Data Trends: A Closer Look

Using RSEI to Develop the Environmental Justice Screening Method

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USC PERE / CSII

Our mission is to conduct research and facilitate discussions on issues of environmental justice, regional equity, immigrant integration—and the social movements that drive them.

Our work is rooted in the three R's: Reach, Relevance, and Rigor

USC PERE / CSII

We seek direct collaborations with community-based organizations in research and other activities, trying to forge a new model of how university and community can work together for the common good.

ENVIRONMENTAL JUSTICE SCREENING METHOD

ADDRESSING ENVIRONMENTAL JUSTICE

EJ is expansive. After all, the environment is where we live work, play, and pray, and the issues range from transportation to land use and housing, from industrial pollution to rural hog farms—and more!

Two key ways to address EJ:

1. Measure it

2. Engage communities

ENVIRONMENTAL JUSTICE SCREENING METHOD

To measure EJ, we created the Environmental Justice Screening Method.

Central Question: Which communities disproportionately suffer from environmental and social stressors that are linked to environmental health disparities?

This is also known as the "cumulative impact" approach.

Principle Investigators: Rachel Morello-Frosch (UC Berkeley), Manuel Pastor (USC), and James Sadd (Occidental College)

EJSM DEVELOPMENT

EJSM was contracted by CA Air Resources Board and co-created with stakeholder input (scientific review committee, regulatory scientists from different agencies, decision makers, and community organizations):

- Helped identify indicators and priorities

- Participated in an iterative process of review and methodological improvements

- Engaged in "ground-truthing" interim results and government databases

EJSM OVERVIEW

- Scores areas where people live (land use)

- Screens for "cumulative impact" using a variety of indicators

- Initial analysis at the neighborhood level

- Scoring and mapping done at the census tract level

- Scores reflect a quintile distribution of indicators

- Statewide coverage, REGIONAL scoring

WHY REGIONS?

The regional scale is key:

- Each region has its own set of industries and pollution problems

- Transportation and land use issues are regional in scale

- Disparities often 'wash-out' at the national or even state levels – but are apparent at the regional level

EJSM: 4 CATEGORIES OF "CUMULATIVE IMPACT"

Proximity to hazards & sensitive land uses

- Point and area emissions sources
- Land uses associated with sensitive populations (CARB, 2005)

Health risk & exposure

- State and national data sources

Social & health vulnerability

- From epidemiological literature on social determinants of health
- American Community Survey/Census Data
- State and municipal data sources

Climate change vulnerability

- Based on climate change and health literature
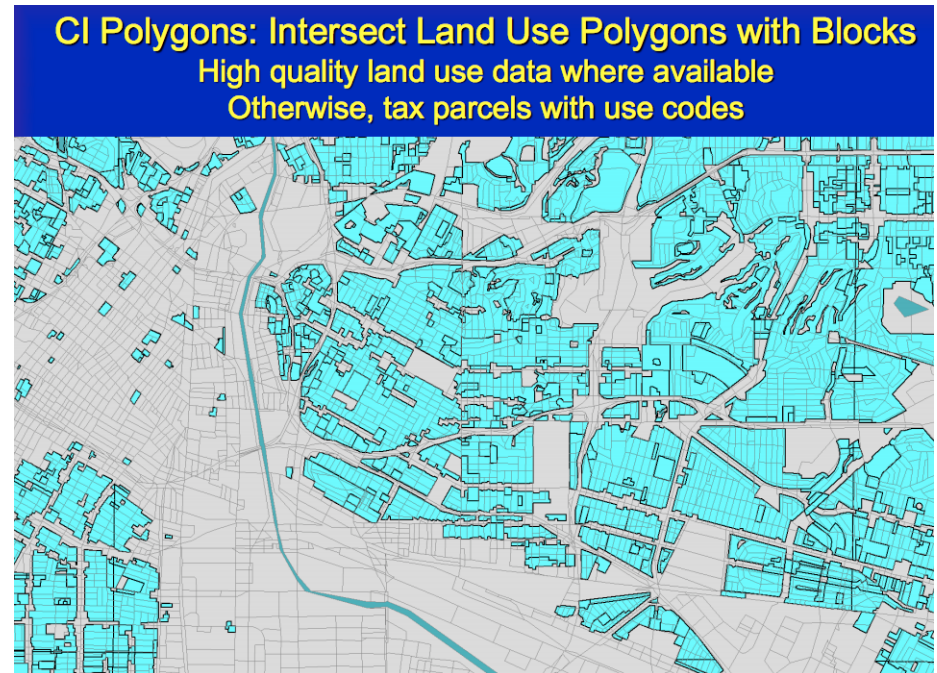- Heat islands, temperature trends, vulnerability/resilience

EJSM ARCHITECTURE

STEP 1: GIS Spatial Assessment (create CI poly layer [residential and sensitive land uses] with Census block info and calculate hazard proximity metrics)

STEP 2: SPSS Programming (data processing and generation of CI scores for tracts)

STEP 3: GIS Mapping of CI scores

CI Polygons: Intersect Land Use Polygons with Blocks
High quality land use data where available
Otherwise, tax parcels with use codes

EJSM Layer 1

Proximity to Hazards and Sensitive Land Uses

LAYER 1 – HAZARD PROXIMITY INDICATORS

"Facilities of interest" (FOI)
- Facilities reporting Greenhouse Gas emissions and toxic air pollution (about 3,000 facilities)

