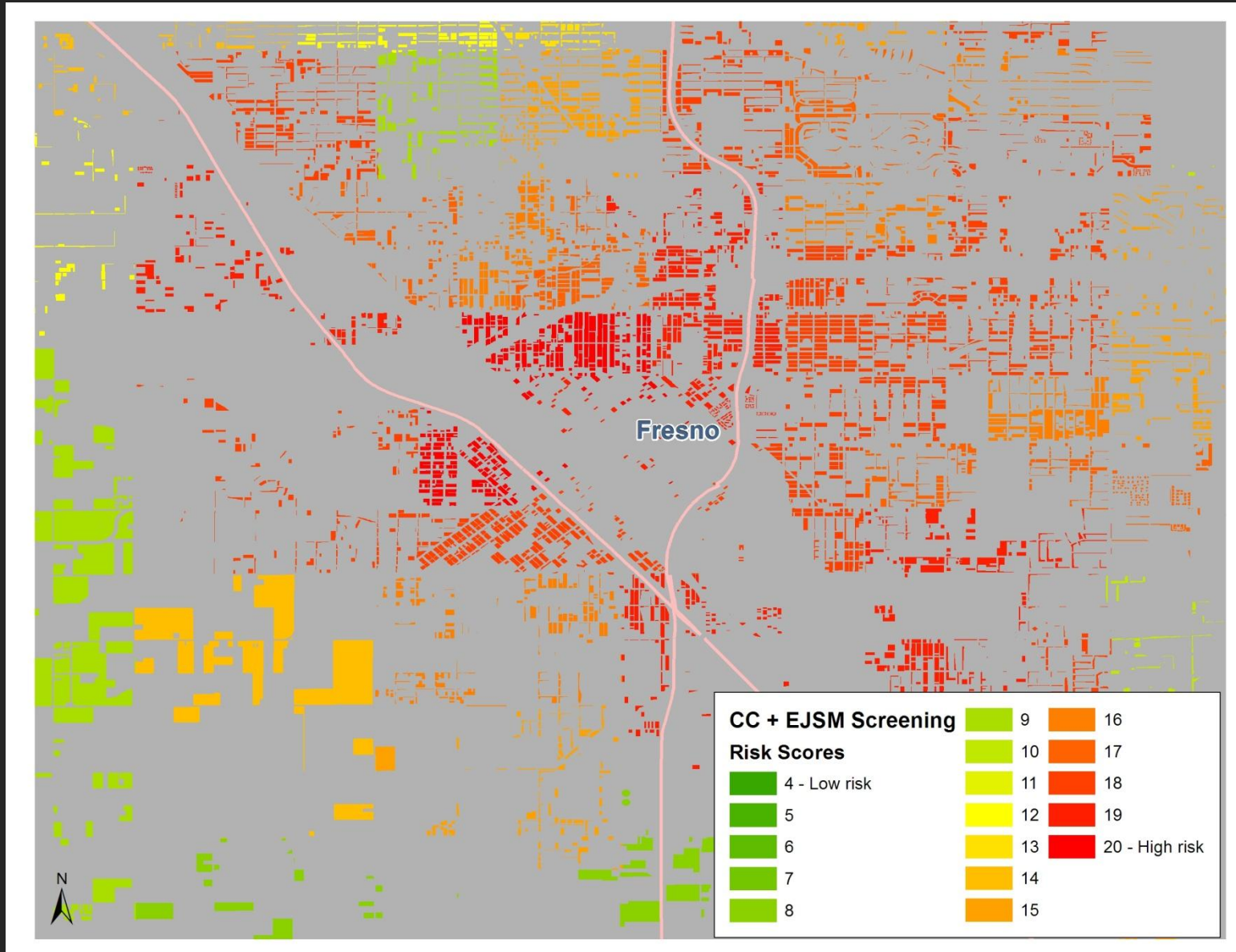
# Final CDPH Climate Scores

Fresno County (including residential & sensitive populations land use mask)



