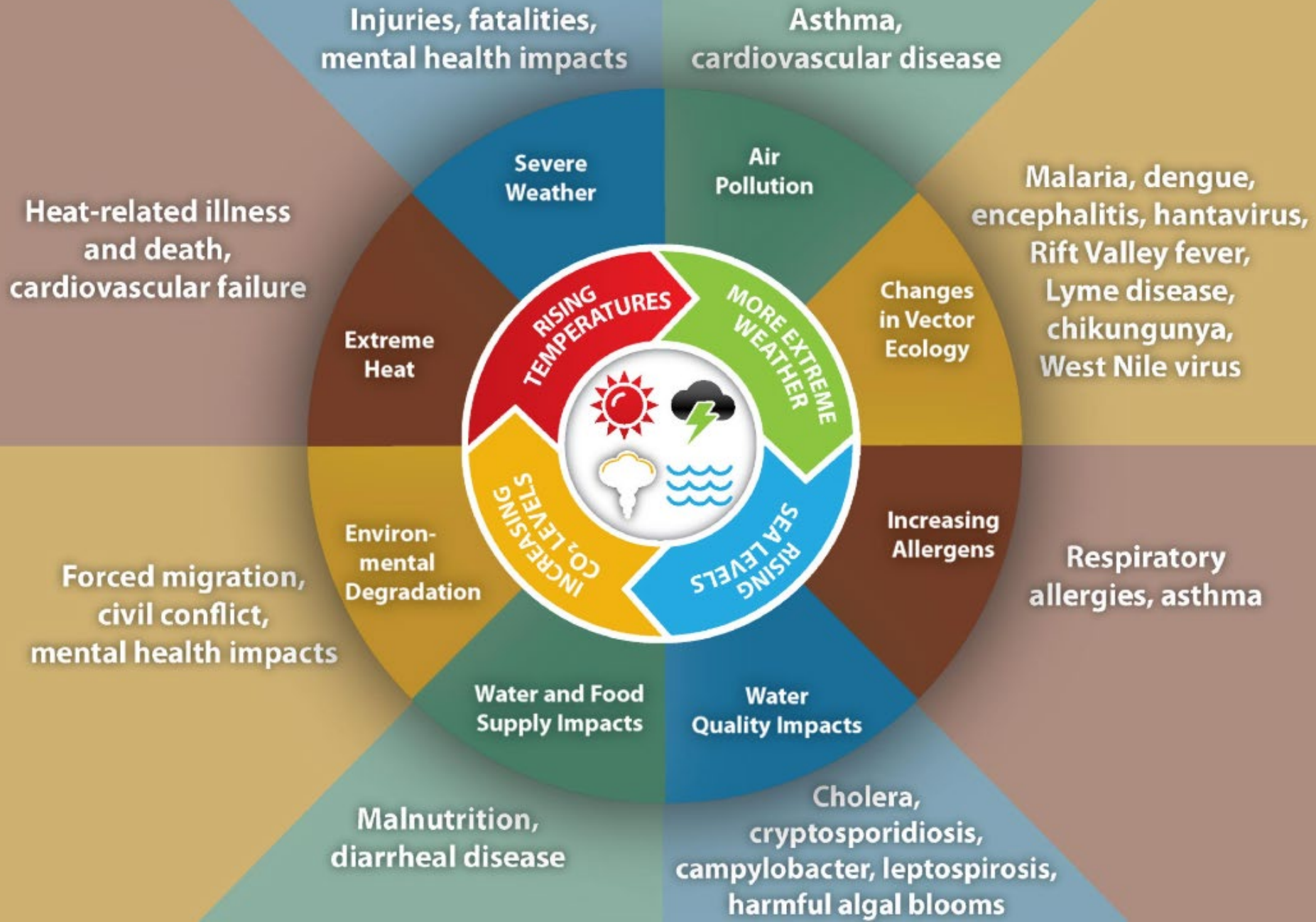


**CLIMATE CHANGE
HEALTH EFFECTS**



Impact of Climate Change on Human Health



CLIMATE CHANGE

- WARMING TEMPERATURES
- WILDFIRES
- CHANGING PRECIPITATION
- STRONGER STORMS