Industry-wide layers
- Autobody shops
- Gas stations

Land uses
- Rail
- Ports
- Airports
- Refineries
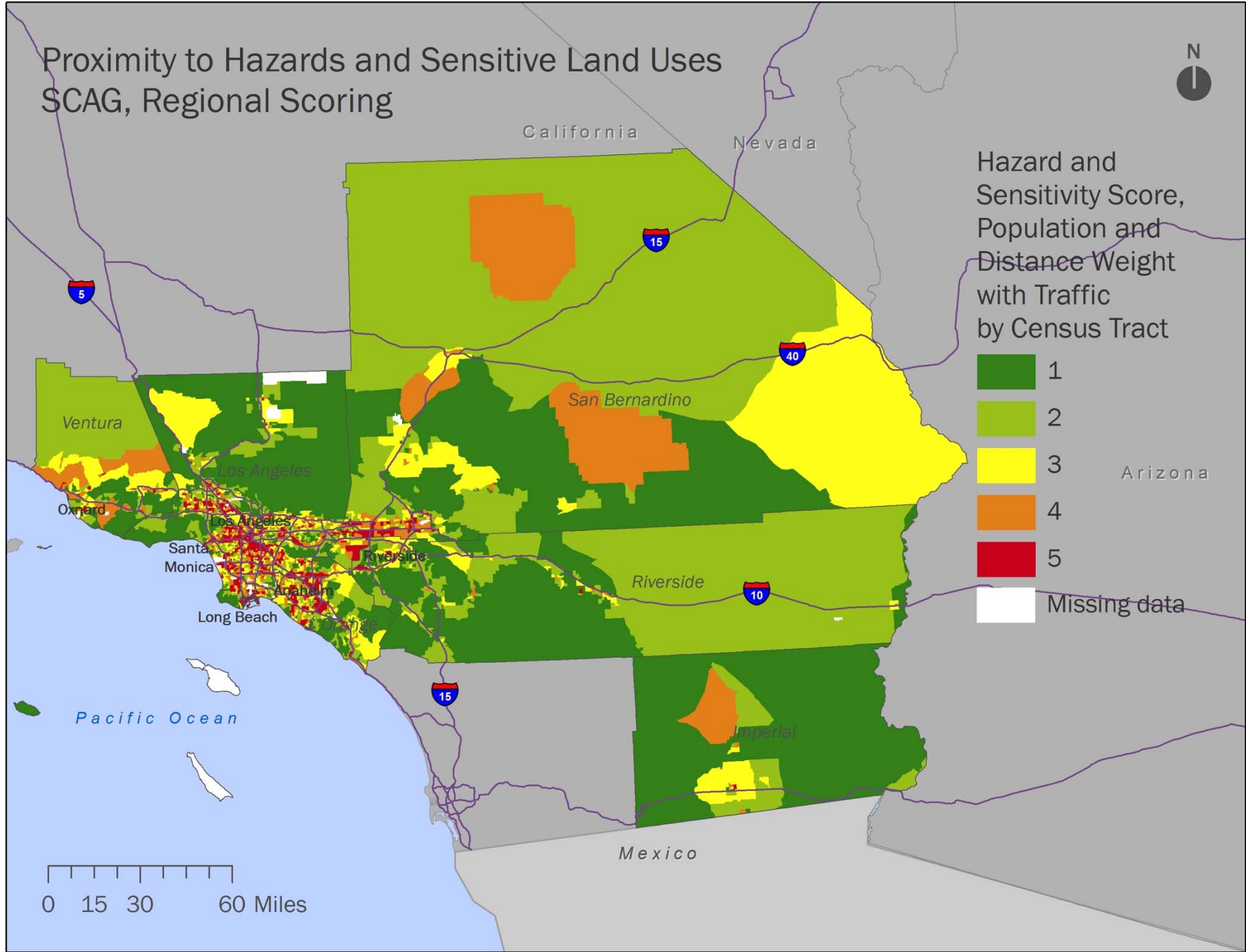- Intermodal distribution facilities
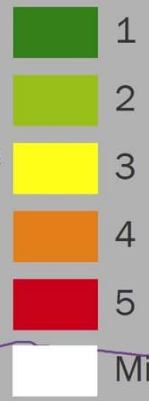- Traffic volume

Sensitive land uses
- Childcare facilities
- Hospitals
- Senior housing
- Schools
- Playgrounds and parks

Proximity to Hazards and Sensitive Land Uses
SCAG, Regional Scoring

Hazard and
Sensitivity Score,
Population and
Distance Weight
with Traffic
by Census Tract

