

Mapping Heat Exposure Links Climate and Bay Goals

Jeremy S. Hoffman, Ph.D.

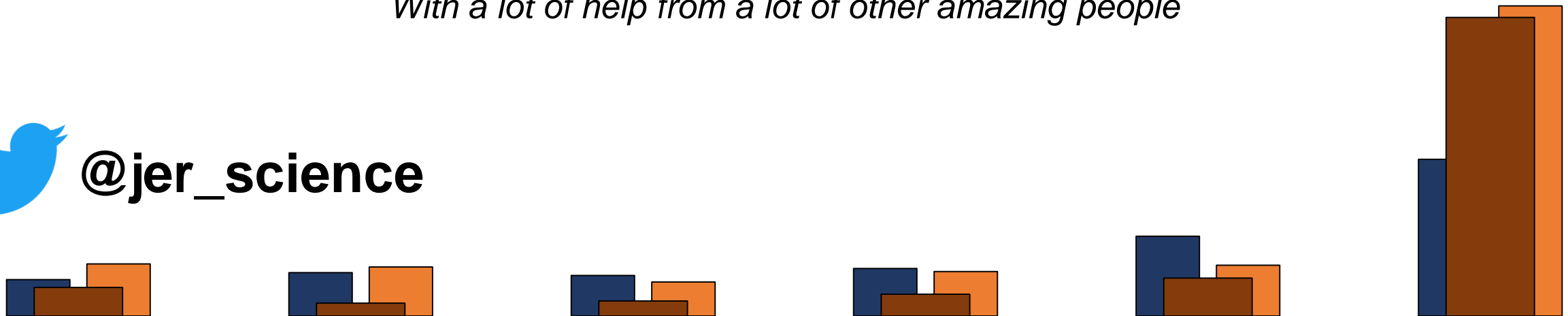
David and Jane Cohn Scientist, Science Museum of Virginia

Affiliate Faculty, Graduate School, L. Douglas Wilder School for Government and Public Affairs, VCU

With a lot of help from a lot of other amazing people



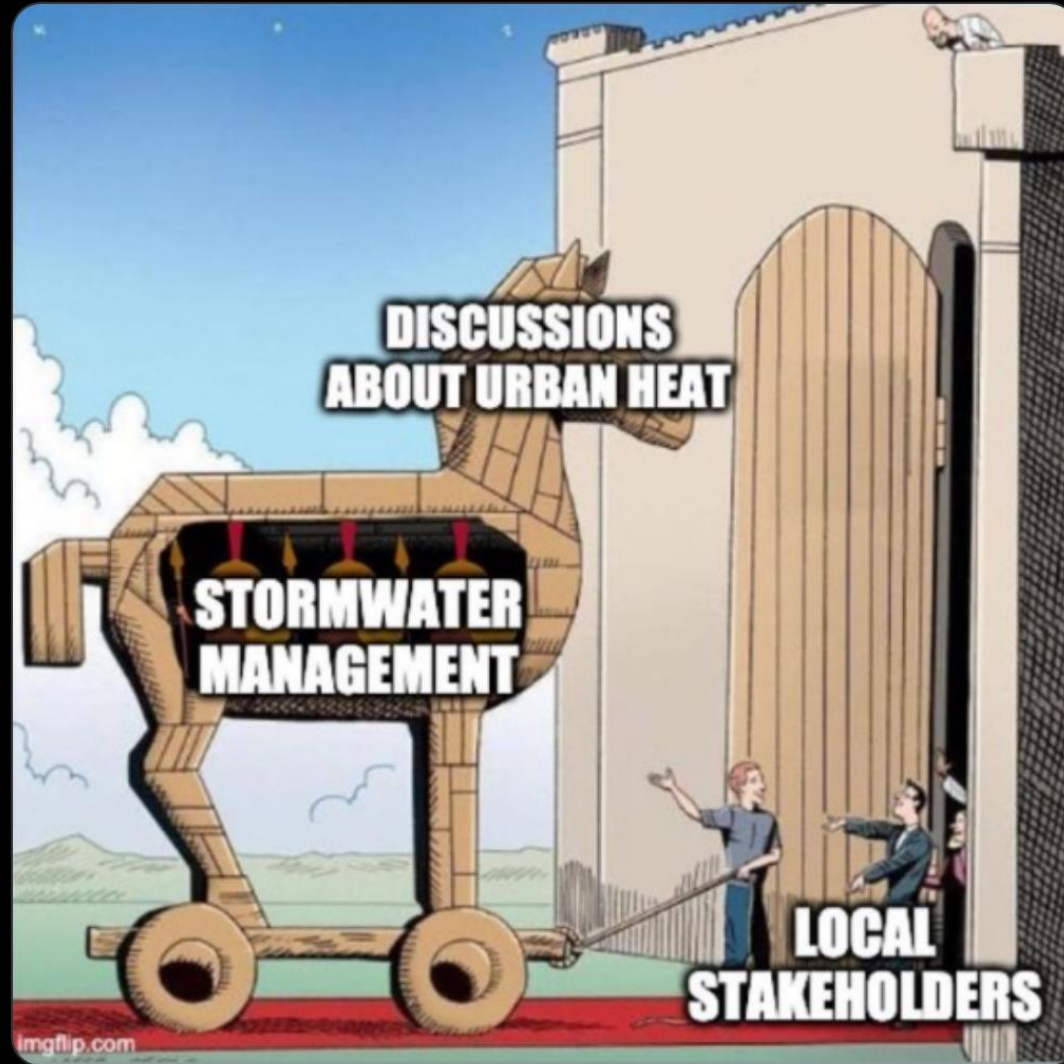
@jer_science





RVAH2O
@rvah2o

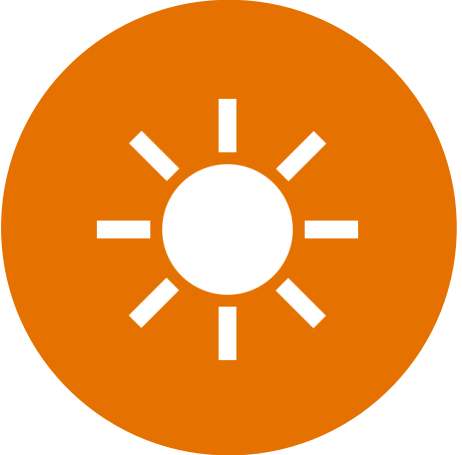
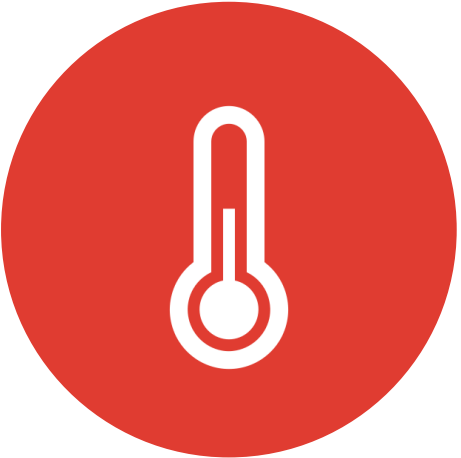
we do what we have to do to get the job done.



You

9:50 AM · Jul 27, 2021 · Twitter Web App

**Need to prepare for a:
hotter, wetter, sneezier and wheezier Virginia**



Need to prepare for a: hotter, wetter, sneezier and wheezier Virginia

Local

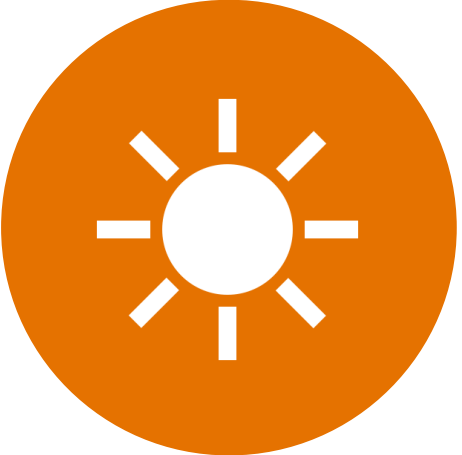
Virginia heavy rains close roads, prompt evacuations at dams

By Associated Press

August 16, 2020 at 1:22 p.m. EDT



Need to prepare for a: hotter, wetter, sneezier and wheezier Virginia



Need to prepare for a: hotter, wetter, sneezier and wheezier Virginia

ENERGY + ENVIRONMENT

HEALTH

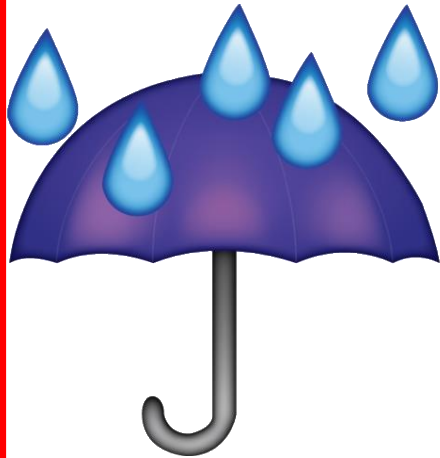
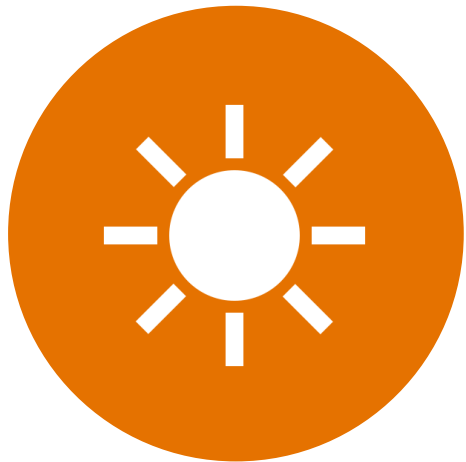
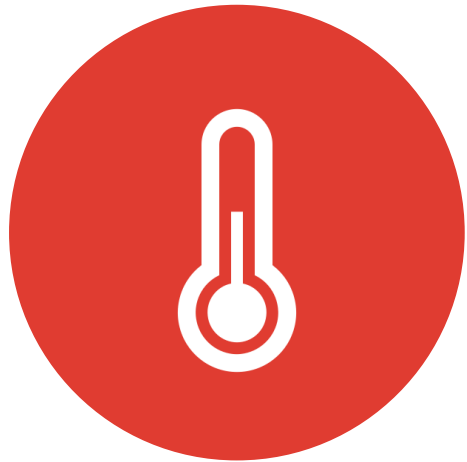
THE BULLETIN