# Final CDPH Climate Scores + Cumulative Impacts Score

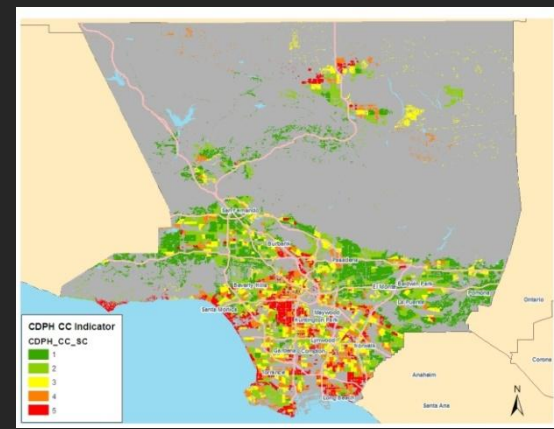
Fresno County (including residential & sensitive populations land use mask)



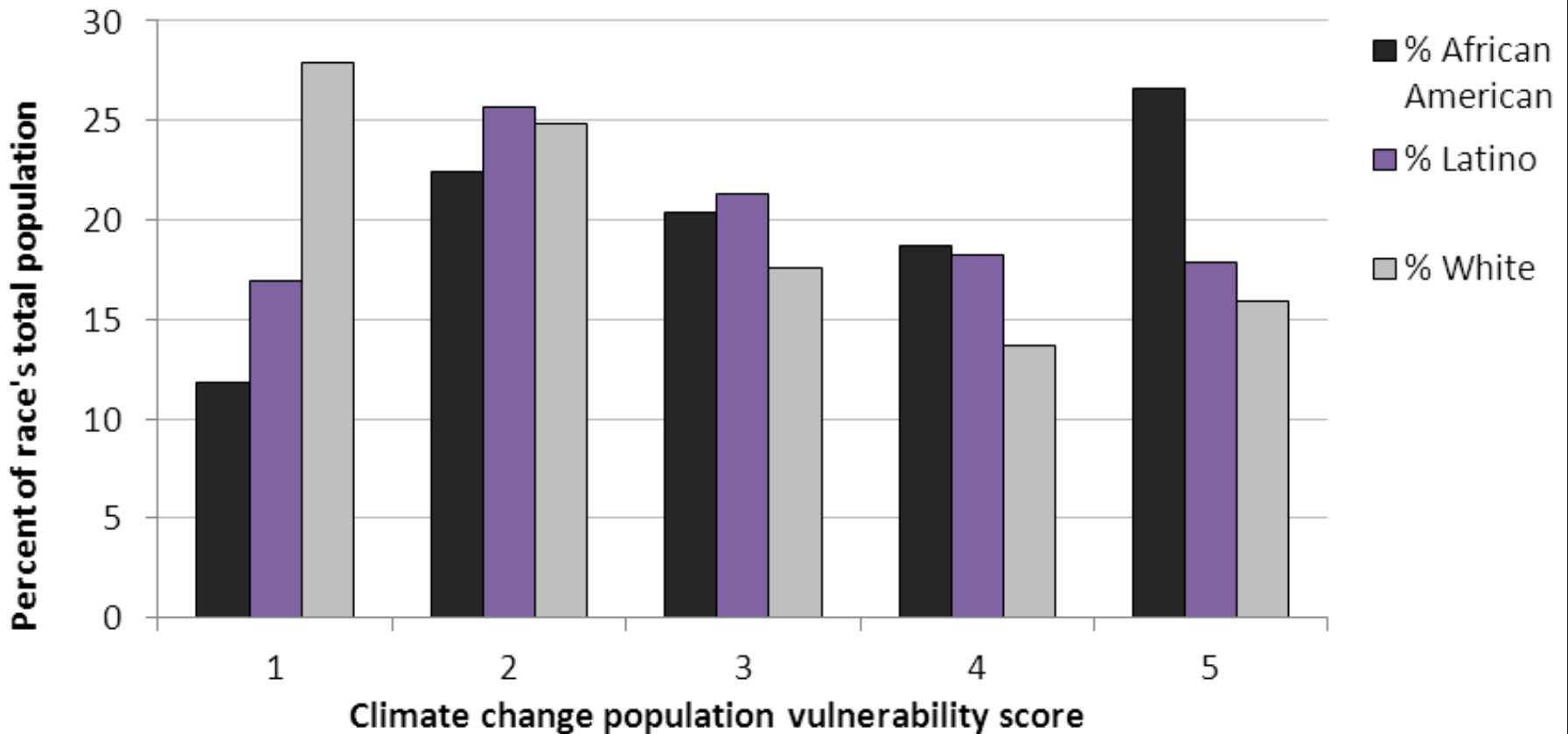
Who is most vulnerable to  
climate change?