1
2
3
4
5
Missing data

0   15   30   60 Miles

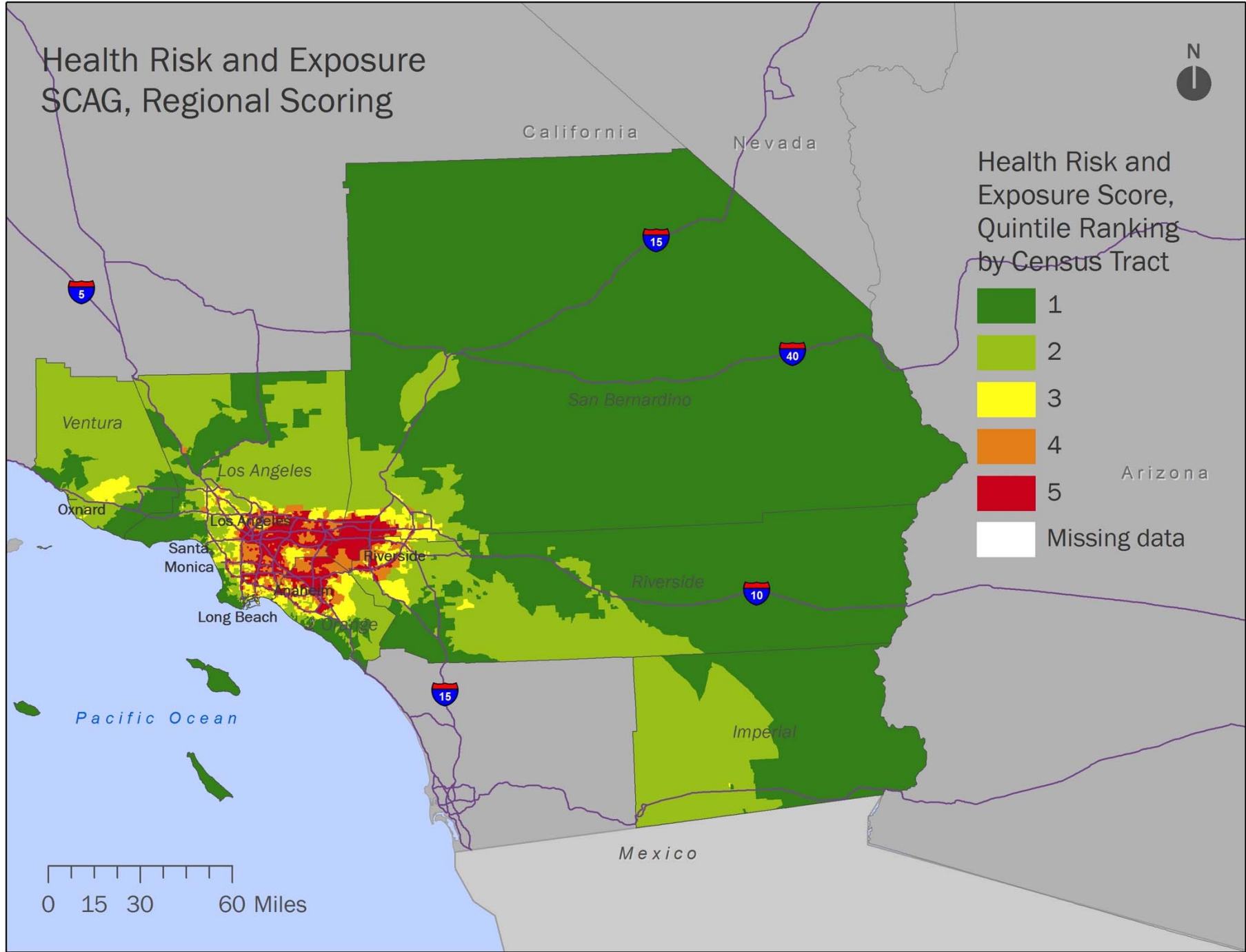# EJSM Layer 2

Health Risks and Exposure

LAYER 2 – HEALTH RISKS & EXPOSURE INDICATORS

- *RSEI (Risk Screening Environmental Indicators), 2007-2010 average toxic concentration hazard scores*

- $PM_{2.5}$ interpolated annual average concentration, 2009-2011

- Ozone concentration, 2009-2011

- NATA (National Air Toxics Assessment) respiratory hazard from mobile and stationary sources, 2005