Canadian and western wildfires bring hazardous smoke to Virginia

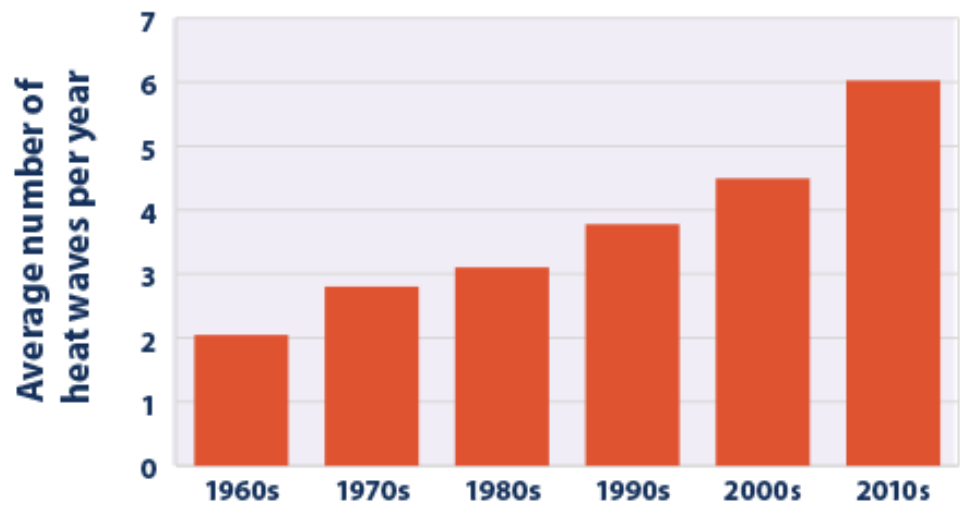
BY: SARAH VOGELSONG - JULY 21, 2021 11:59 AM



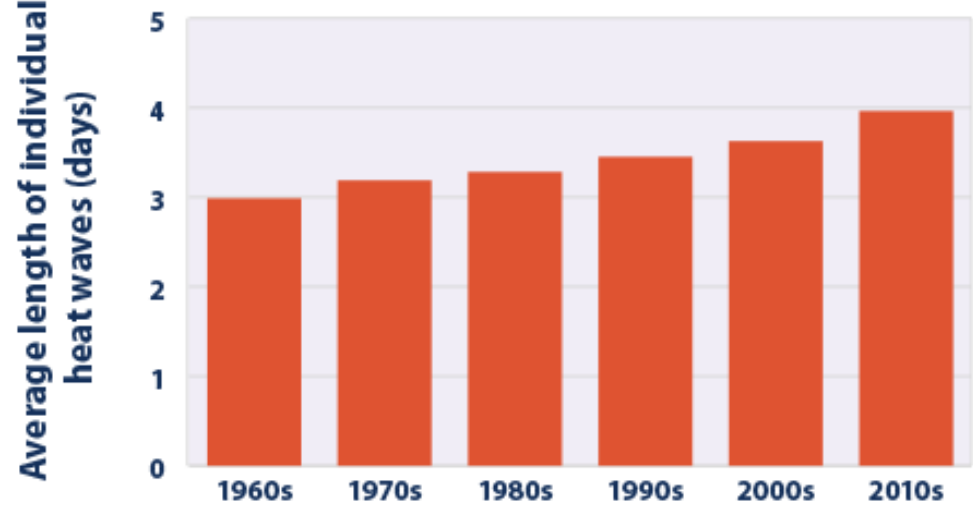
**Need to prepare for a:
hotter, wetter, sneezier and wheezier Virginia**