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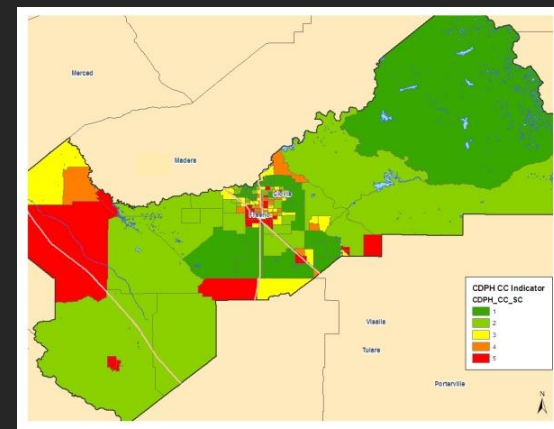
**46% of African Americans and 36% of Latinos reside in the two highest risk categories compared to 30% of whites**



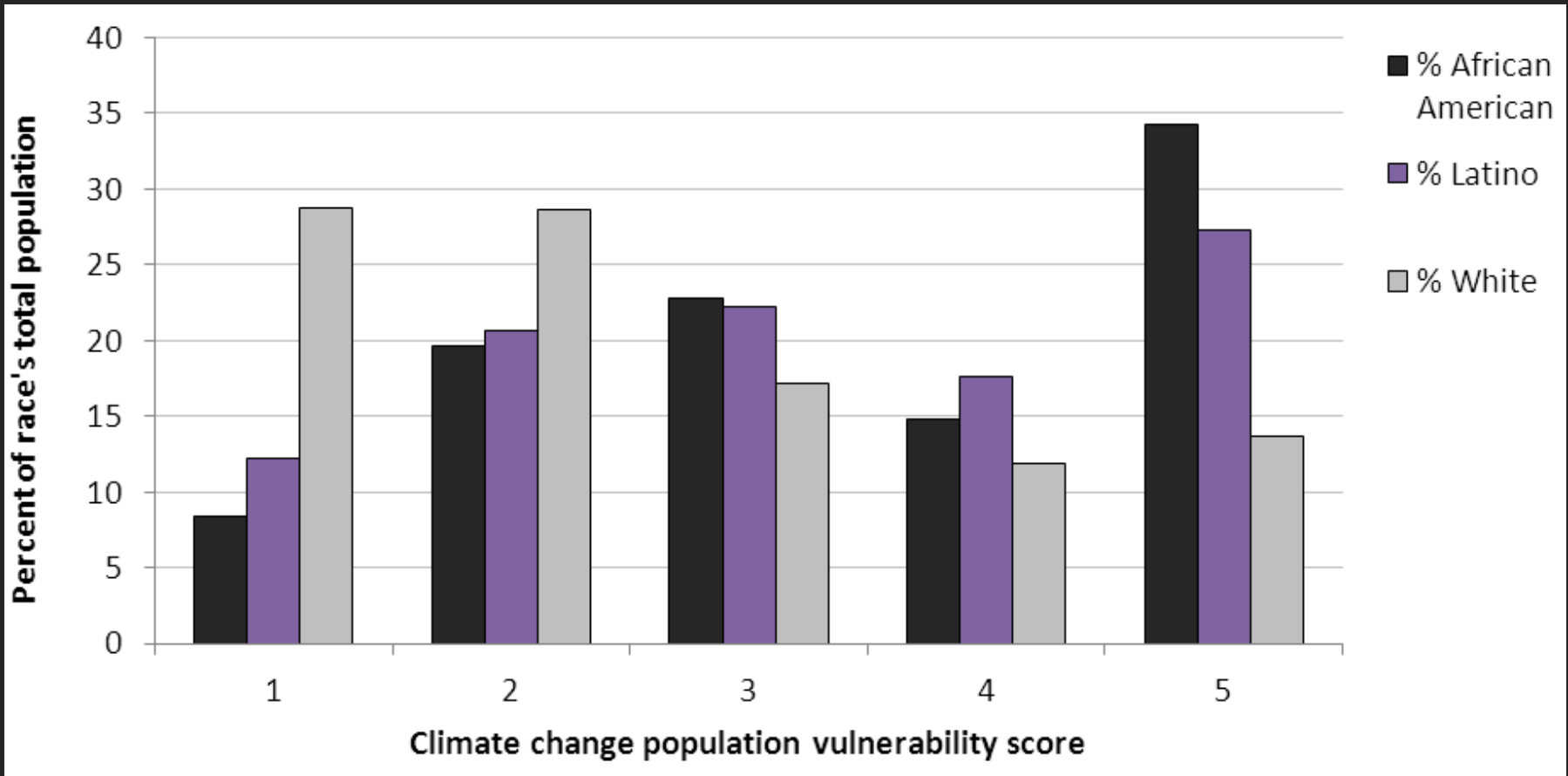
## Los Angeles County



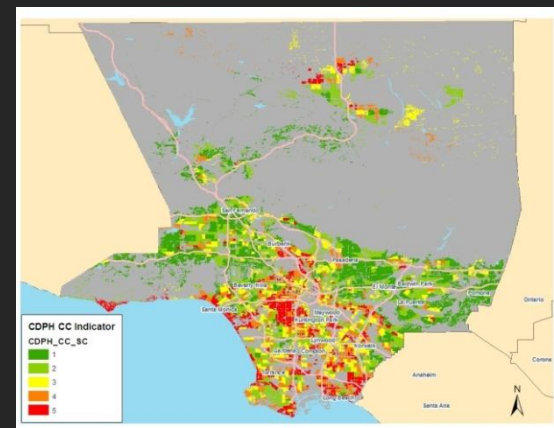
**49% of African Americans and 45% of Latinos reside in the two highest risk categories compared to 26% of whites**