- NATA inhalation cancer risk, 2005

Health Risk and Exposure
SCAG, Regional Scoring

California

Nevada

San Bernardino

Ventura

Los Angeles

Oxnard

Santa Monica

Los Angeles

Riverside

Long Beach

Anaheim

Orange

Riverside

Arizona

Imperial

Pacific Ocean

Mexico

Health Risk and Exposure Score, Quintile Ranking by Census Tract

- 1
- 2
- 3
- 4
- 5
- Missing data

N

0   15   30   60 Miles

EJSM Layer 3

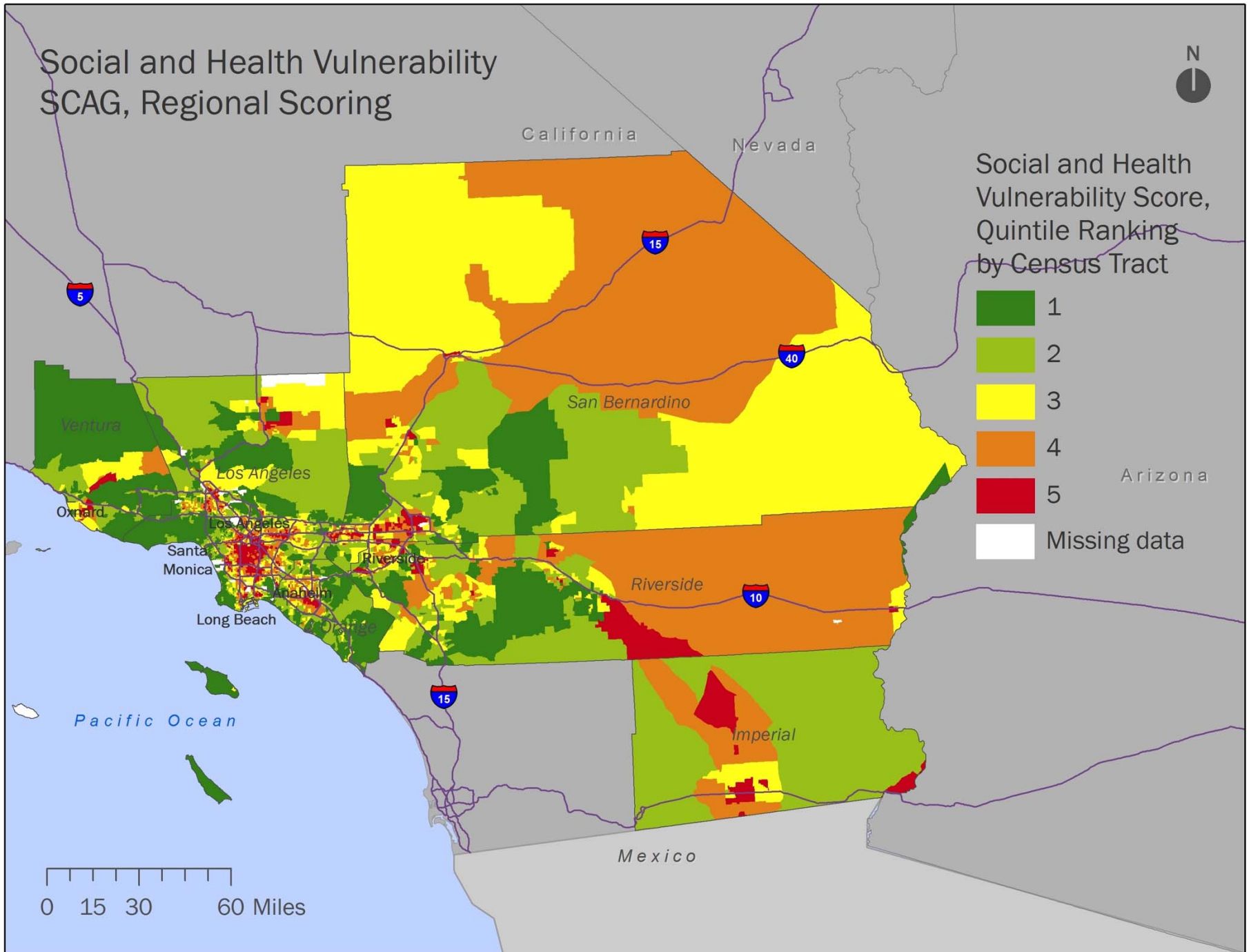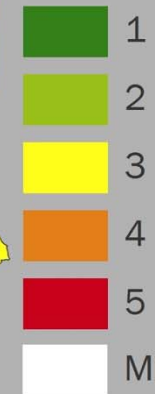## Social and Health Vulnerability

LAYER 3 – SOCIAL VULNERABILITY

Socio-economic vulnerability
- % residents of color
- % residents below twice national poverty level
- % renter
- Median housing value
- % population >24 with less than a high school education

Biological vulnerability
- % <5 years old and % >60 years old
- % pre-term of SGA infants, 2001 – 2006

Political vulnerability
- % >4 in HH where no one >15 speaks English well
- % votes cast among all registered voters averaged for 2004, 2006, 2008, 2010 general elections