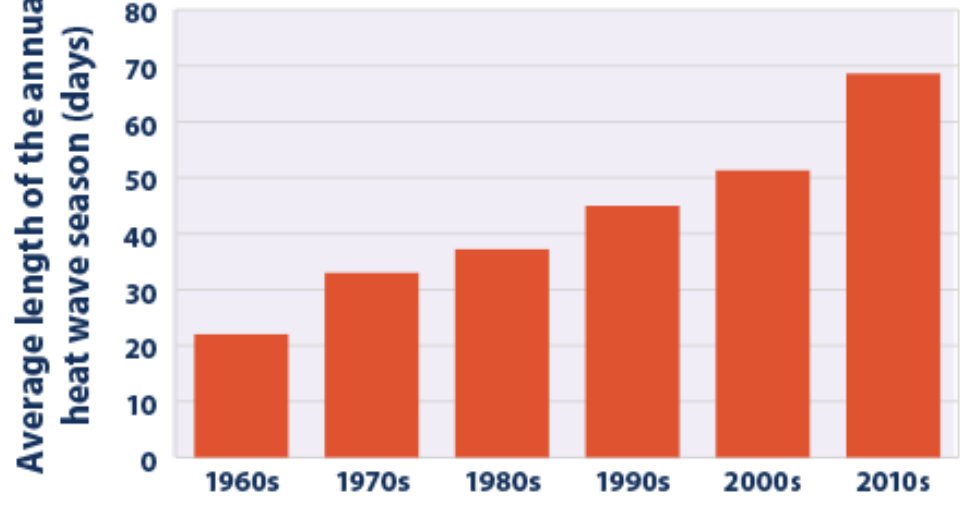
Heat Wave Frequency



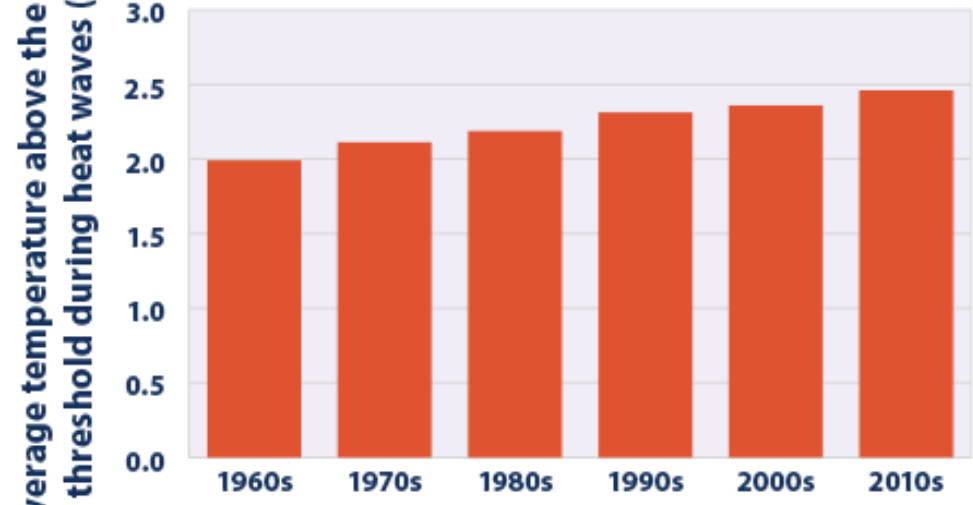
Heat Wave Duration



Heat Wave Season



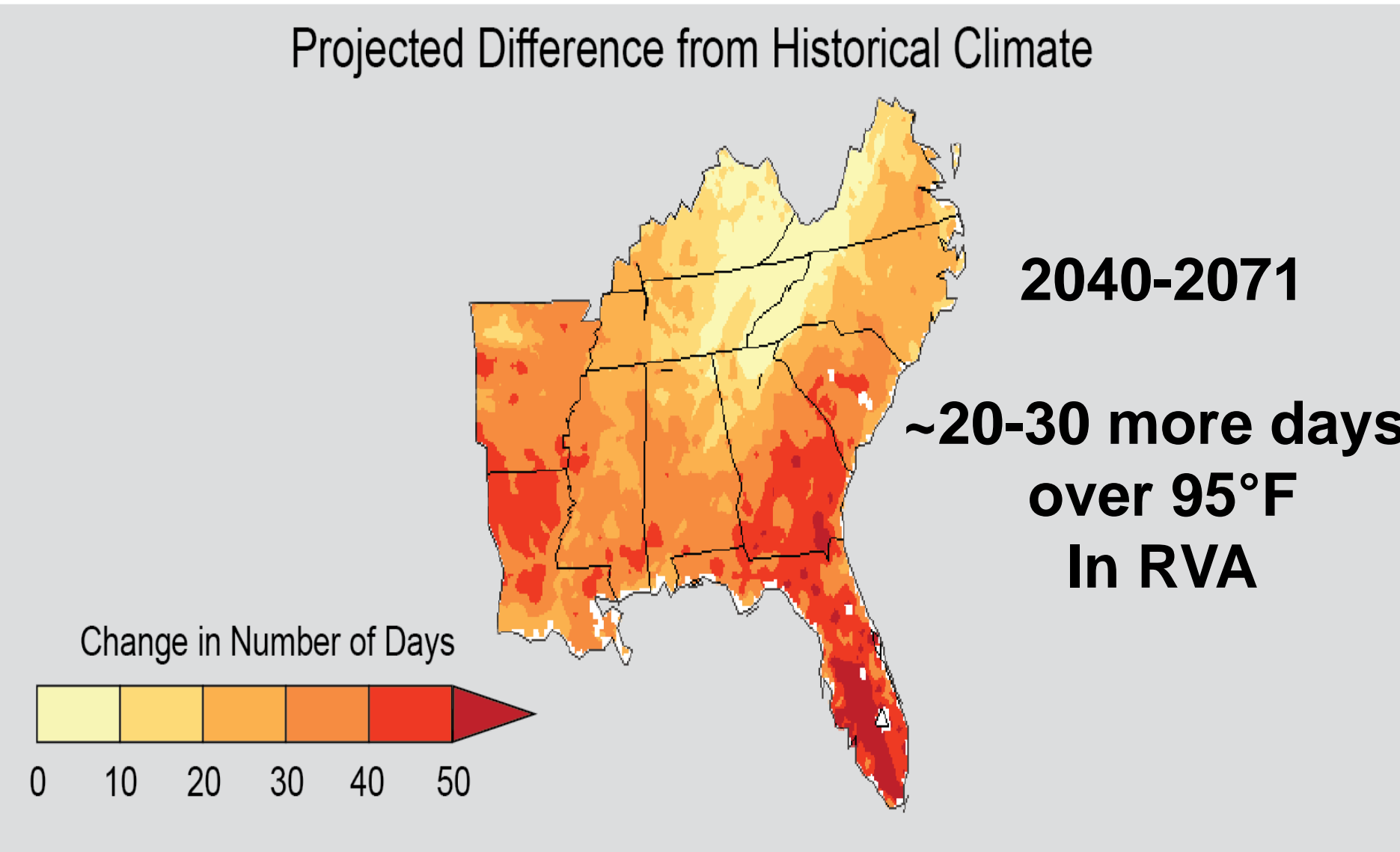
Heat Wave Intensity



Decade

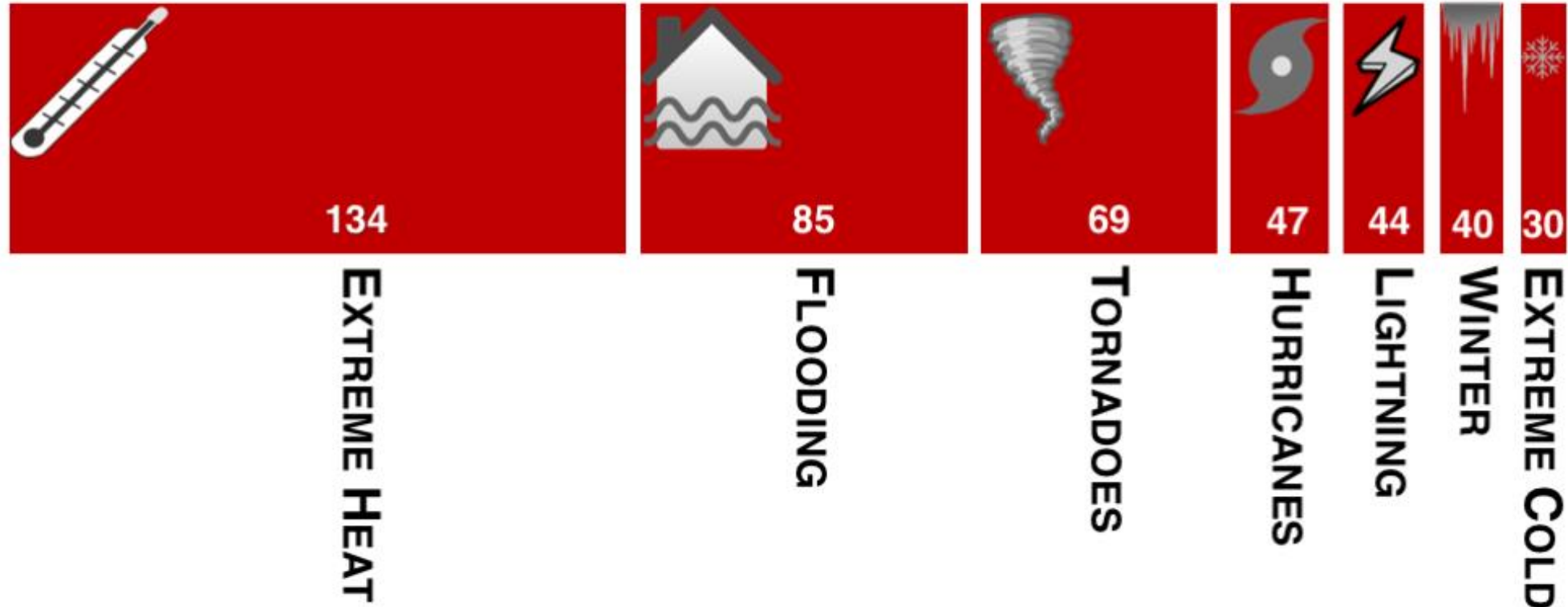
Projected Change in Number of Days Over 95°F

Projected Difference from Historical Climate



DEADLIEST WEATHER-RELATED HAZARDS

AVERAGE NUMBER OF PEOPLE KILLED PER YEAR (1988-2017)

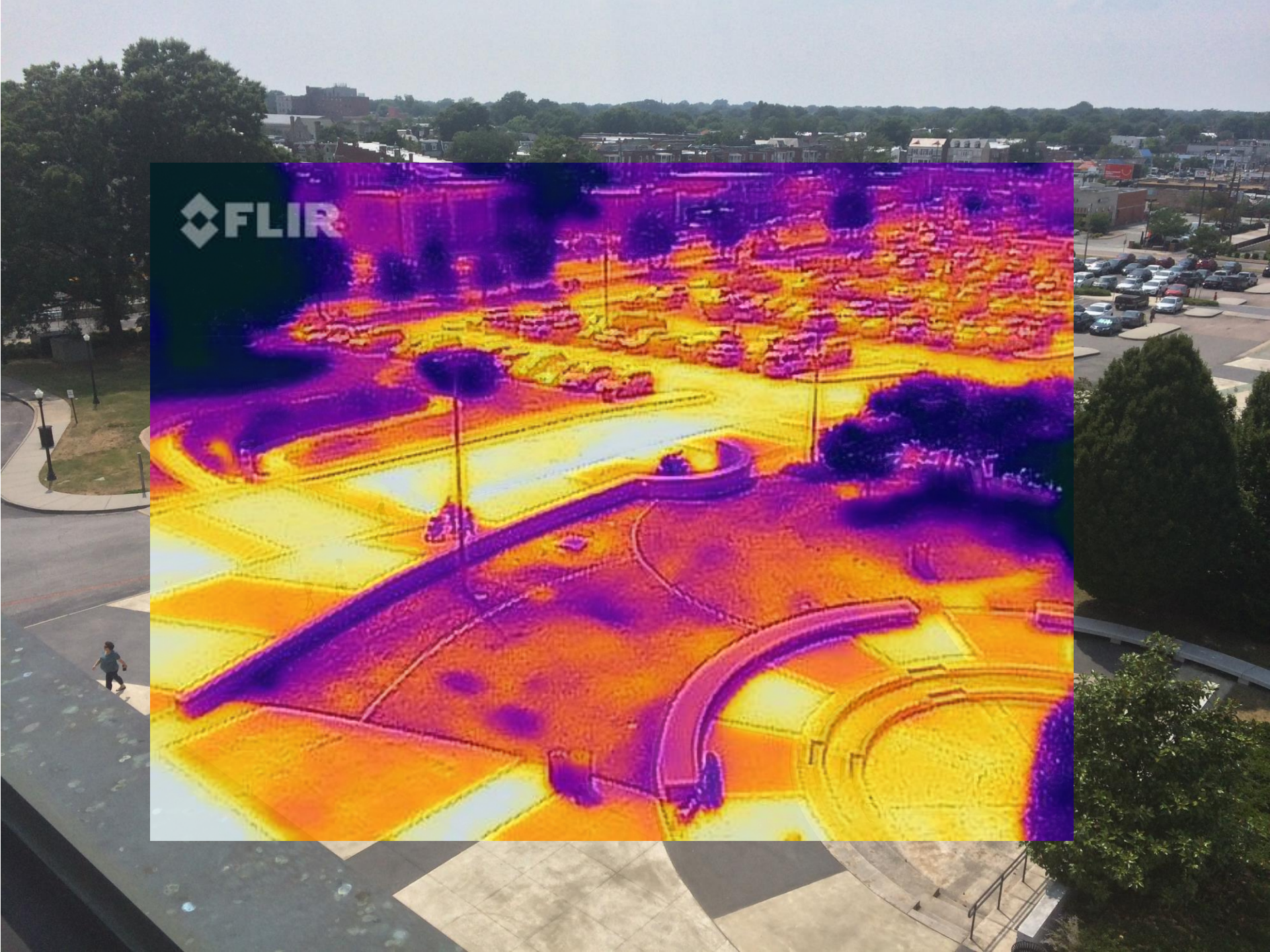


Source: National Weather Service Office of Climate, Water, and Weather Services Natural Hazard Statistics



Walter Kale, Chicago Tribune





FLIR

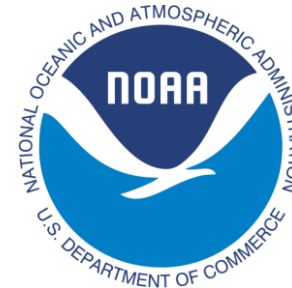


Vivek Shandas

[Shandas et al., 2019:](https://www.mdpi.com/2225-1154/7/1/5/htm)
<https://www.mdpi.com/2225-1154/7/1/5/htm>



RICHMOND URBAN HEAT ISLAND COLLECTIVE





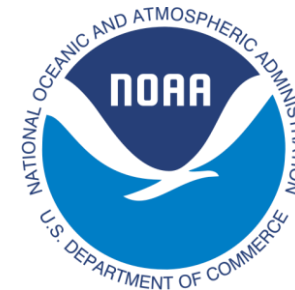
Brianne Mullen



Alicia Zatcoff

www.RVAGreen2050.com

RICHMOND URBAN HEAT ISLAND COLLECTIVE



Giles Harnsberger



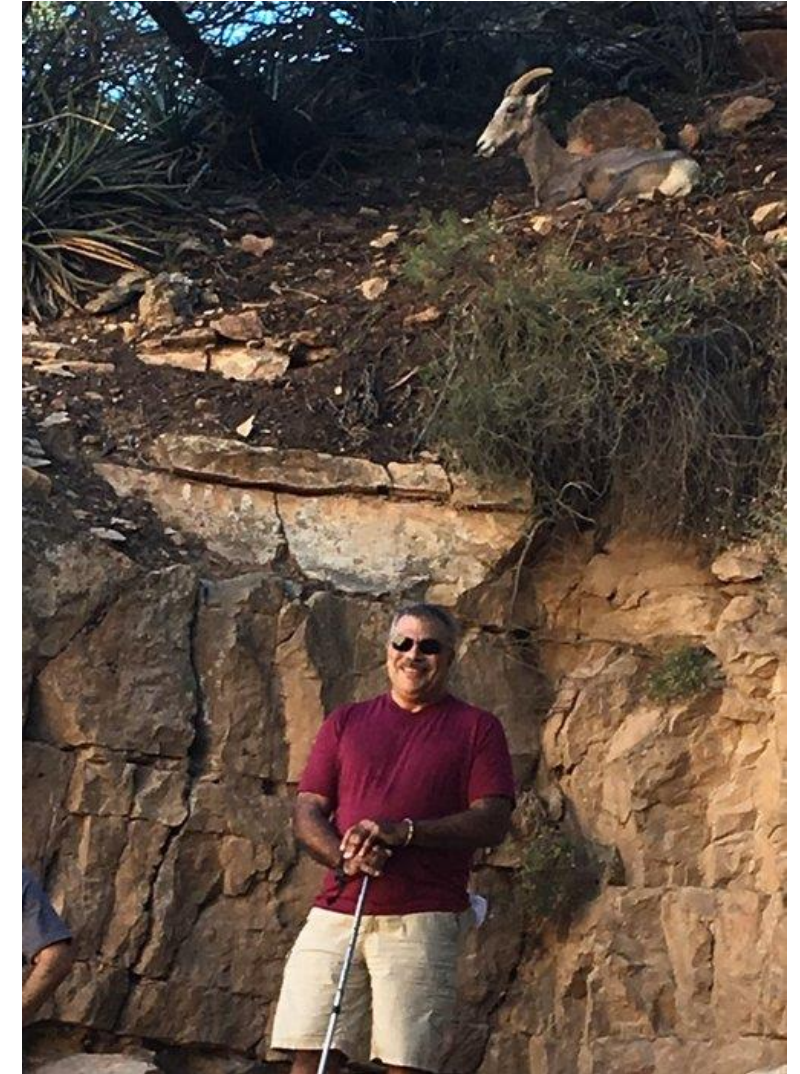
**Greening Richmond
Preparing Youth for Success
Improving Health and Quality of Life
Realizing Racial Equity**

