Extreme Heat in Schools: Rationale and Response to Maximum Temperature Law

JOELLE BURNHAM, MS
New York State Department of Health
School Environmental Health Program

Spring 2025 | NYS School Environmental Health Program | Regional Seminars

PRESENTATION OBJECTIVES

- **Part 1: Facts & Figures**
  - Learn what causes extreme heat and the effects it can have on human health and learning environments.
- **Part 2: Law & Order**
  - Understand NYS Public Schools' responsibility per legislative amendments to Education Law section 409-n.
- **Part 3: Tips & Tricks**
  - Guidance and best practices for developing:
    - Extreme Heat Policy
    - Heat Readiness Strategy

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Part 1: Facts & Figures

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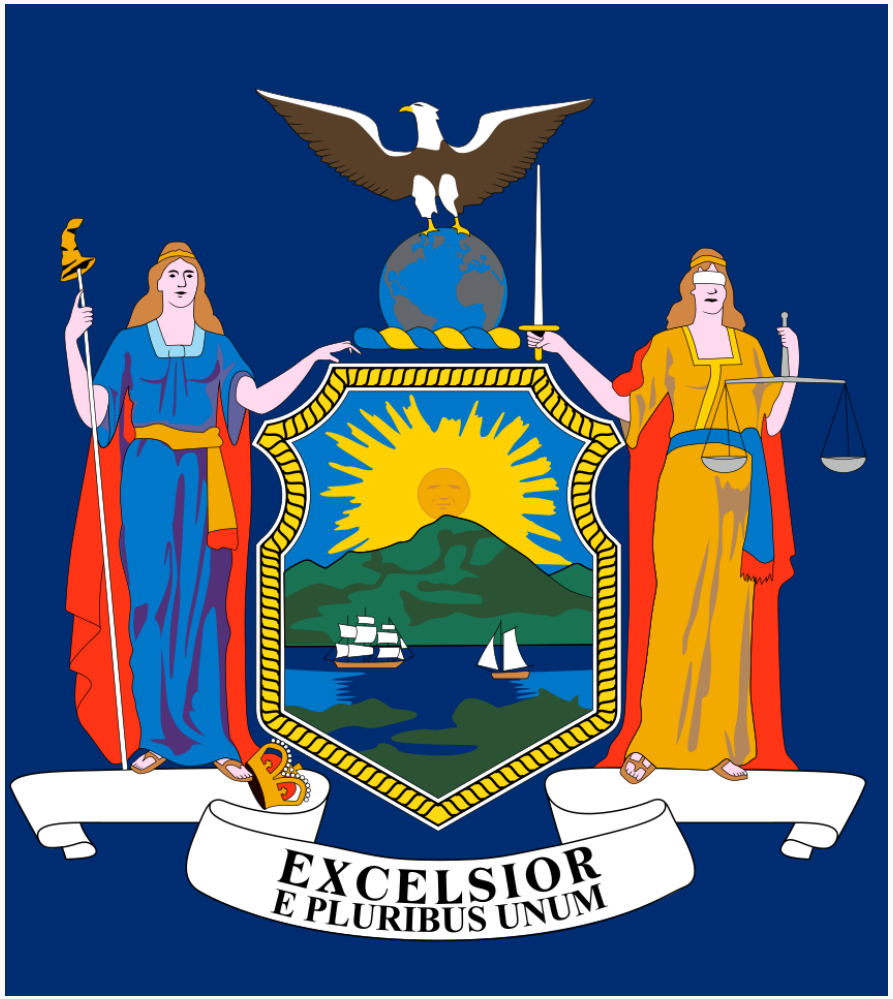

- **Extreme Heat Watch**
  - Issued at the county level
  - Heat index is predicted to remain above 95ºF for two or more consecutive days, or above 100ºF for any interval
  - Be Prepared
- **Extreme Heat Warning**
  - Issued at the county level
  - Heat index is at or above 105°F for two or more hours at any location within the affected county or counties
  - Take Action

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Emergency Weather Terminology

Remember the cupcake analogy!