... mostly from 2008-2012 American Community Survey data

Social and Health Vulnerability
SCAG, Regional Scoring

Social and Health
Vulnerability Score,
Quintile Ranking
by Census Tract

1
2
3
4
5
Missing data

California
Nevada
Arizona
San Bernardino
Ventura
Los Angeles
Oxnard
Santa Monica
Los Angeles
Anaheim
Long Beach
Orange
Riverside
Riverside
Imperial
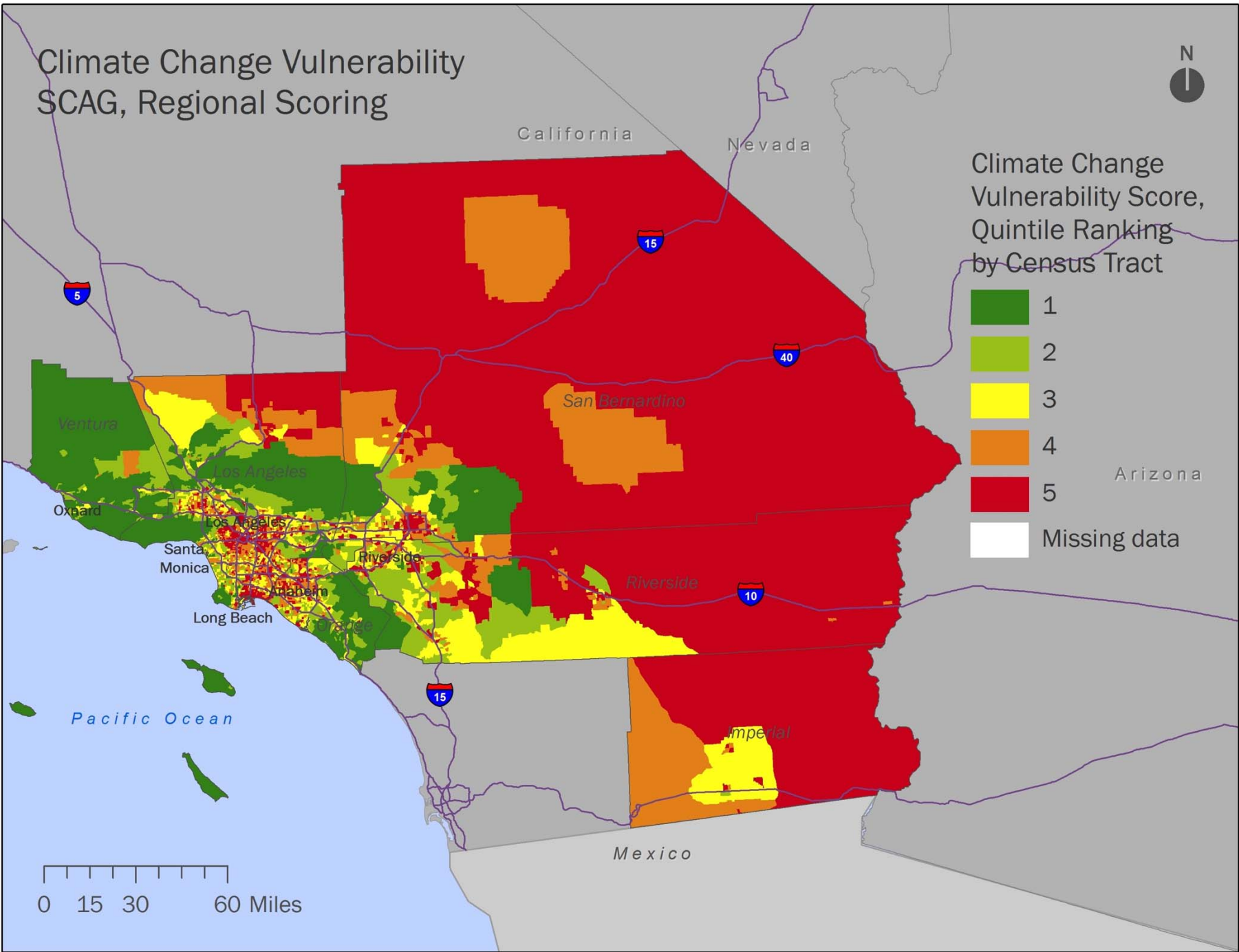Pacific Ocean
Mexico

N

0   15   30   60 Miles

EJSM Layer 4

Climate Change Vulnerability

LAYER 4 – CLIMATE CHANGE VULNERABILITY INDICATORS

Heat Island Risk
- % tree canopy, National Land Cover Data (NLCD), 2001
- % impervious surface, NLCD, 2001

Temperature
- Projected max monthly temperature
- Change in projected max monthly temperature
- Change in degree-days of warm nights

Mobility / social isolation
- % elderly living alone
- % car ownership

Climate Change Vulnerability
SCAG, Regional Scoring

California

Nevada

Arizona

San Bernardino

Ventura

Los Angeles

Oxnard

Santa Monica

Anaheim

Long Beach

Orange

Riverside

Riverside

Imperial

Pacific Ocean

Mexico

Climate Change Vulnerability Score, Quintile Ranking by Census Tract

- 1
- 2
- 3
- 4
- 5
- Missing data

0   15   30   60 Miles
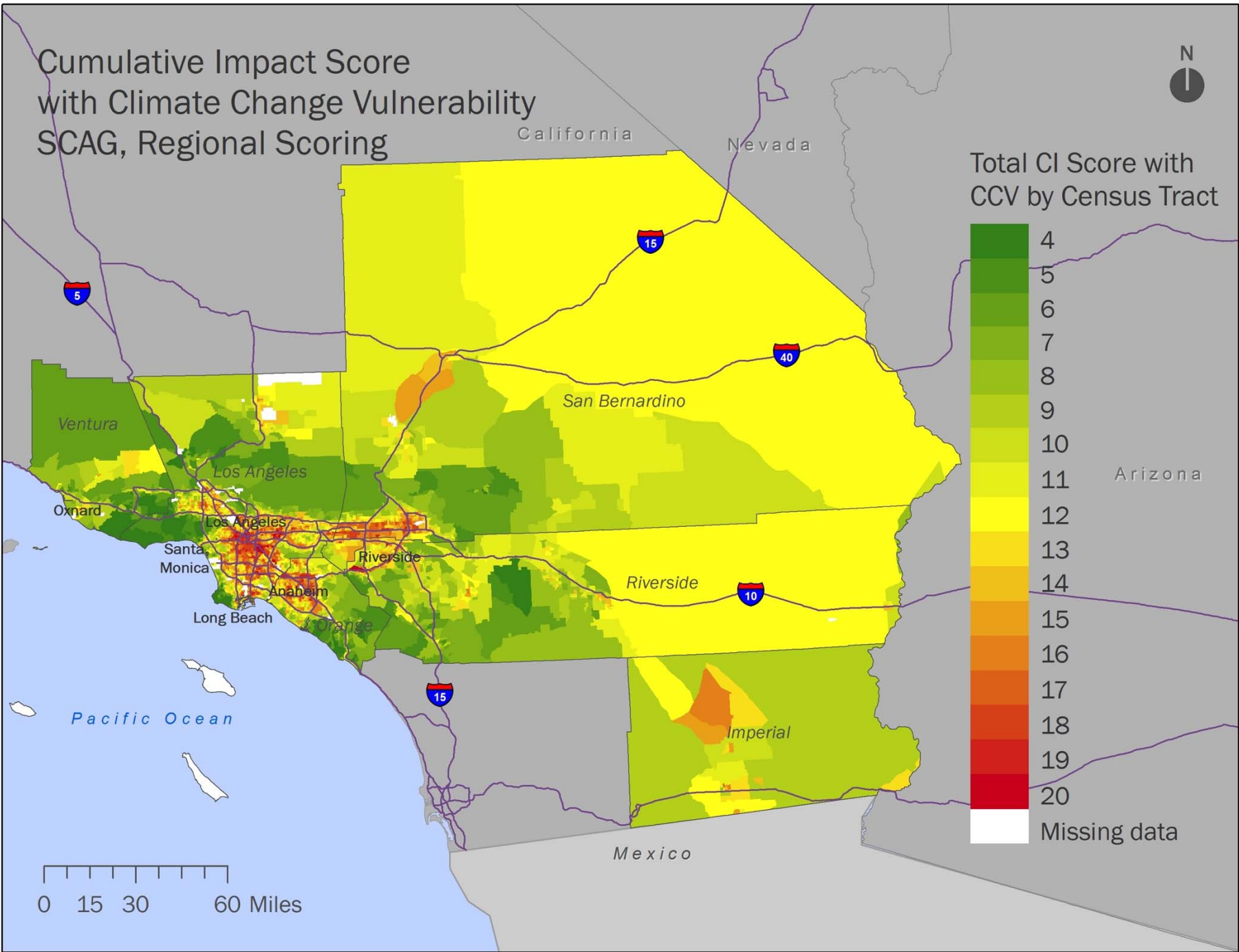
Combining EJSM Layers…