HAZARD

- EXTREME HEAT
- FIRE AND SMOKE
- EXTREME WEATHER EVENTS

HEALTH OUTCOME

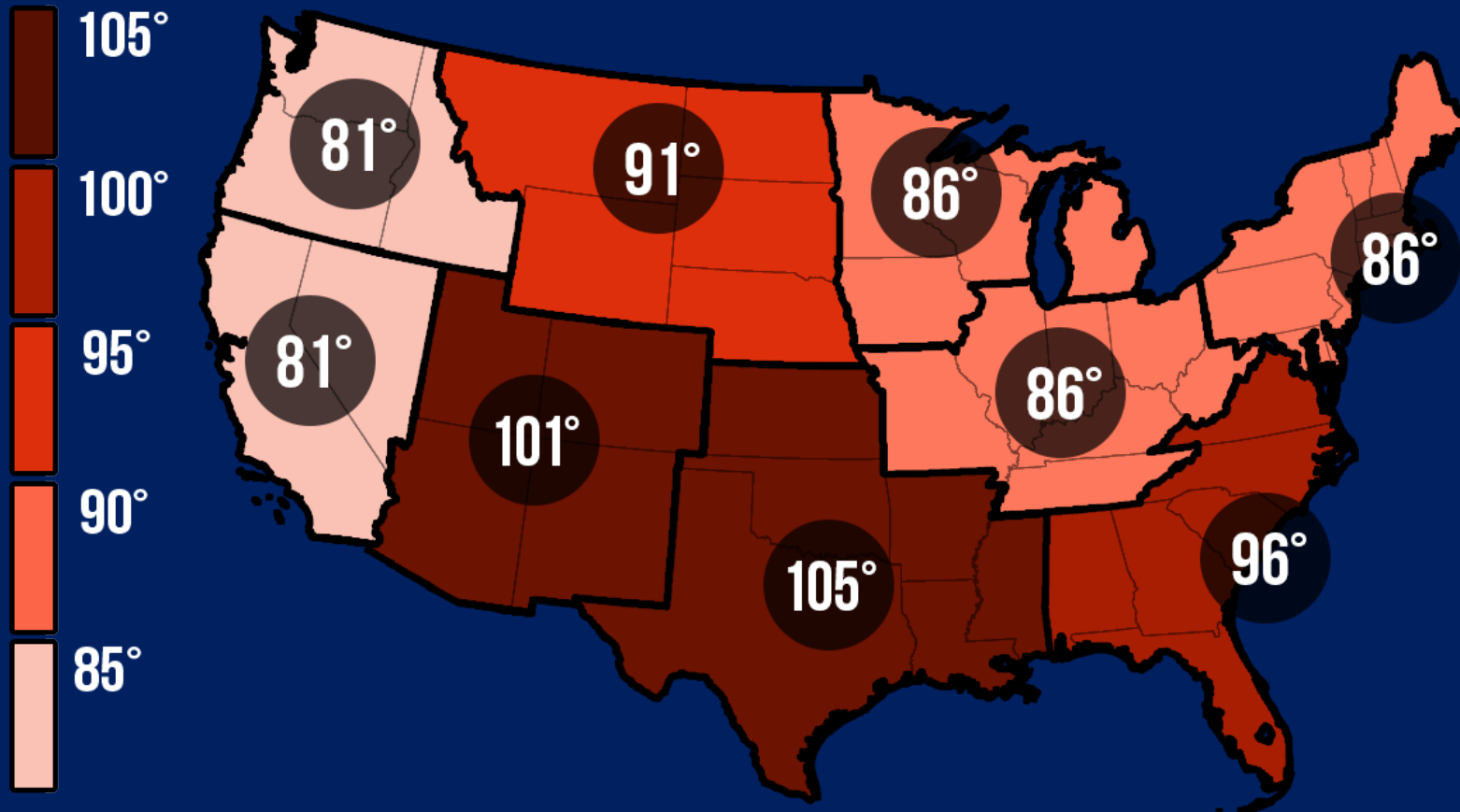
- HEAT STRESS
- VECTOR BORNE ILLNESS
- ALLERGIES & ASTHMA
- INJURY
- DISPLACEMENT
- MENTAL ILLNESS