Kendra Norrell



Melissa Guevara

Rob Jones, Executive Director

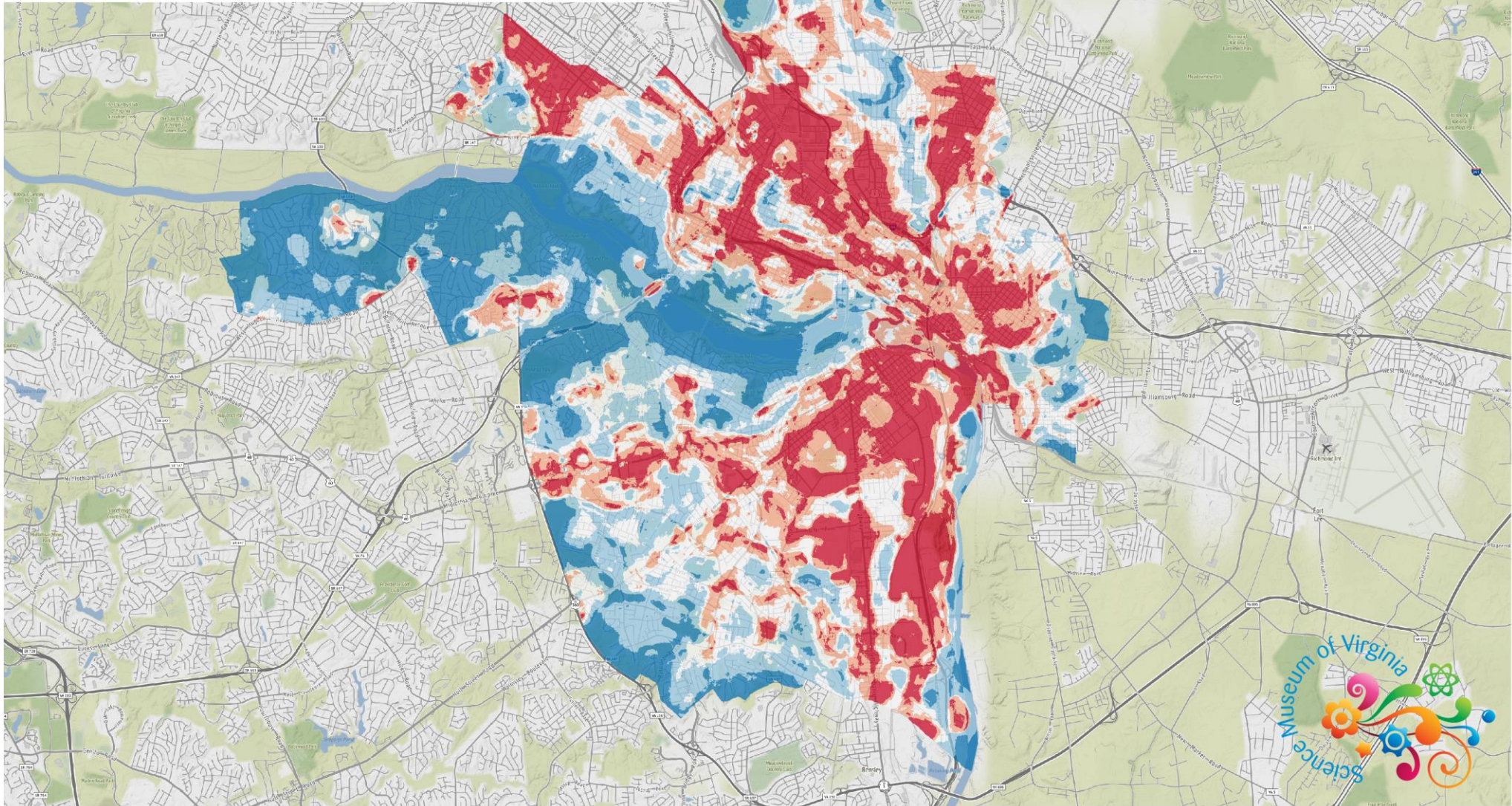
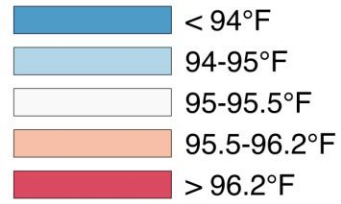




Shelby Lum, RTD

Richmond's Urban Heat Islands

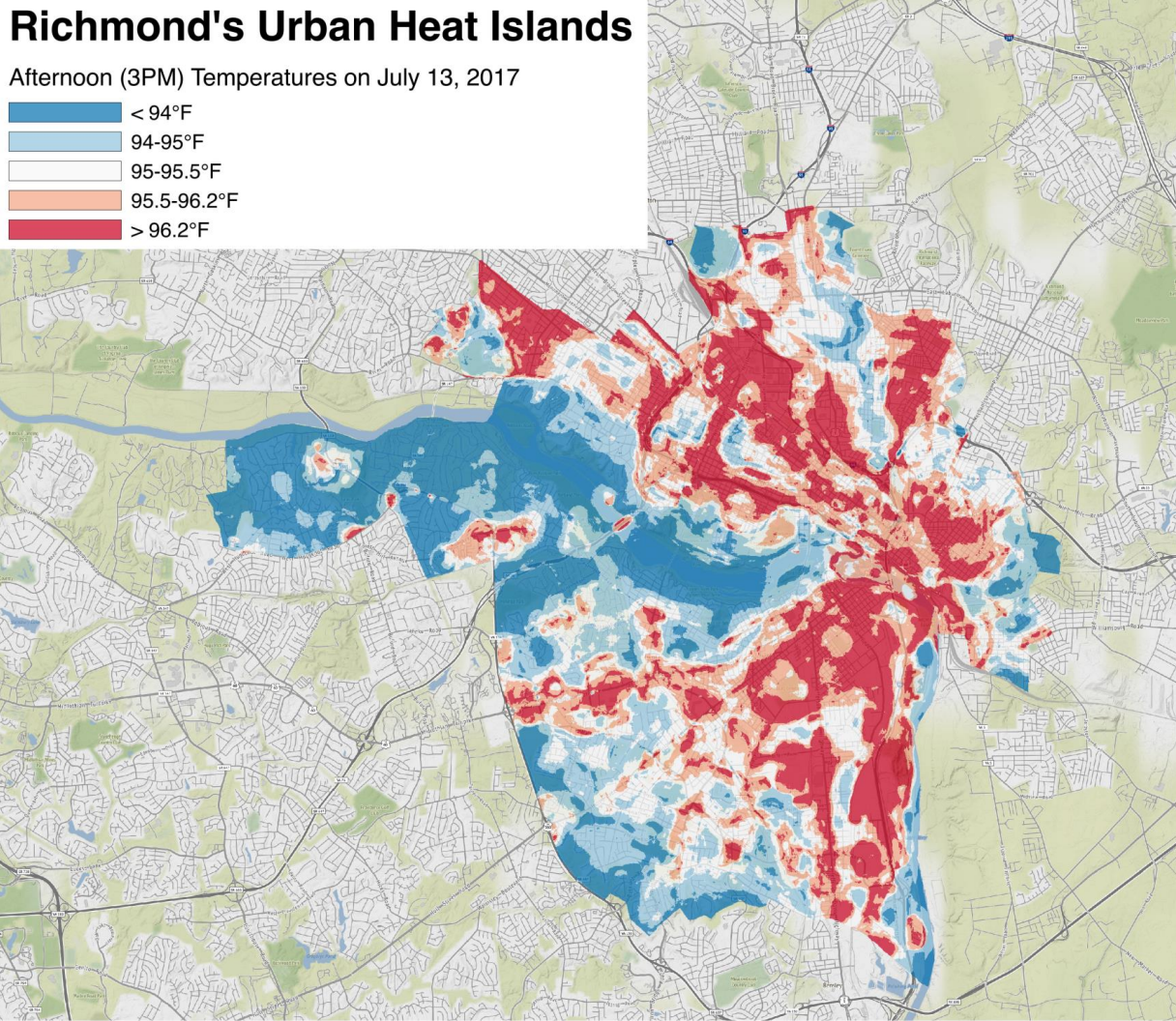
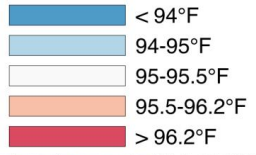
Afternoon (3PM) Temperatures on July 13, 2017