Watch:

Warning:

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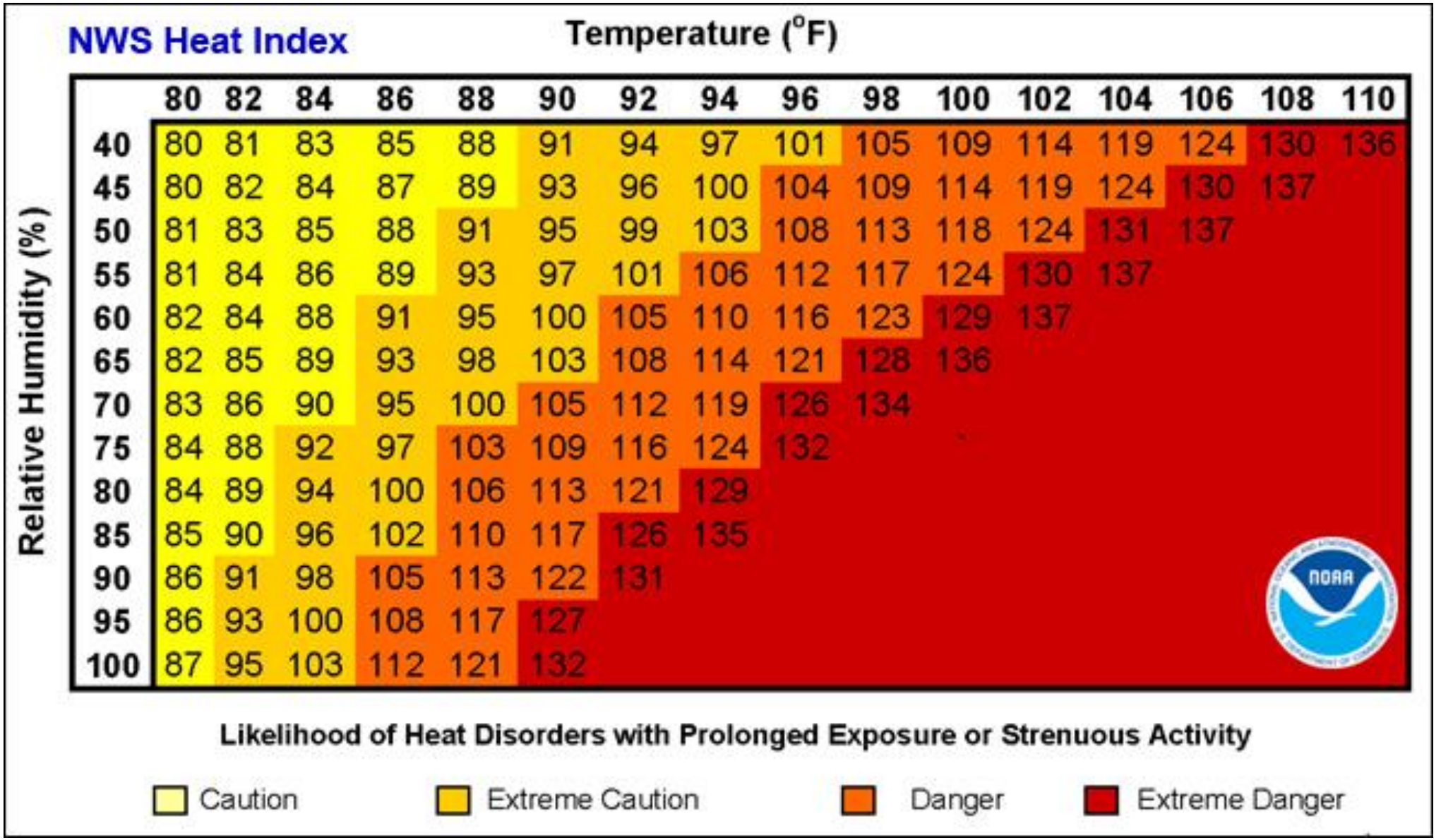