HEAT STRESS

- Extreme heat is conclusively linked with increased risk of illness and death
 - The elderly, young children, and pregnant women
- Analysis of hospital admissions and ER-visits on hot days has found increase in
 - Heat stroke
 - Cardiovascular and respiratory complications
 - Renal failure
 - Electrolyte imbalance
 - Kidney stones
 - Fetal stress and preterm birth

HEAT & HOSPITALIZATIONS

REGIONAL HEAT INDEX RANGE FOR PEAK HOSPITALIZATIONS



Source: Vaidyanathan, et. al (2019) DOI: 10.1073/pnas.1806393116

CLIMATE  CENTRAL

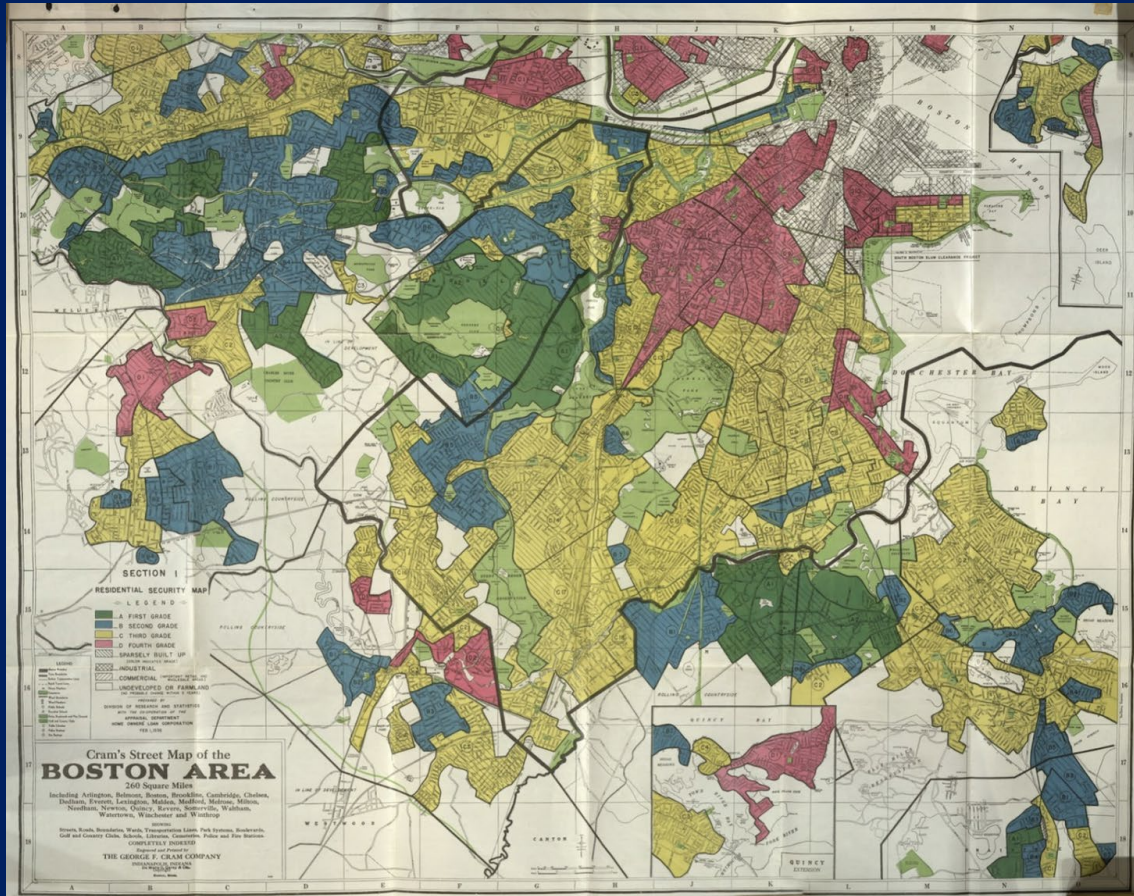
HEALTH EQUITY

Communities of color hit hardest by heat waves

Like COVID-19, severe heat waves are not an equal opportunity health threat. The most disinvested neighborhoods — those dominated by buildings, pavement, and parking lots — are hit the hardest.

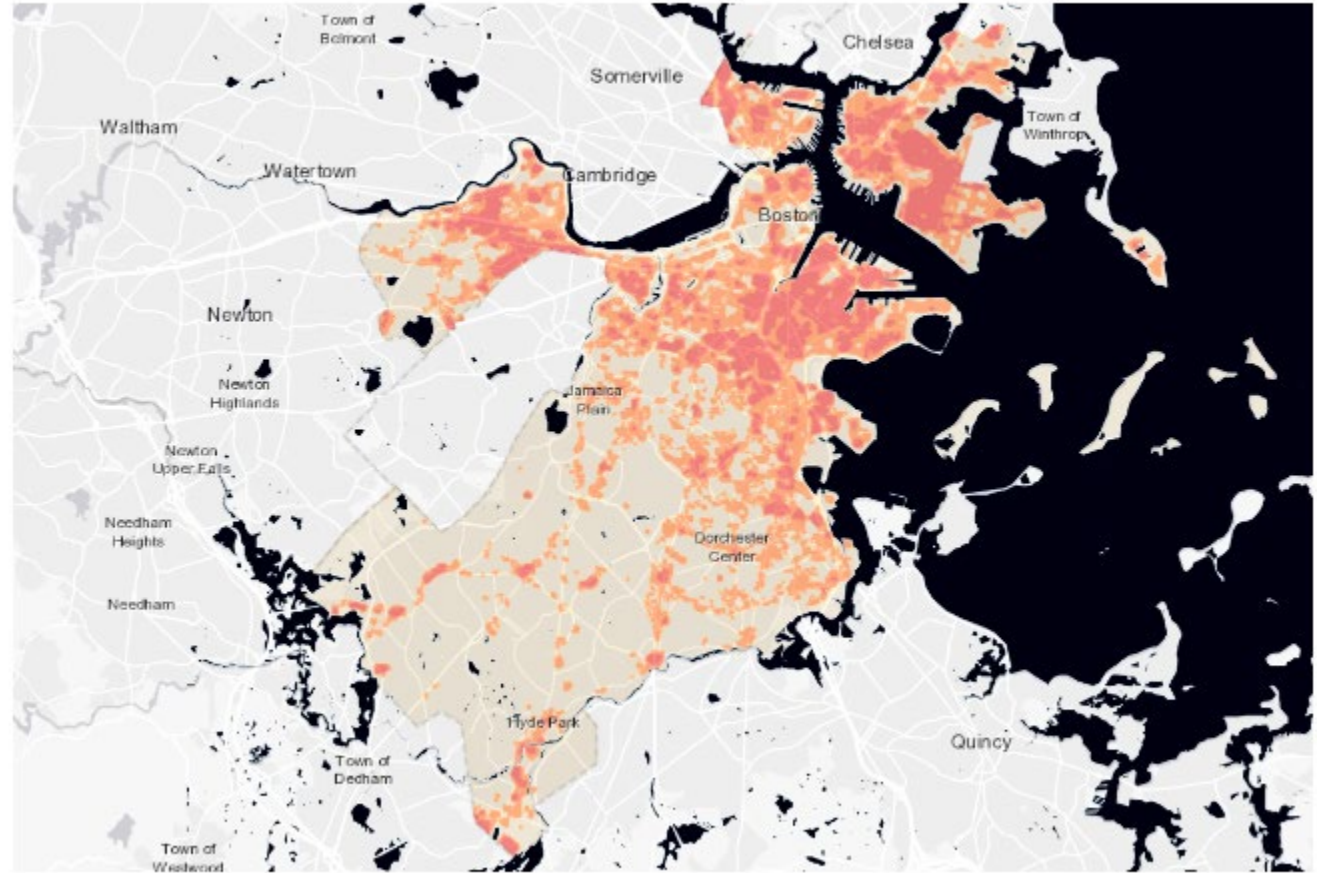
By Reann Gibson Updated July 14, 2020, 3:00 a.m.