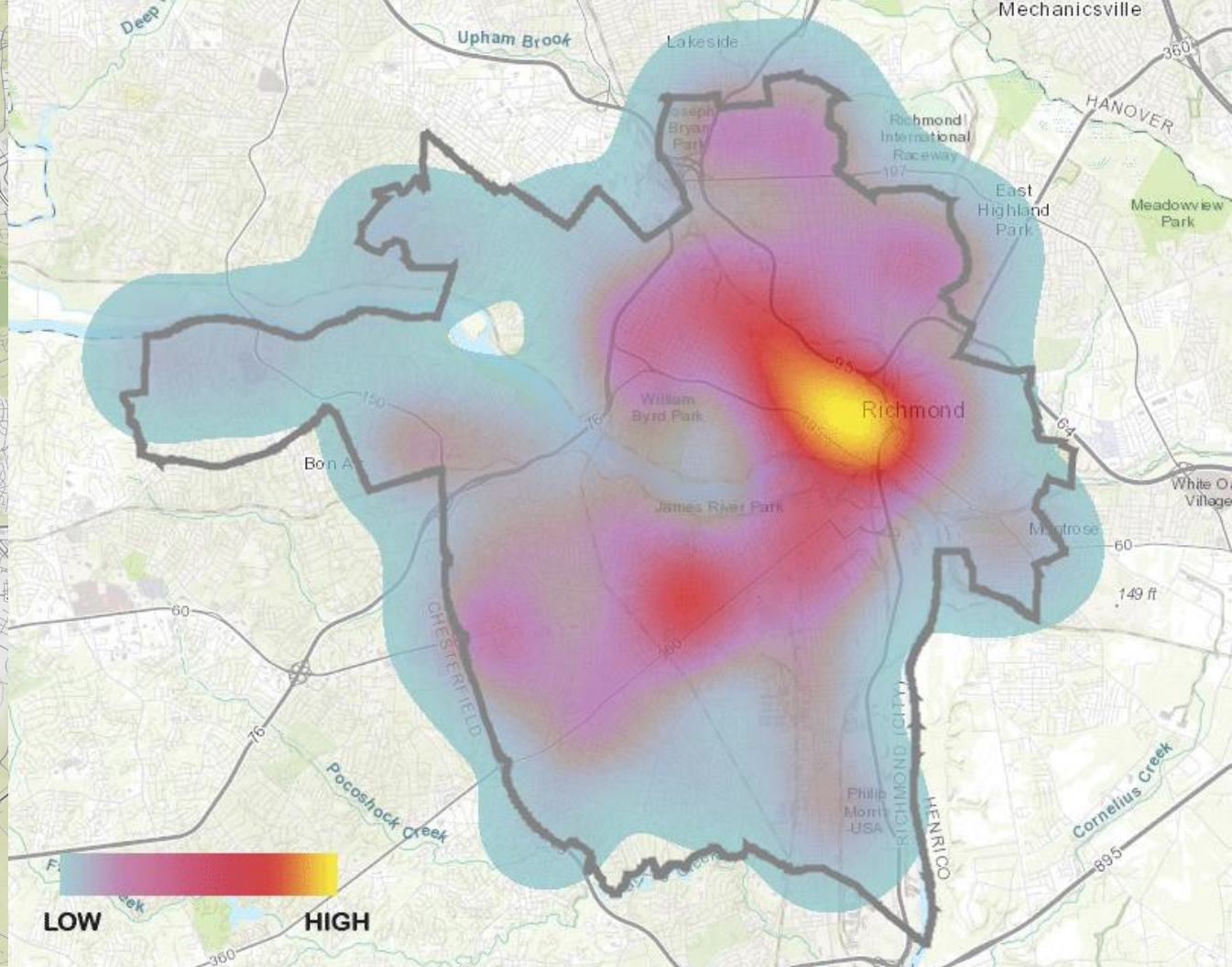
EXTREME HEAT

Richmond's Urban Heat Islands

Afternoon (3PM) Temperatures on July 13, 2017



RAA AMBULANCE RESPONSES

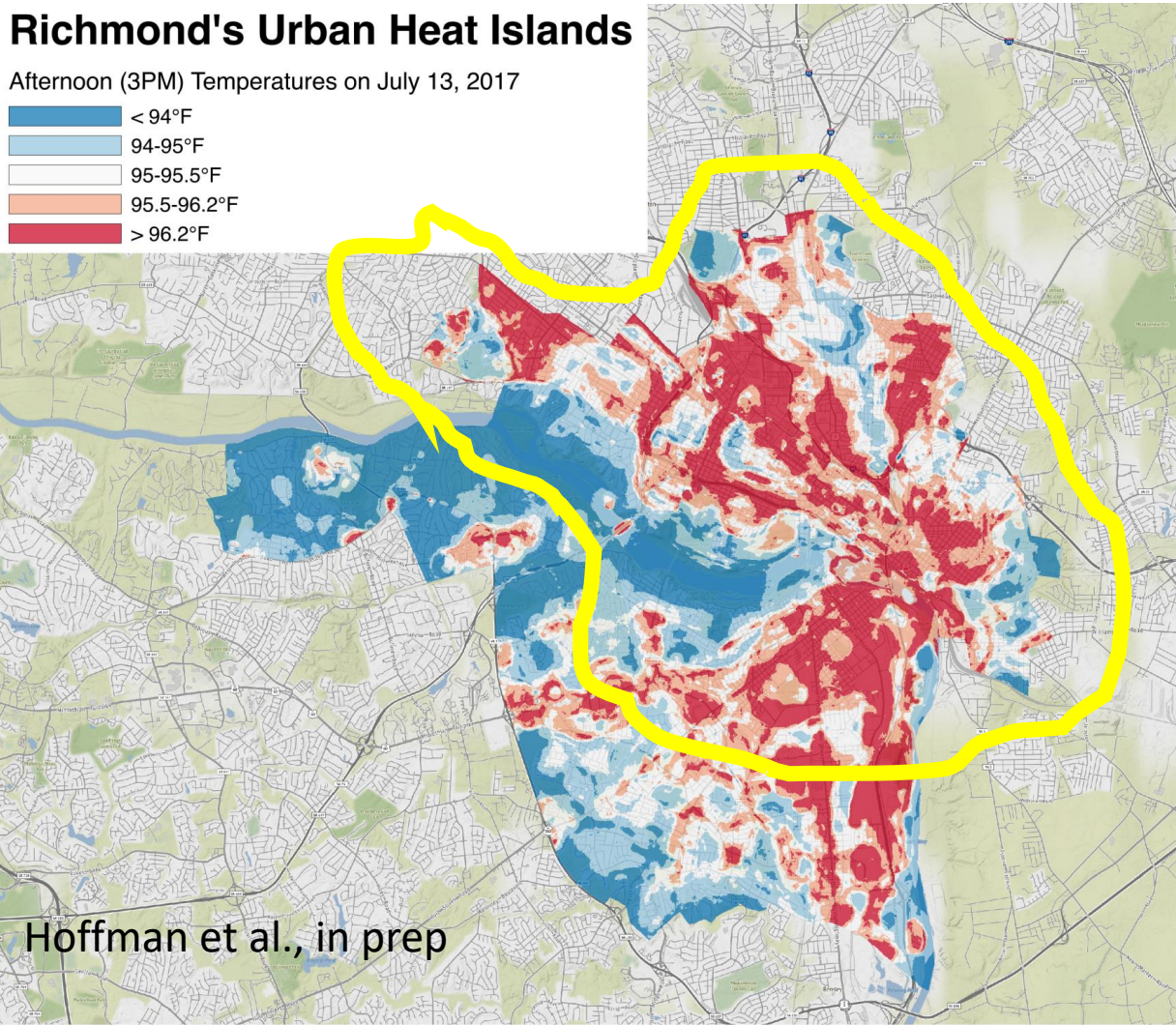
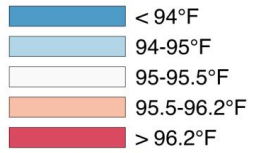


HEAT EXPOSURE

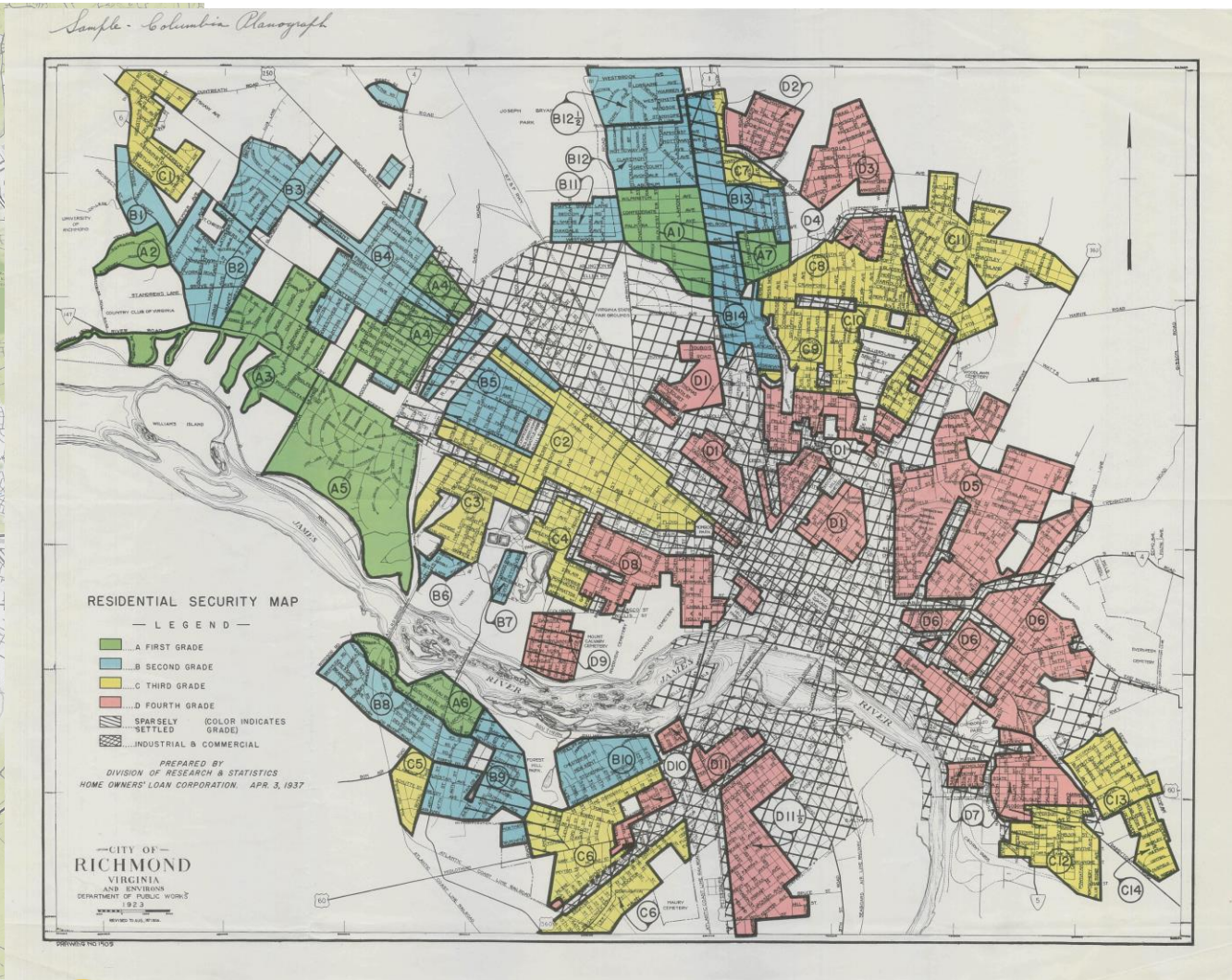
REDLINING MAP (1937)

Richmond's Urban Heat Islands

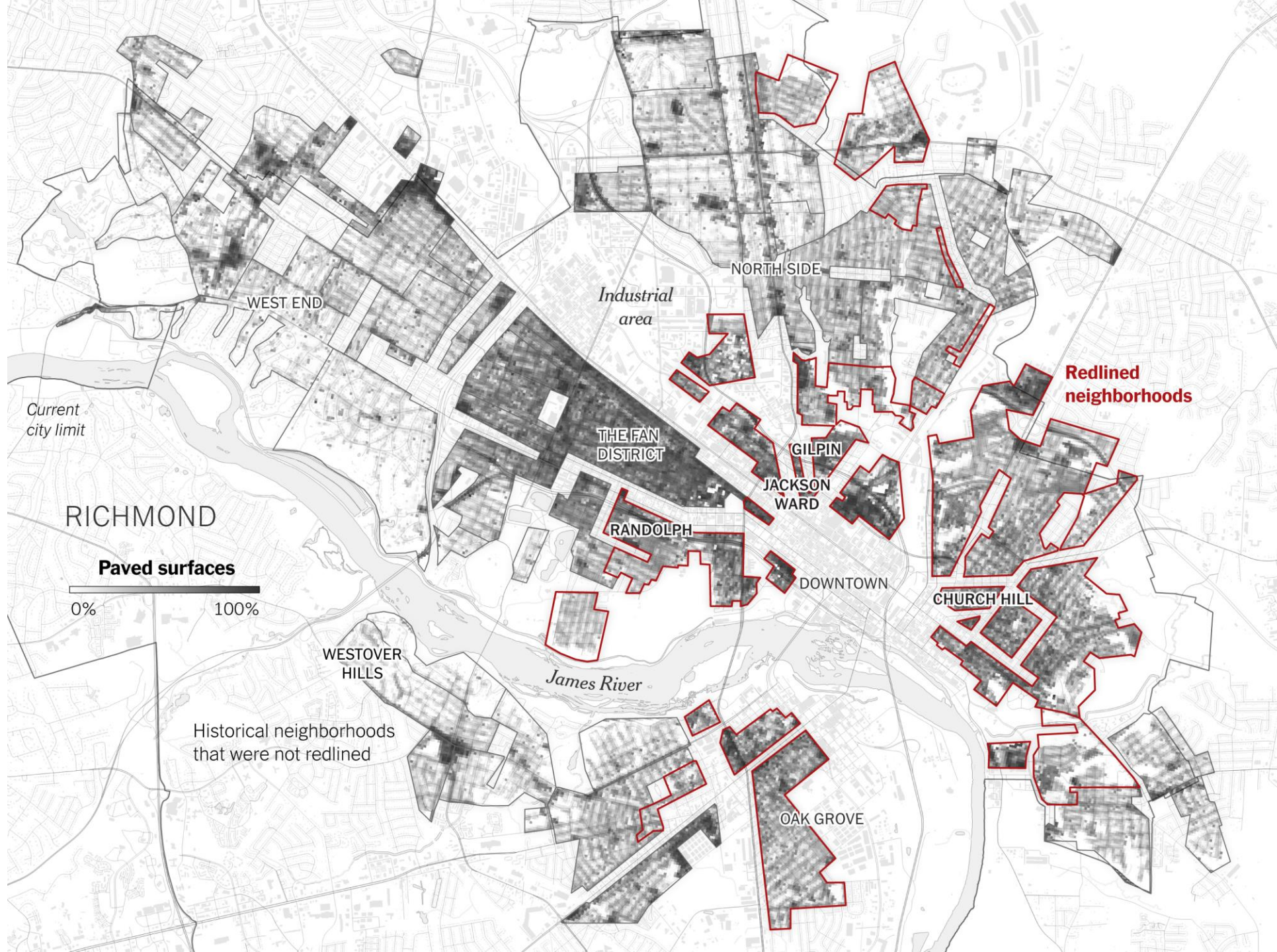
Afternoon (3PM) Temperatures on July 13, 2017