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Heat Index Chart

THE HEAT INDEX AND ITS EFFECTS ON THE BODY

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

National Weather Service - Heat Forecast Tools

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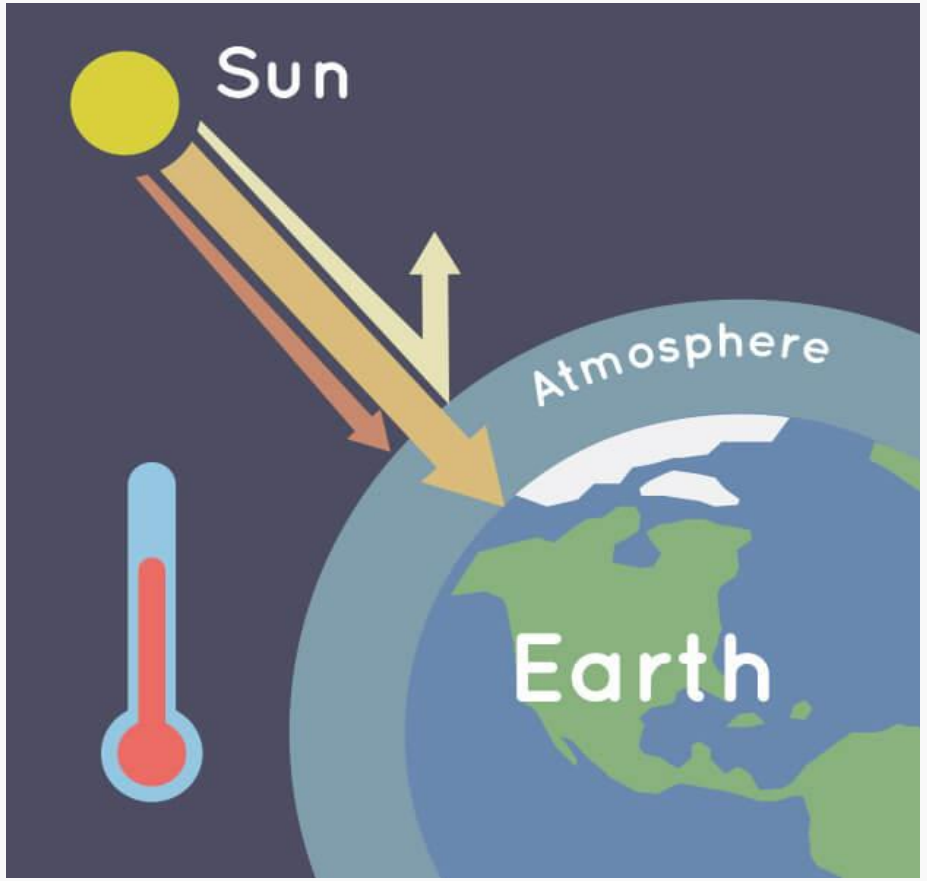
WHAT CAUSES EXTREME HEAT?
GREEN HOUSE EFFECT