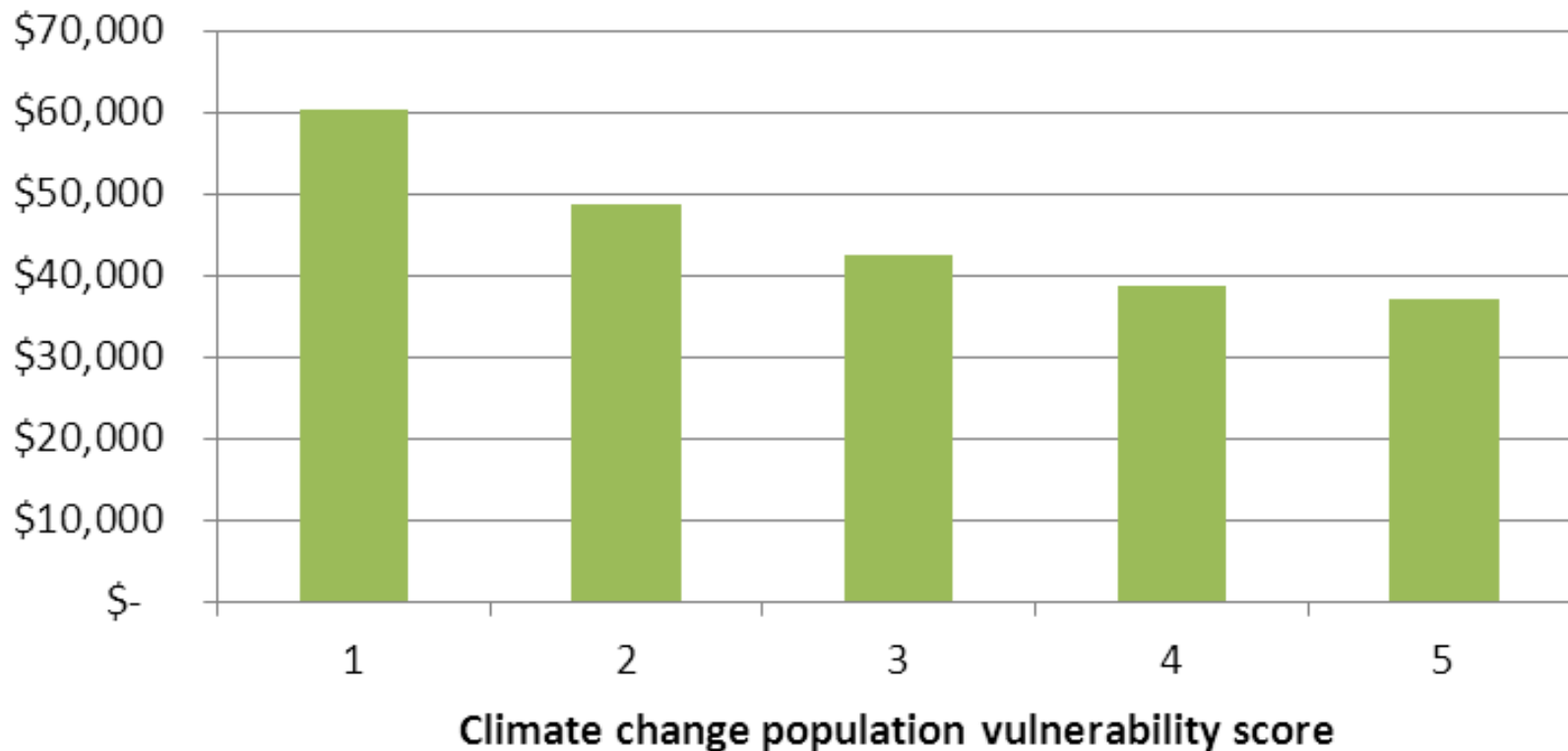
### Fresno County



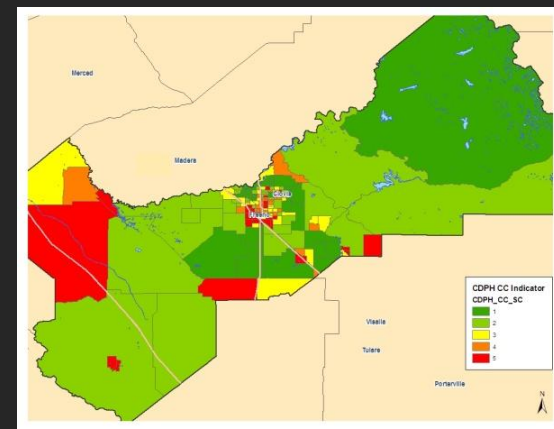
**In LA County, median income in the highest risk area is 40% lower than the lowest risk area**