Heat: Daytime land surface temp

Extreme heat due to rising temperatures and the urban heat island effect.



Source: Climate ready Boston

VECTOR BORNE ILLNESS

- Diseases transmitted to humans through insect bites (or rodents, parasites, etc.)
 - Lyme disease, EEE, West Nile, Zika
- Rising temperatures increase the length of mosquito/tick season
- Increased rainfall makes for a more viable mosquito environment
- This means that the geographic areas where vectors can thrive are expanding

TICKS ON THE MARCH

Projections in Deer Tick Habitat

Source: Brownstein, J.S., T.R. Hurling, and D. Foltz, 2005. Effect of climate change on Lyme disease risk in North America.



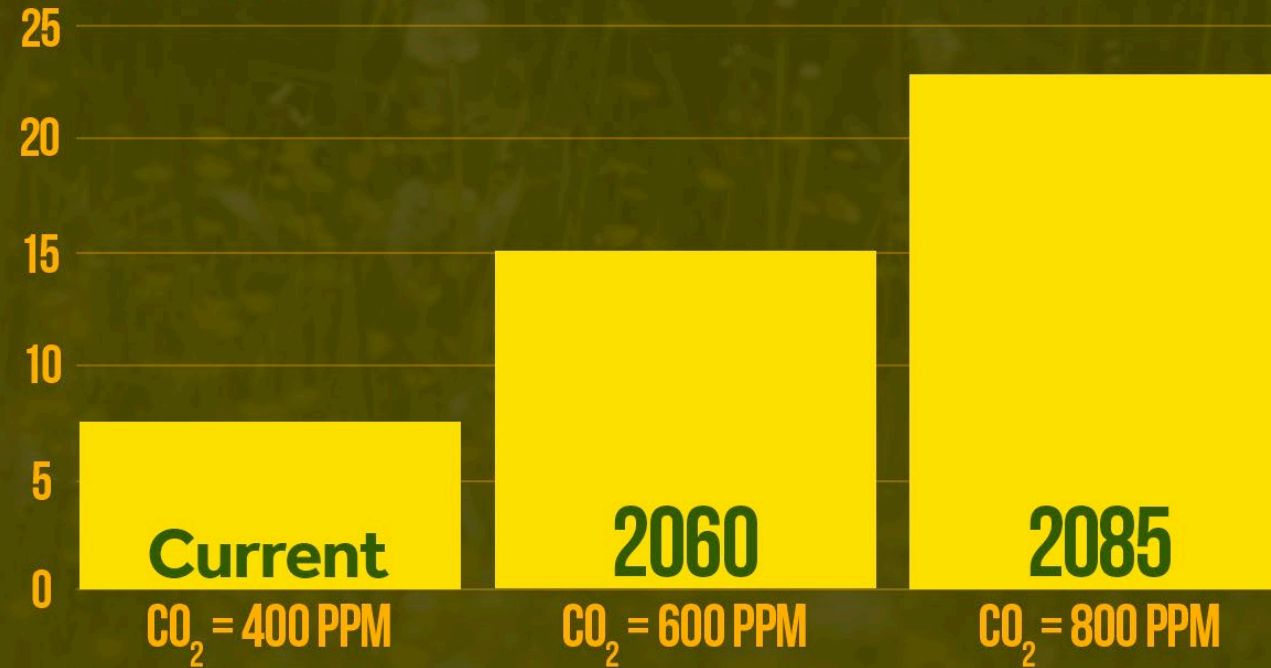
ALLERGIES

- Seasonal allergies impact 30% of the world's human population
- In a warming climate, allergy season:
 - Starts earlier
 - Lasts longer
 - Produces more pollen
- Effects of carbon dioxide concentrations on ragweed
 - Studies show that with increased CO₂ plants produce ragweed with more irritation causing protein

More CO₂ = More Pollen

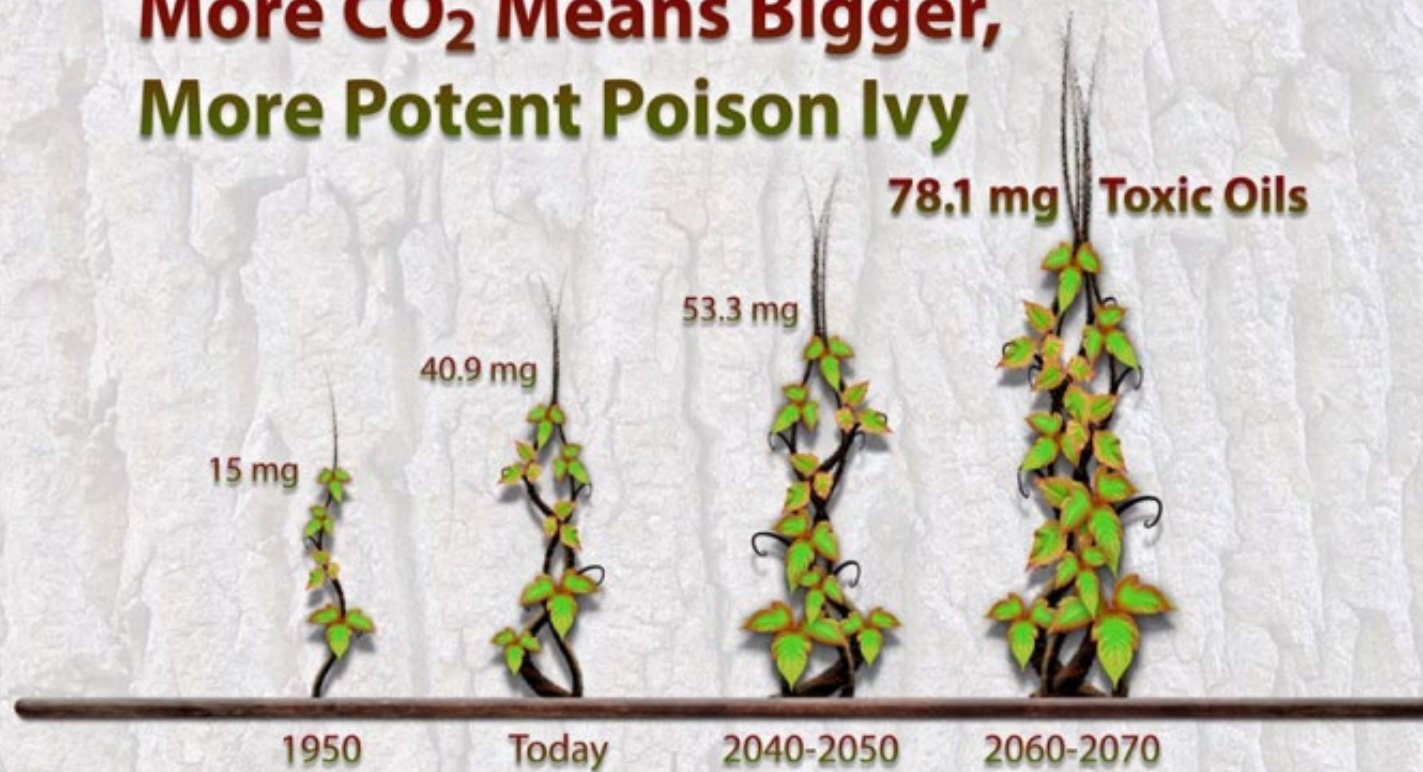
Climate Change Increases Grass Pollen Production