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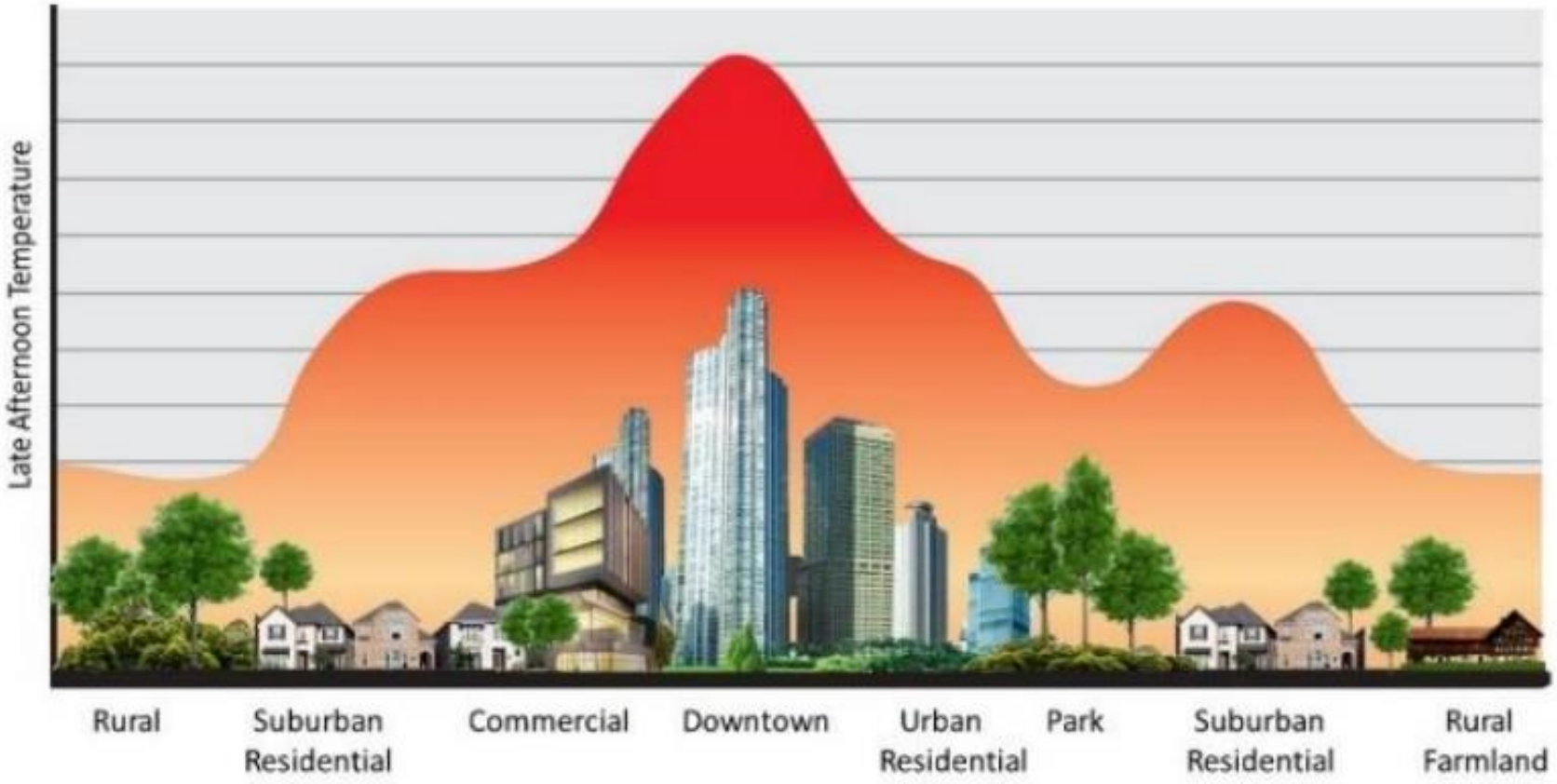
WHAT CAUSES EXTREME HEAT?
URBAN HEAT ISLAND