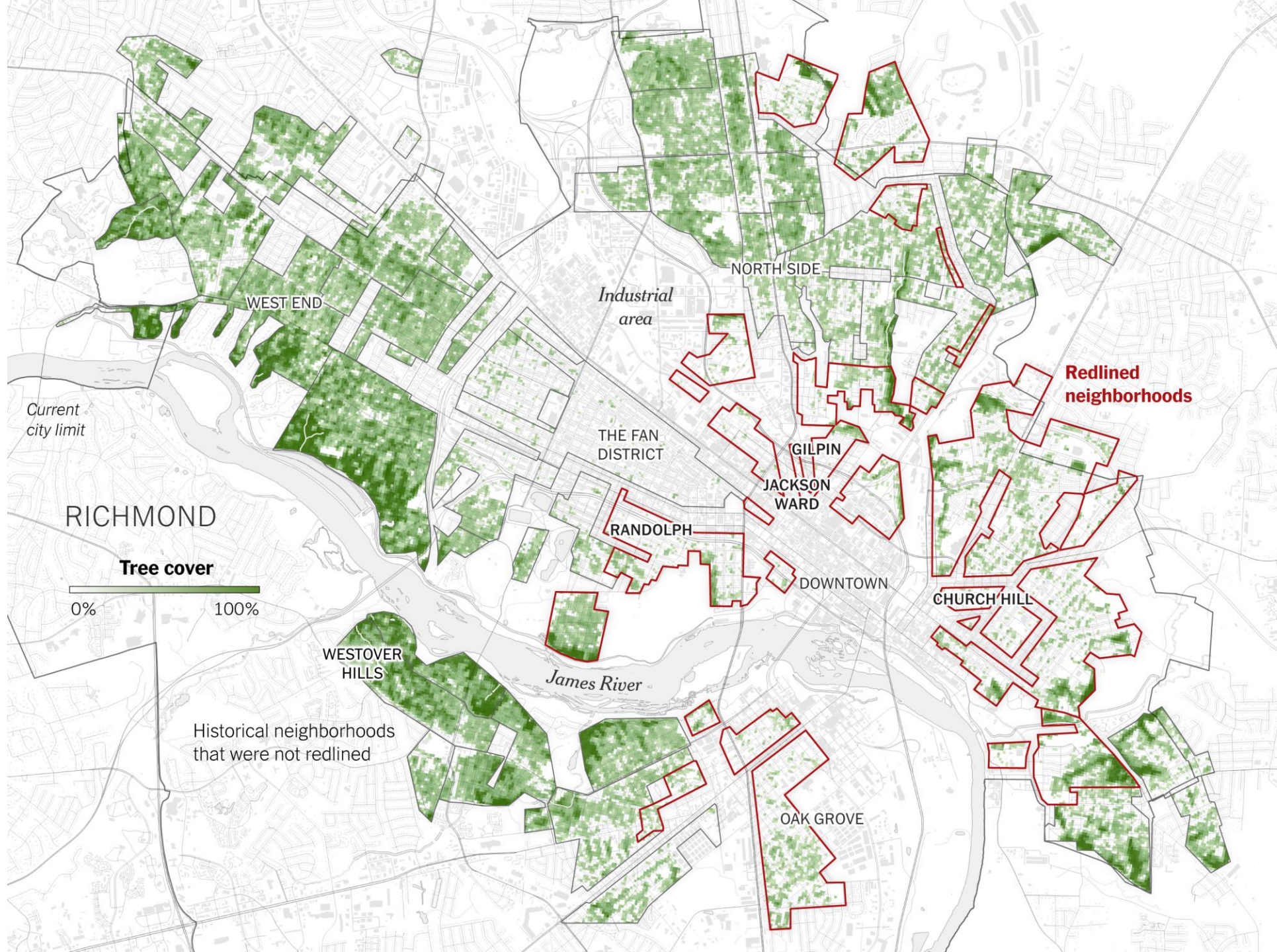


Hoffman et al., in prep



A B C D





Current city limit

RICHMOND

Tree cover

0% 100%

Historical neighborhoods that were not redlined

Industrial area

NORTH SIDE

Redlined neighborhoods

THE FAN DISTRICT

GILPIN

JACKSON WARD

RANDOLPH

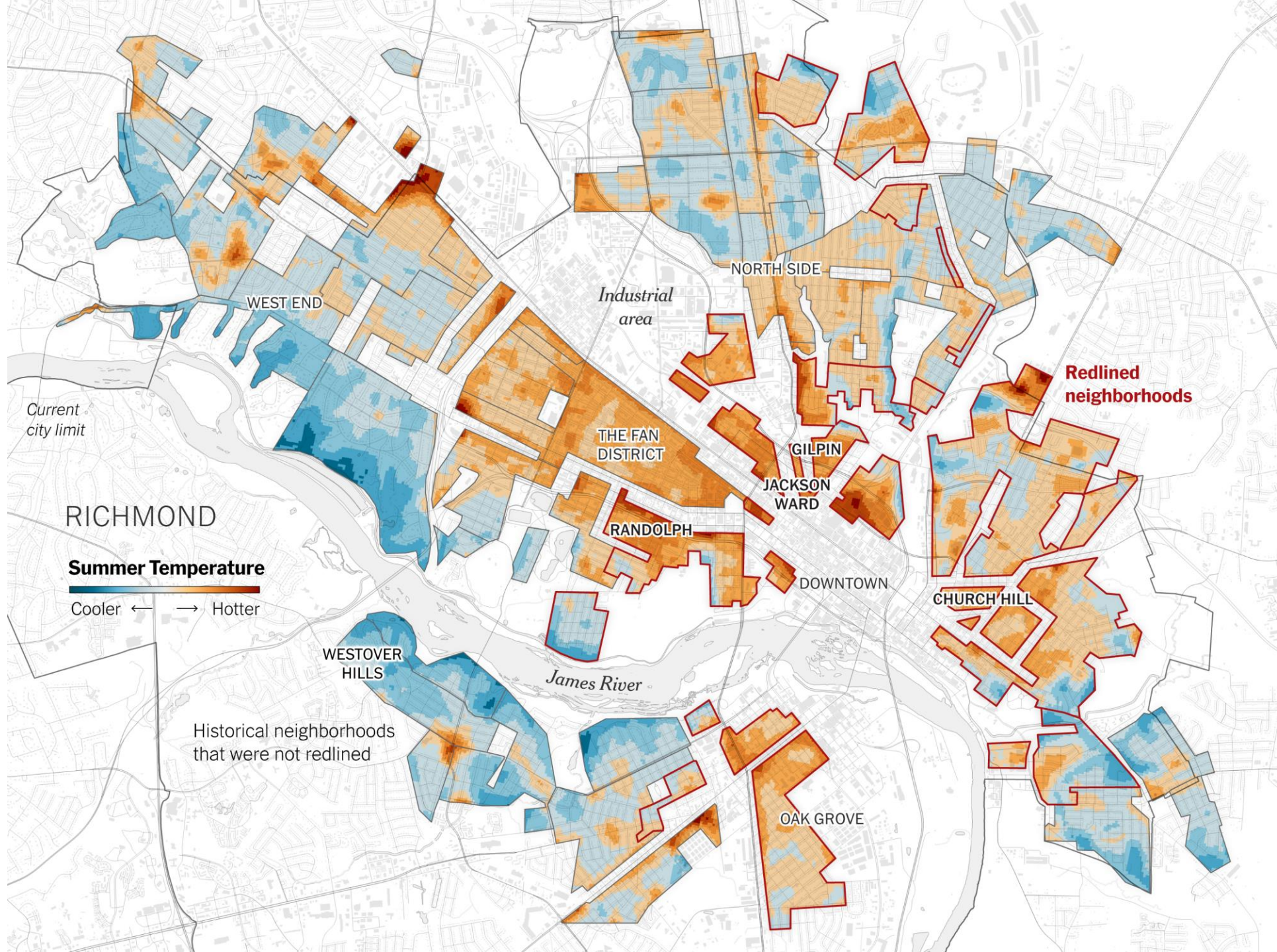
DOWNTOWN

CHURCH HILL

WESTOVER HILLS

James River

OAK GROVE



NEWS 2019

What's Norfolk's hottest area? Scientists to record temps on scorching Saturday

NEWS 2019

What's Norfolk's hottest area? Scientists to record temps on scorching Saturday

2020

Roanoke to take part in 'groundbreaking' climate research project on urban heat this summer