Cumulative Impact Score

CUMULATIVE IMPACT SCORE
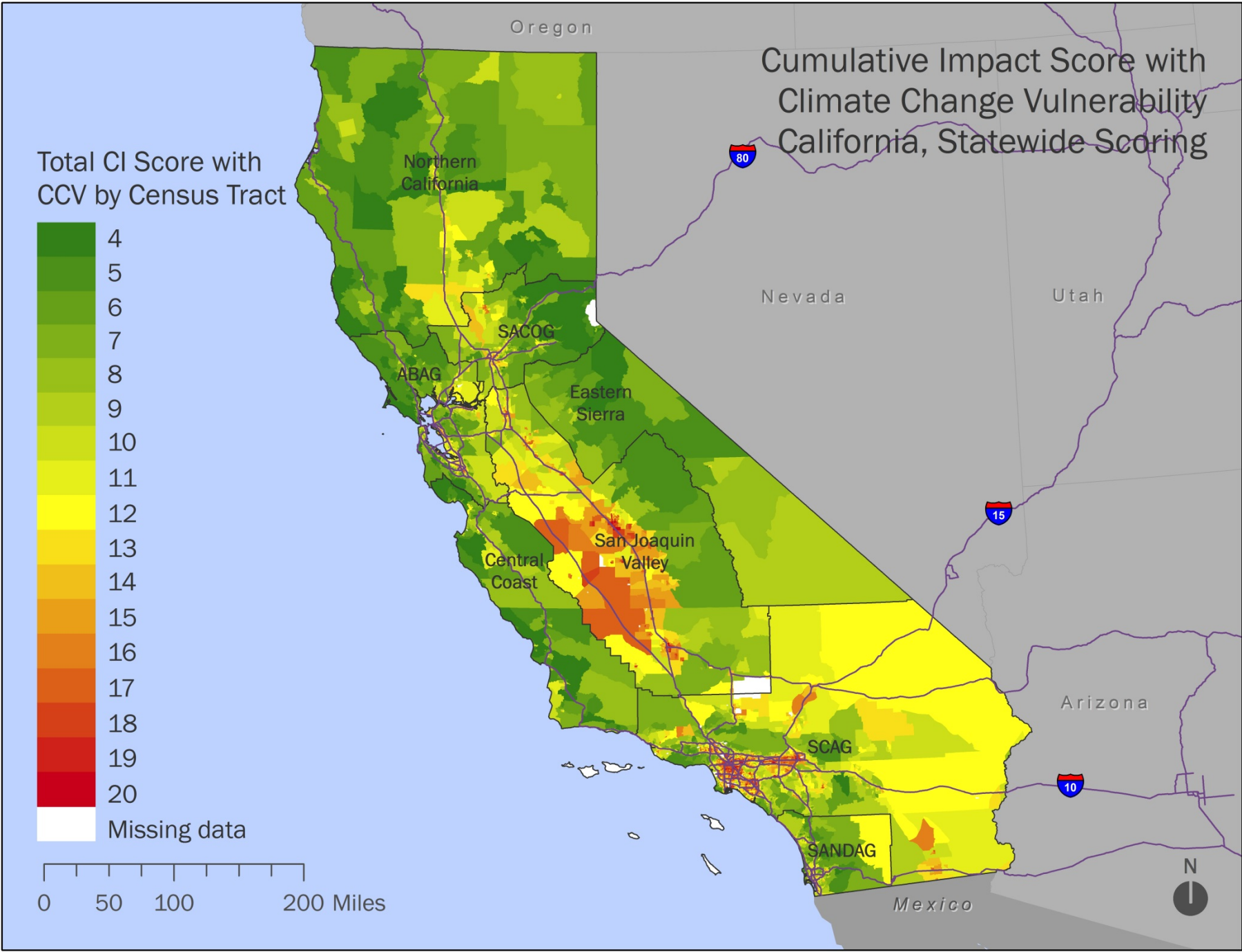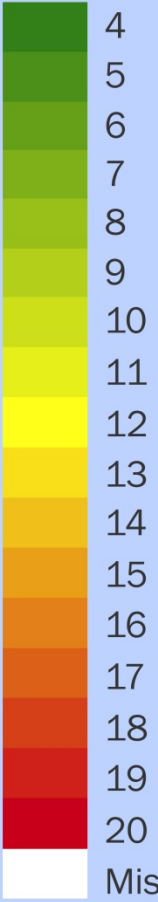
Cumulative Impact Score =