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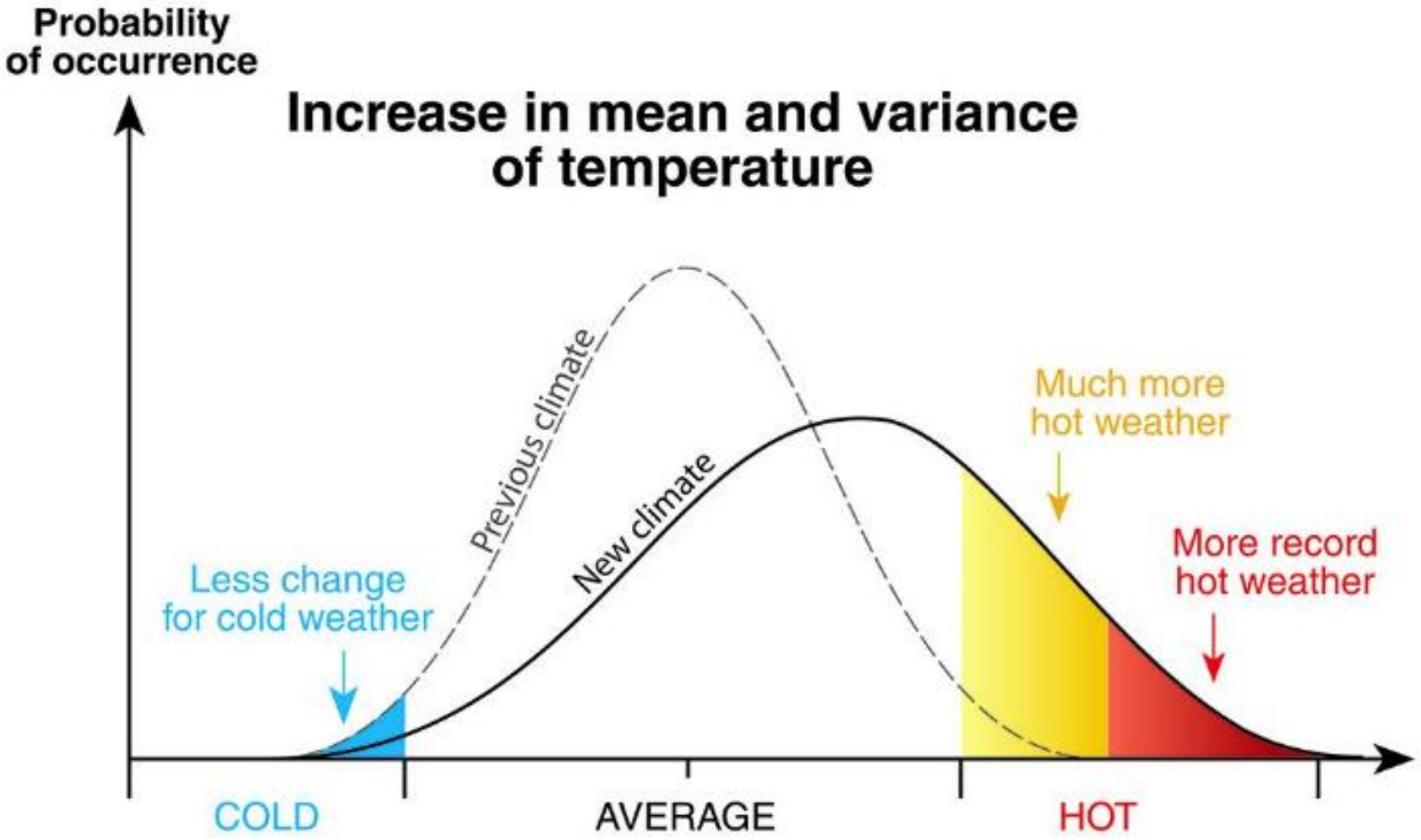