Grains of Pollen (millions)



Source: Albertine et al. 2014

More CO₂ Means Bigger, More Potent Poison Ivy

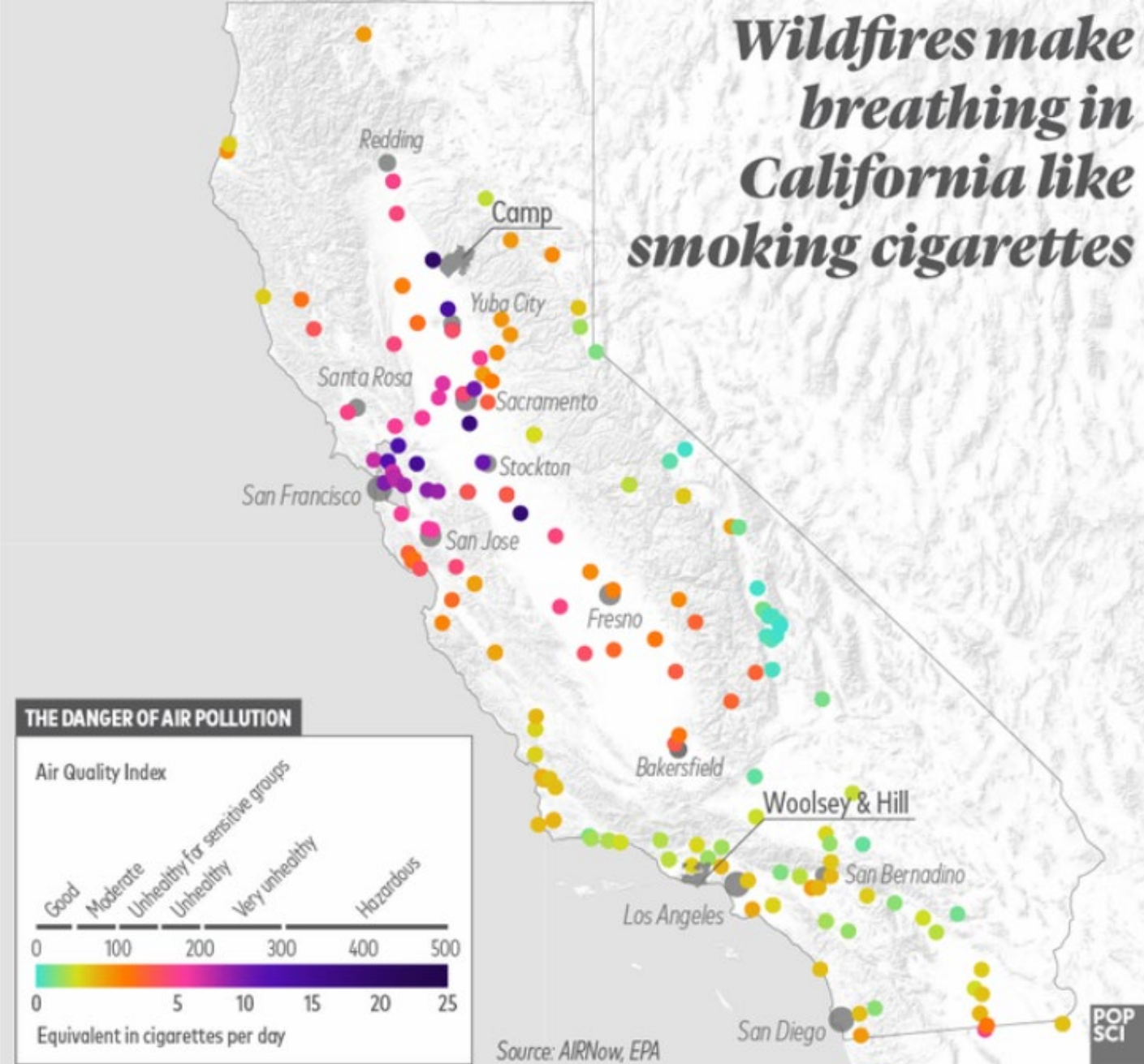


Average per plant in Ziska (2007) lab study

ASTHMA

- Increased flooding, leading to mold, can exacerbate asthma
- Increasing allergen intensity increases allergic asthma ER-hospitalizations
- The same fossil fuel emissions contributing to climate change decrease air quality, increasing prevalence of asthma and respiratory conditions
 - Particulate matter, black carbon, NOx,
- Higher temperatures lead to more ground level ozone, respiratory irritant
- Increasing wildfire intensity, frequency and duration impacts asthma and respiratory conditions

Wildfires make breathing in California like smoking cigarettes



THE DANGER OF AIR POLLUTION

Air Quality Index

Good Moderate Unhealthy for sensitive groups Unhealthy Very unhealthy Hazardous

0 100 200 300 400 500

0 5 10 15 20 25

Equivalent in cigarettes per day

Source: AIRNow, EPA

POP SCI

NATURAL
DISASTERS AND
HEALTHCARE
INFRASTRUCTURE

SUPERSTORM
SANDY

NEW YORK

- Bellevue Hospital:
 - Lost power (including to elevators) and generators were on the 13th floor, relied on a human chain to move buckets of fuel up the stairs
 - Evacuated 736 patients, closing for the 1st time since 1736
- NYU Langone:
 - 15 million gallons of water flooded the hospital
 - Flooded ER resulting in closure