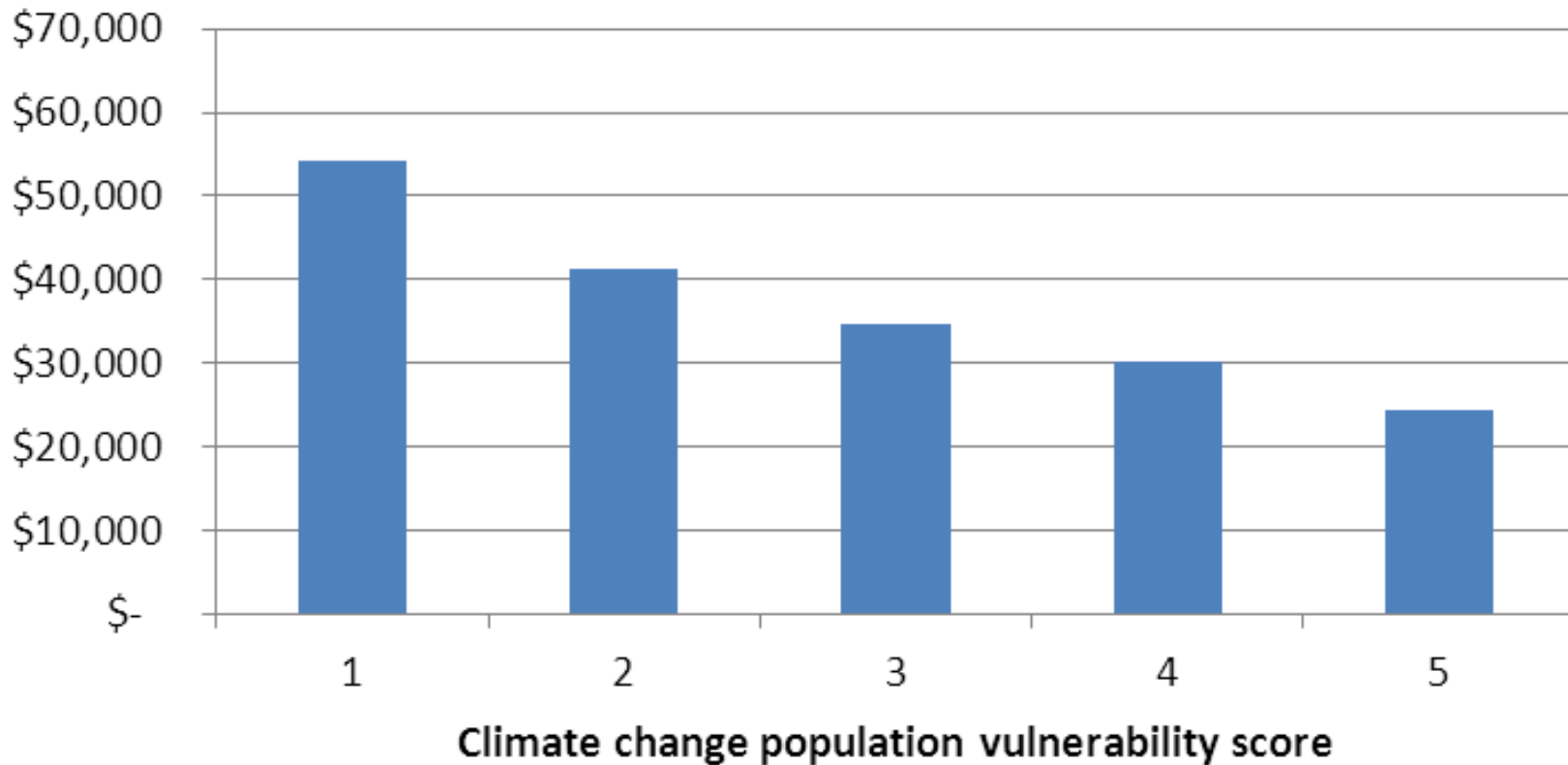
**LA County average median household income, 1999(\$), by climate change population vulnerability score**



**In Fresno County, median income in the highest risk area is 55% lower than the lowest risk area**



**Fresno County average median household income, 1999(\$), by climate change vulnerability score**





# Conclusions

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# Conclusions

- Screening tool is able to identify local communities at high risk for climate change impacts
- Climate change risks are not distributed equally across racial/ethnic and income groups
- Climate change poses additional risks to areas already affected by cumulative hazards

# Limitations

- Many of the measures we used were not adjusted for future climate change risks, such as wildfire and flooding risk. They only assess current existing conditions.
- Input from local health departments, community groups, planning groups, and other relevant stakeholders would help in reviewing and revising the screening tool.