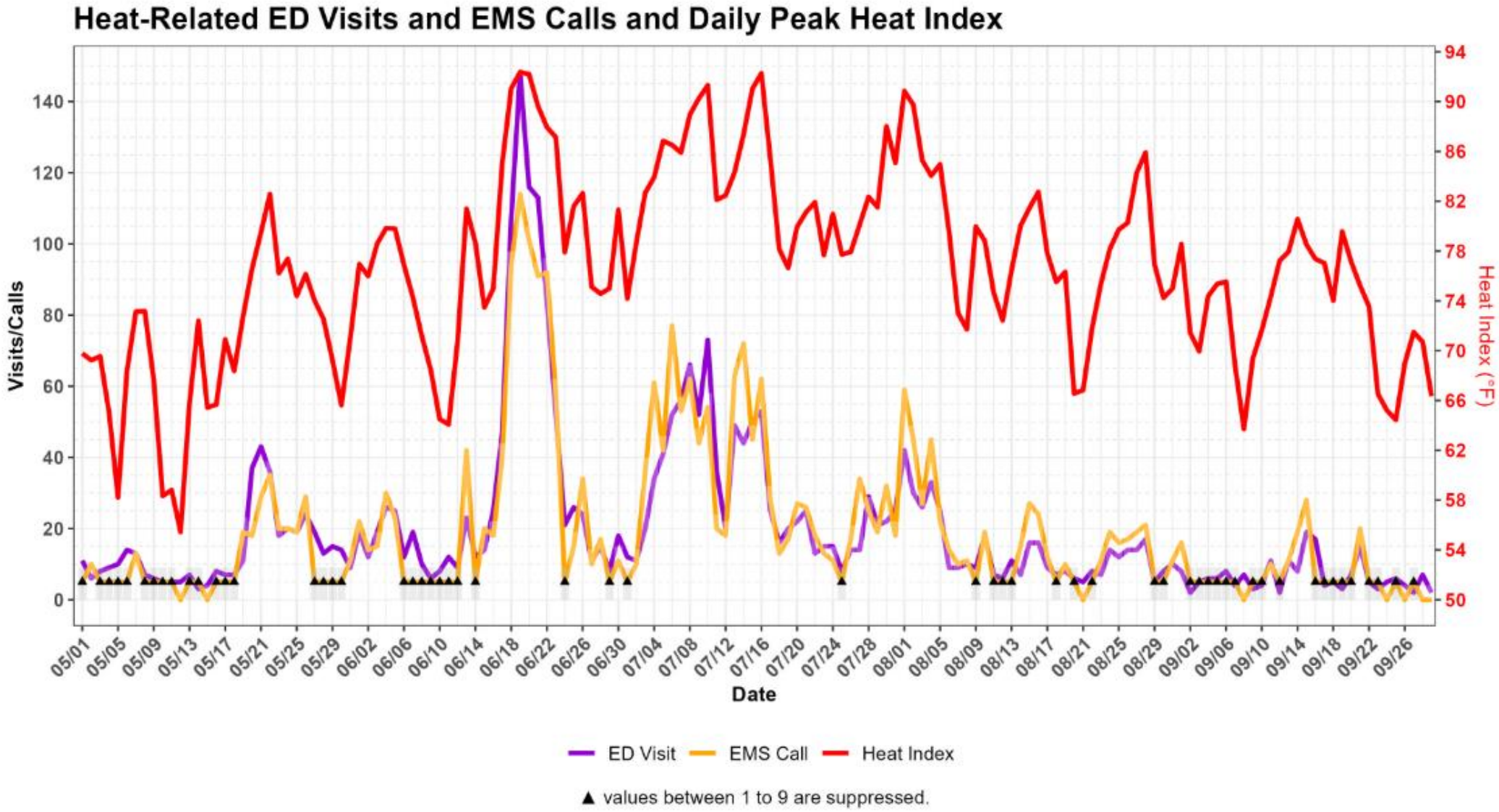
Response of Crops to Heat Stress - Sri Lankan Context.pdf