Hazard Proximity and Sensitive Land Use Score (1 through 5) +

Health Risk and Exposure Score (1 through 5) +

Social and Health Vulnerability Score (1 through 5) +

Climate Change Vulnerability Score (1 through 5)

Cumulative Impact Score
with Climate Change Vulnerability
SCAG, Regional Scoring

Total CI Score with
CCV by Census Tract

4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

Missing data

California   Nevada

Ventura

Los Angeles

Oxnard

Santa
Monica

Anaheim

Long Beach   Orange

San Bernardino

Riverside

Riverside

Arizona

Imperial

Pacific Ocean

Mexico

0   15   30   60 Miles

Cumulative Impact Score with Climate Change Vulnerability California, Statewide Scoring

Total CI Score with CCV by Census Tract

- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- Missing data

0   50   100   200 Miles

Oregon

Nevada

Utah

Arizona

Mexico

Northern California

SACOG

ABAG

Eastern Sierra

San Joaquin Valley

Central Coast

SCAG

SANDAG

N

Applications

Environmental Justice Screening Method

STATEWIDE: CALENVIROSCREEN 2.0
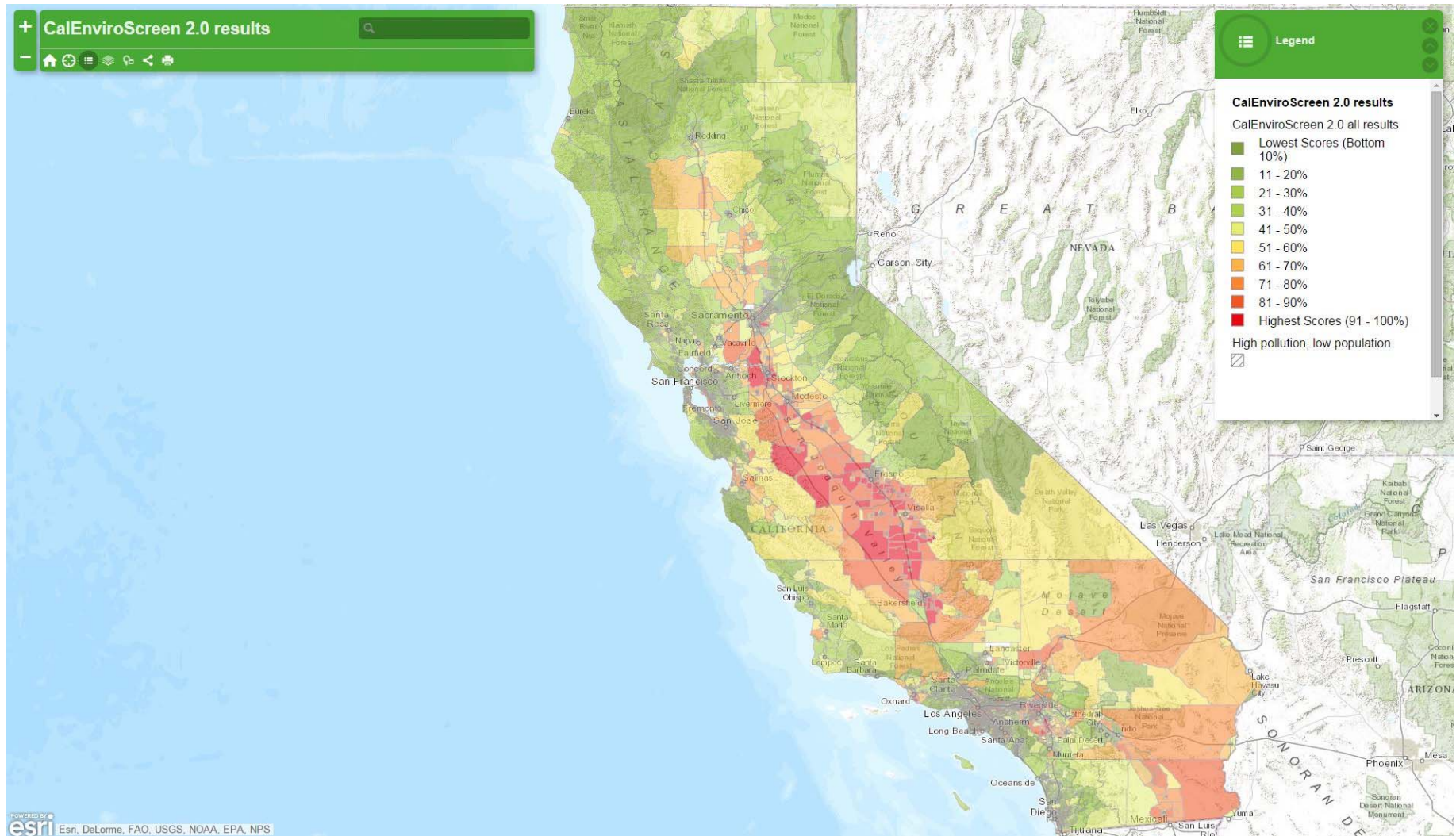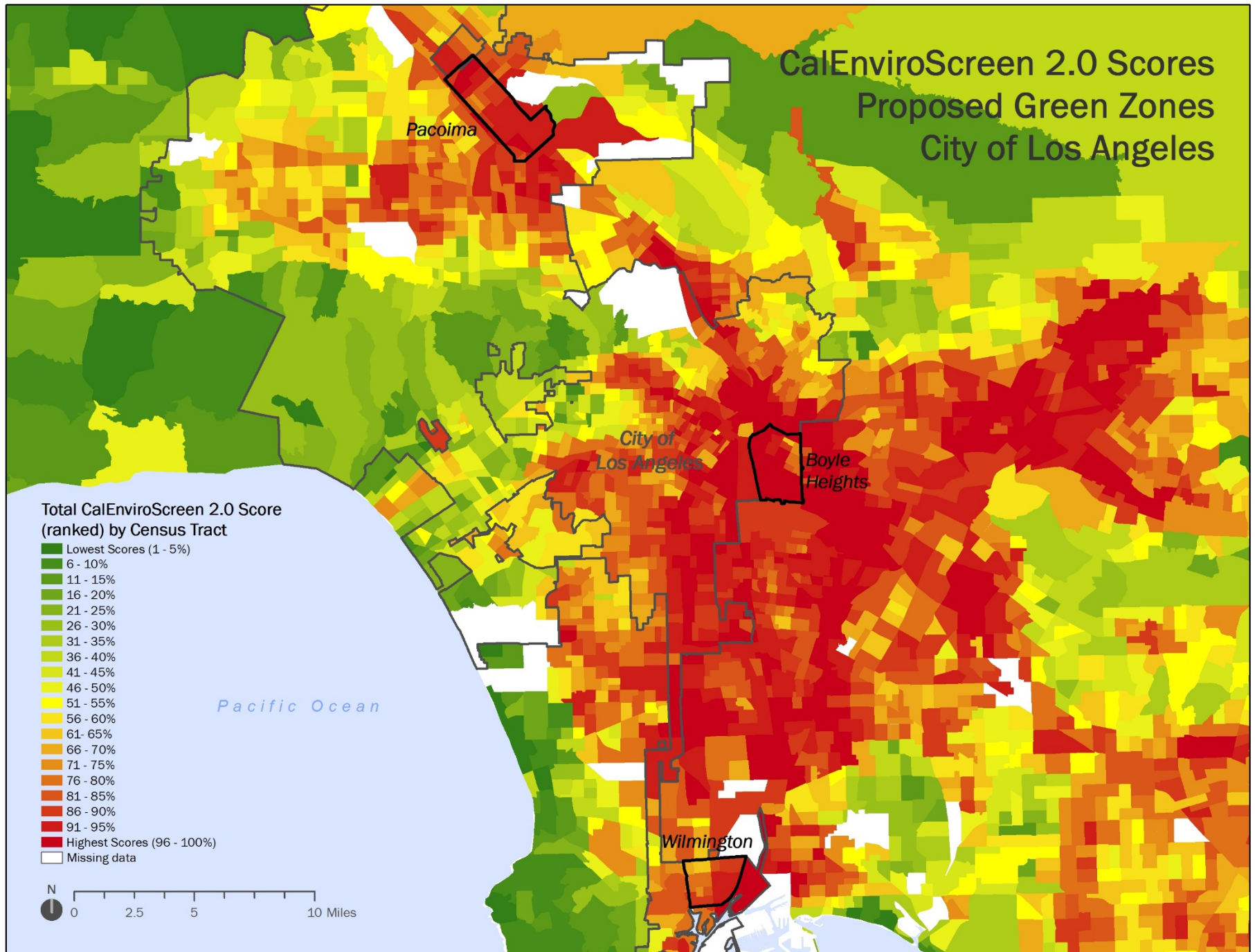

Explore CalEnviroScreen 2.0 HERE

LOCAL: CLEAN UP, GREEN UP CAMPAIGN

"Clean Up, Green UP" campaign in Los Angeles

- Campaign aims to provide special assistance to prevent new siting while also helping businesses convert to safer, cleaner processes

- EJSM helped identify environmentally overburdened and socially vulnerable communities

- Researchers have also trained and collaborated with community on data gathering, analysis, and presentation

CalEnviroScreen 2.0 Scores
Proposed Green Zones
City of Los Angeles

Pacoima

City of
Los Angeles

Boyle
Heights

**Total CalEnviroScreen 2.0 Score
(ranked) by Census Tract**

Lowest Scores (1 - 5%)
6 - 10%
11 - 15%
16 - 20%
21 - 25%
26 - 30%
31 - 35%
36 - 40%
41 - 45%
46 - 50%
51 - 55%
56 - 60%
61- 65%
66 - 70%
71 - 75%
76 - 80%
81 - 85%
86 - 90%
91 - 95%
Highest Scores (96 - 100%)
Missing data

Pacific Ocean

Wilmington

N

0   2.5   5   10 Miles

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