2021

Virginia Beach included in one of the nation's largest extreme heat studies

Virginia State University to join other state colleges in heatmapping Petersburg

By THE

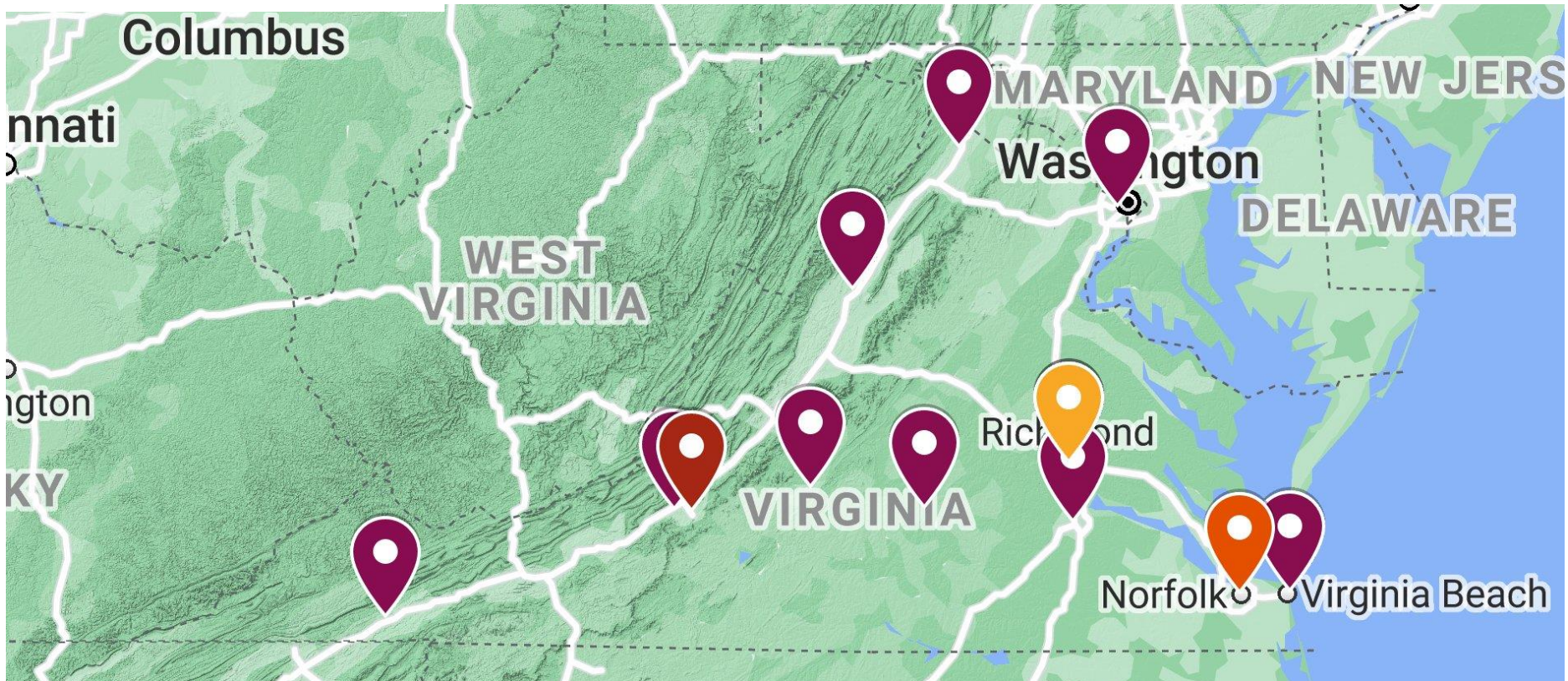
Tamica Jean-Charles The Progress-Index

Published 4:50 p.m. ET Jun. 24, 2021 | Updated 1:27 p.m. ET Jun. 29, 2021

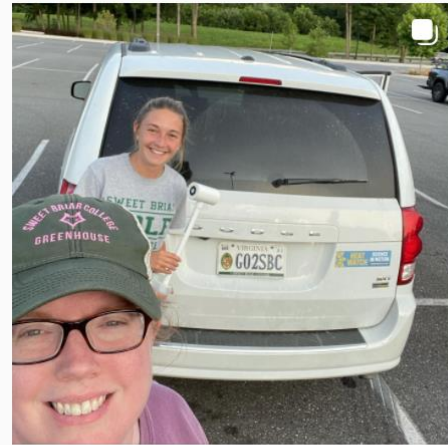
In Richmond - and Virginia - a heat-mapping effort seeks to mitigate effects of climate change

FEATURED

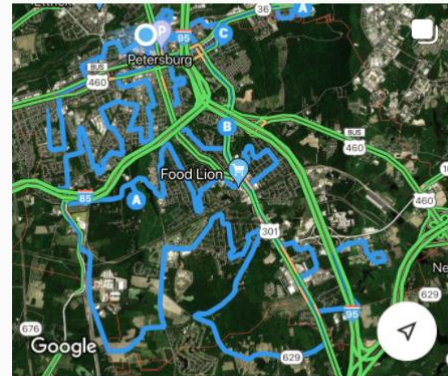
David Tran 15 hrs ago 6



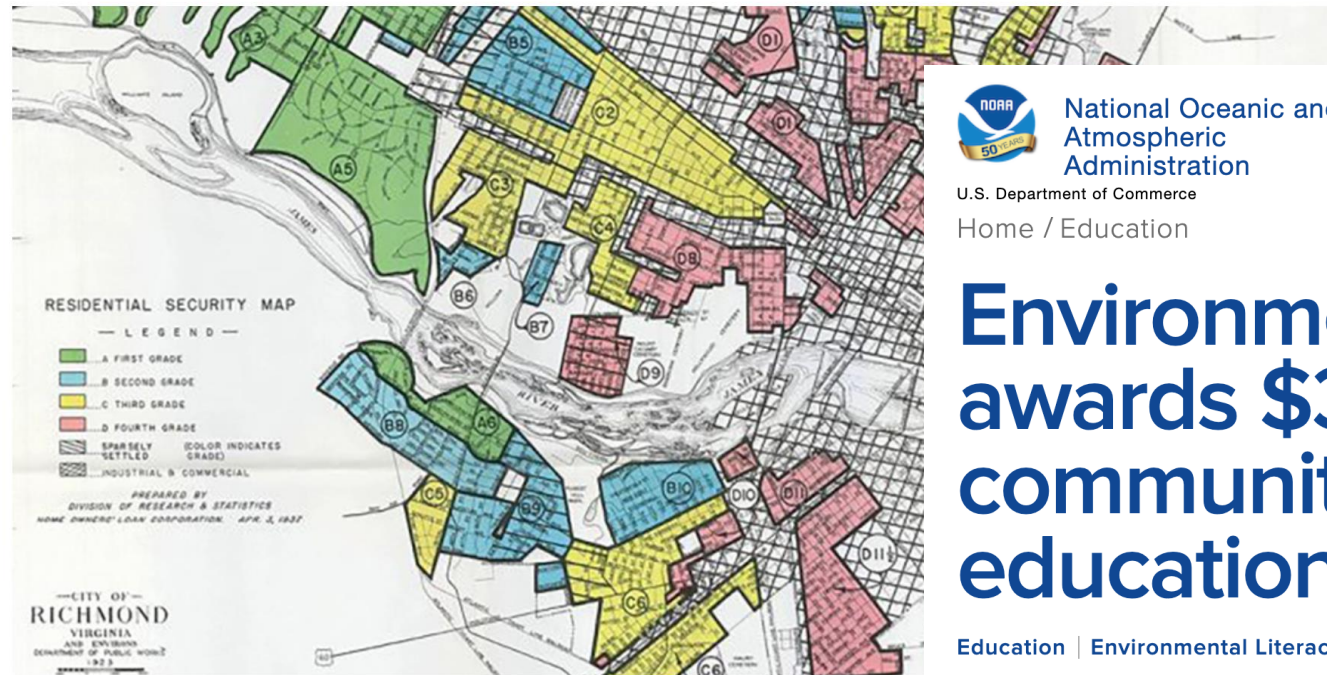
VFIC Heat Watch in
Arlington with
@marymountu



#VFICHeatWatch



Petersburg_Polygons & Routes
Routes Draft 1



Environmental Literacy Program awards \$3.5 million to advance community resilience through education

Education | Environmental Literacy Program Office of Education

SHARE



In 1937, the Home Owners' Loan Corporation rated the risks of different neighborhoods in Richmond, Virginia for a coded scale that ranged from "best" (green) to "hazardous" (red).
MAPPING INEQUALITY

September 30, 2020 — Eight projects will engage youth and the public

REDLINING'S LEGACY

Williams: Climate equity is a social justice issue. Four Richmond nonprofits with a federal grant are building resiliency

Formerly Redlined Areas of Richmond Are Going Green



In 1937, the Home Owners' Loan Corporation rated the risks of different areas on a color-coded scale that ranged from "best" (green) to "hazardous" (red).
MAPPING INEQUALITY



U.S. Department of Commerce

Home / Education

Search NOAA sites



Environmental Literacy Program awards \$3.5 million to community res education

12 ABOUT TOWN

Mayor Stoney announces 5 new green spaces in Richmond's southside

Education | Environmental Literacy Program Office

September 30, 2020 — Eight projects announced to address risks around extreme weather, climate hazards.



Mayor Levar Stoney (Source: NBC12)