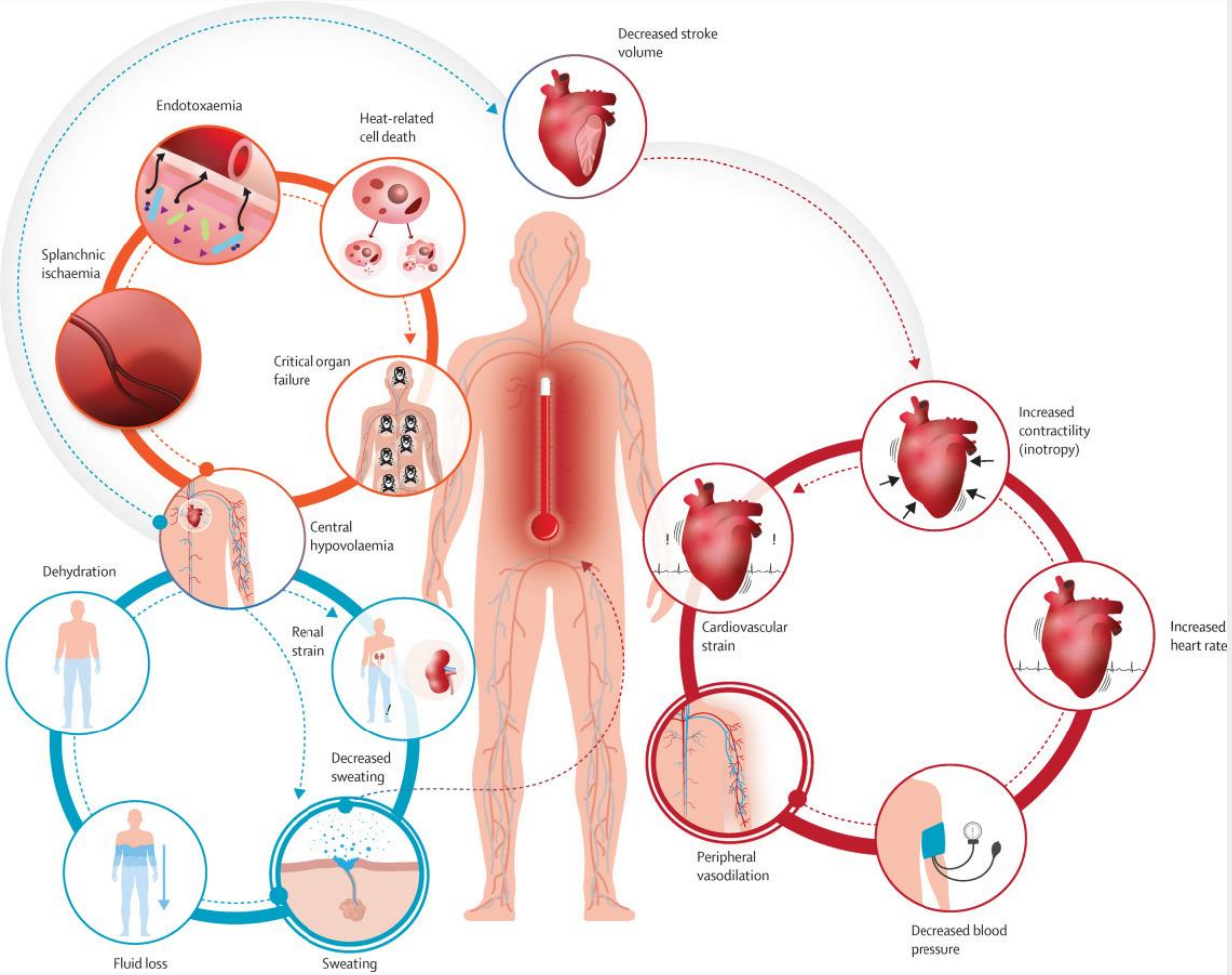


Based on findings from Intergovernmental Panel on Climate Change, 2012



NYSDOH Heat Surveillance Report | NYSDOH Heat Surveillance Report

EXTREME HEAT EFFECTS ON HUMAN HEALTH



- Temperatures that are too high have negative effects on body systems
  - Heart & Circulatory system
  - Lungs
  - Kidneys
  - Liver
  - Gastrointestinal tract
  - Brain
- When these systems begin to fail, we see the signs of heat related illnesses