 - Lost millions of dollars in MRI equipment
 - Lost entire use of elevator shaft

NATURAL
DISASTERS AND
HEALTHCARE
INFRASTRUCTURE

SUPERSTORM
SANDY

NEW YORK

"I asked how much fuel we had. We calculated on a napkin that we had an hour's worth of fuel in the generator. After that, the entire hospital would go dark."

-Marcy Pressman,
Deputy Executive Director
Bellevue Hospital
Superstorm Sandy

NATURAL
DISASTERS AND
HEALTHCARE
INFRASTRUCTURE

PARADISE
WILDFIRE

PARADISE, CA

“We packed them [patients] in every vehicle possible. Newborn babies and there’s a lot of elderly in the community. One of the doctors that eventually escaped had to finish the surgery and get that patient out too...The bottoms of our shoes were melting.”

-Karen Davis, surgical nurse,
Adventist Hospital
Paradise, CA

NATURAL
DISASTERS AND
HEALTHCARE
INFRASTRUCTURE

PARADISE
WILDFIRE

PARADISE, CA



NATURAL
DISASTERS AND
HEALTHCARE
INFRASTRUCTURE

HURRICANE MARIA

PUERTO RICO

- Over 3,000 people died in Hurricane Maria
- Mostly in the days and weeks following the Hurricane's landfall
- These deaths have been largely attributed to the inability of the healthcare system to recover
 - No electricity
 - No dialysis
 - No access to medications (insulin, BP)
 - No ambulances
 - Limited to no mobility

MENTAL HEALTH

- PTSD
- Increase in depression and anxiety
- Increase in high risk behaviors
- Eco-anxiety