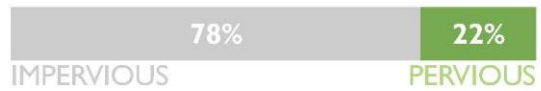


CONVERTING IMPERVIOUS TO GREEN SPACE



EXISTING CONDITION

IMPERVIOUS / PERVIOUS



|| TREES

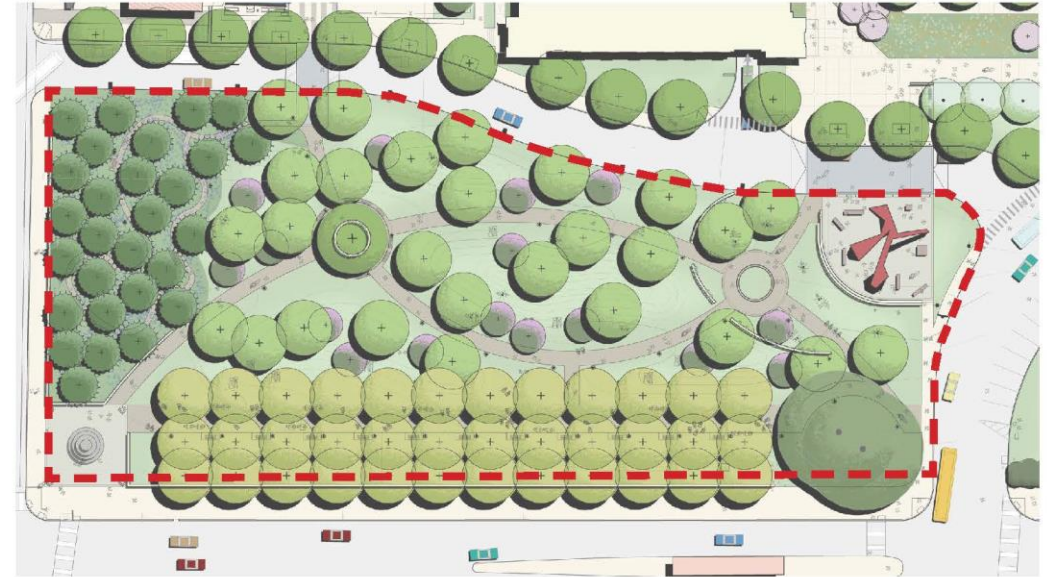


BENEFITS

- REDUCE WATER RUNOFF AND PROMOTE INFILTRATION
- REDUCE THE HEAT ISLAND EFFECT

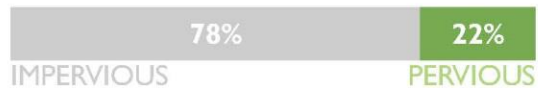
CONVERTING IMPERVIOUS TO GREEN SPACE

CREATING GREEN SPACE IN AN URBAN SETTING



EXISTING CONDITION

IMPERVIOUS / PERVIOUS



11 TREES

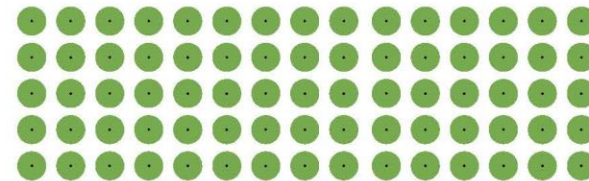


PROPOSED DESIGN CONDITION

IMPERVIOUS / PERVIOUS



112 TREES



BENEFITS

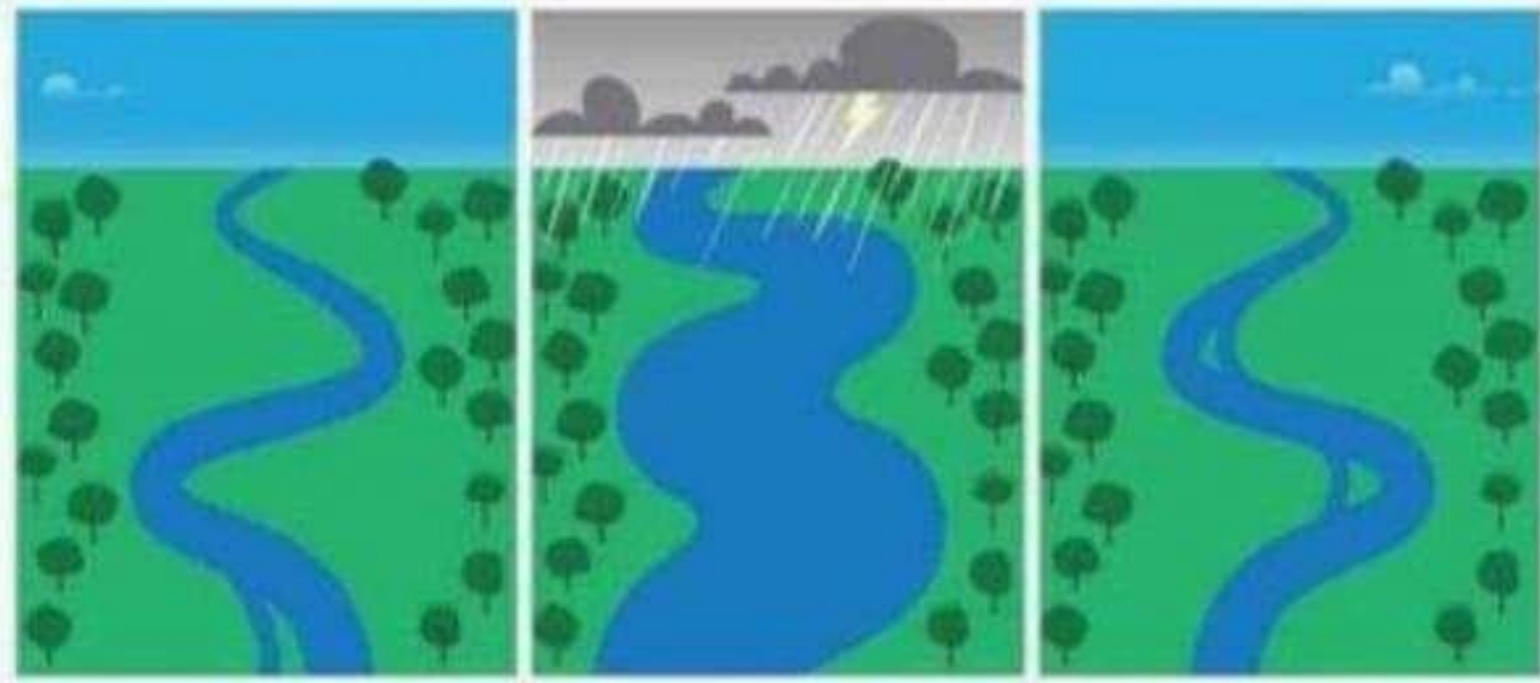
- REDUCE WATER RUNOFF AND PROMOTE INFILTRATION
- REDUCE THE HEAT ISLAND EFFECT

*PERCENTAGES ARE APPROXIMATE



SCIENCE MUSEUM OF VIRGINIA

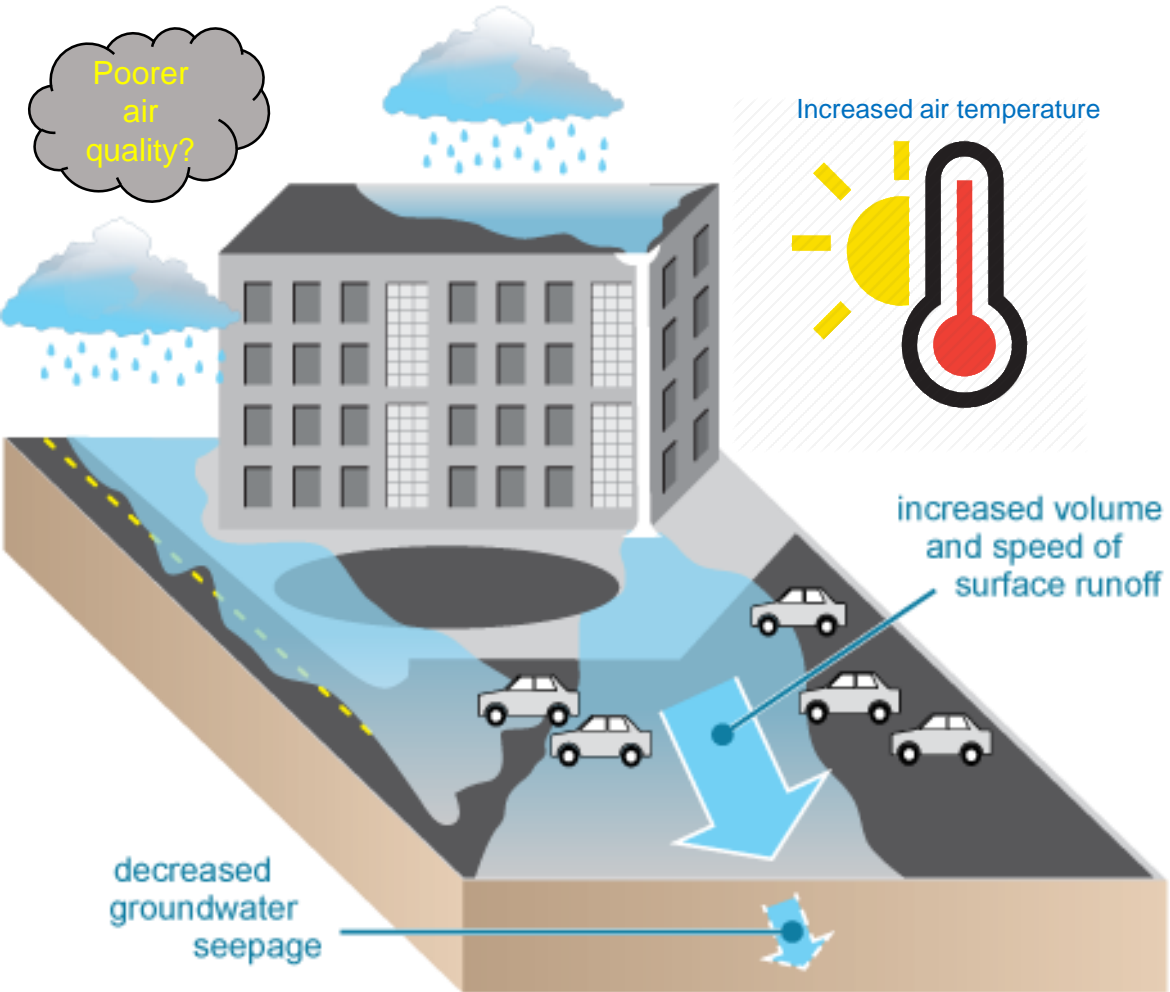
JANUARY 19, 2021



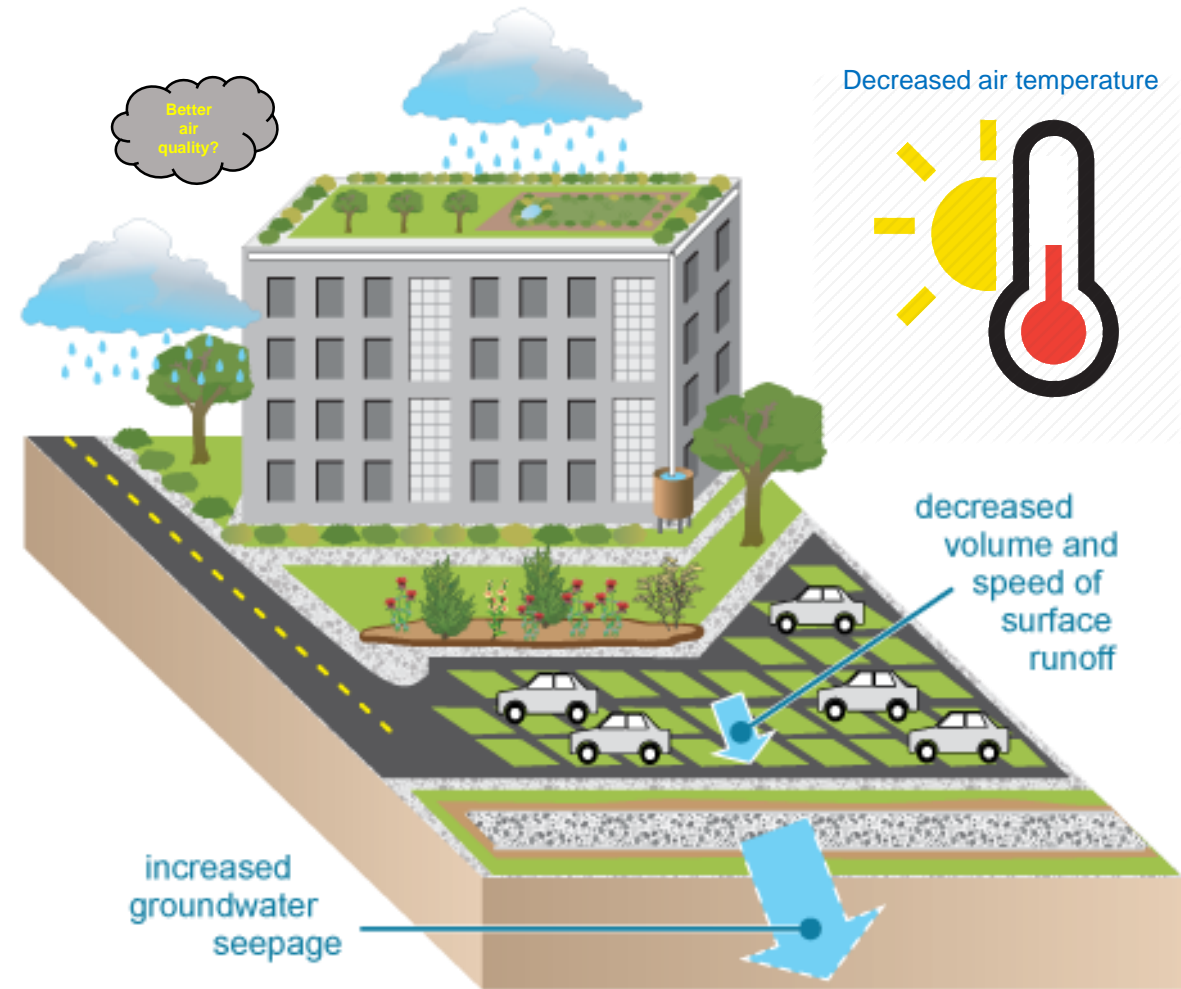


The best solutions mimic nature, achieving Bay goals

Impervious surfaces



Pervious surfaces





Benefits

OF TREES IN OUR CITY



PLANifax and Halifax Regional Municipality



Thanks!

jhoffman@smv.org

[@jer_science](#)