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Extreme Heat Advice

EXTREME HEAT ILLNESS

Extreme Heat Advice

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CHILDREN ARE ESPECIALLY VULNERABLE TO HEAT

- Children have a greater surface area-to-body mass ratio than adults, which causes a greater heat gain from the environment on a hot day (Falk & Dotan, 2011)
- Children have a lower sweating capacity than adults, which reduces their ability to dissipate heat by evaporation (Falk & Dotan, 2011)
- Children have less adaptive capacity to change their environment and behavior while under thermal discomfort (Kennedy et al., 2020)
- Children have less experience recognizing the symptoms of heat stress (Kennedy et al., 2020)
- Children do not experience the same urge to drink water as adults (Casa et al., 2015)
- Children have less awareness of their own hydration status (Casa et al., 2015)

Arizona DOH: Managing Extreme Heat Recommendations for Schools

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EFFECTS ON LEARNING ENVIRONMENTS

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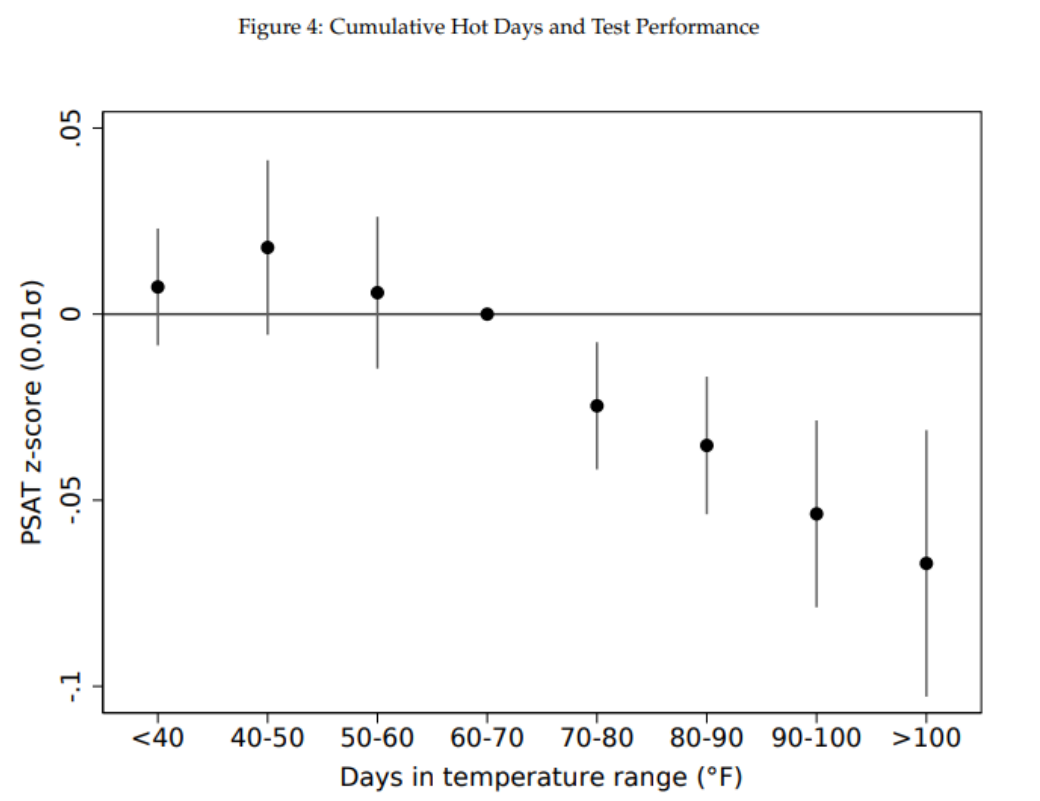
HEAT AND LEARNING



Heat and Learning - NBER 2019

In 2019, the Harvard Kennedy School of Government published a study on heat and learning. They concluded that:

- Cumulative heat exposure inhibits cognitive skill development and reduces academic achievement by decreasing the productivity of instructional time
- There was a measurable decrease in test scores that was directly associated with how many school days were above 90°F
- This effect was larger for low income and minority students
- This effect can be mitigated by air conditioning schools

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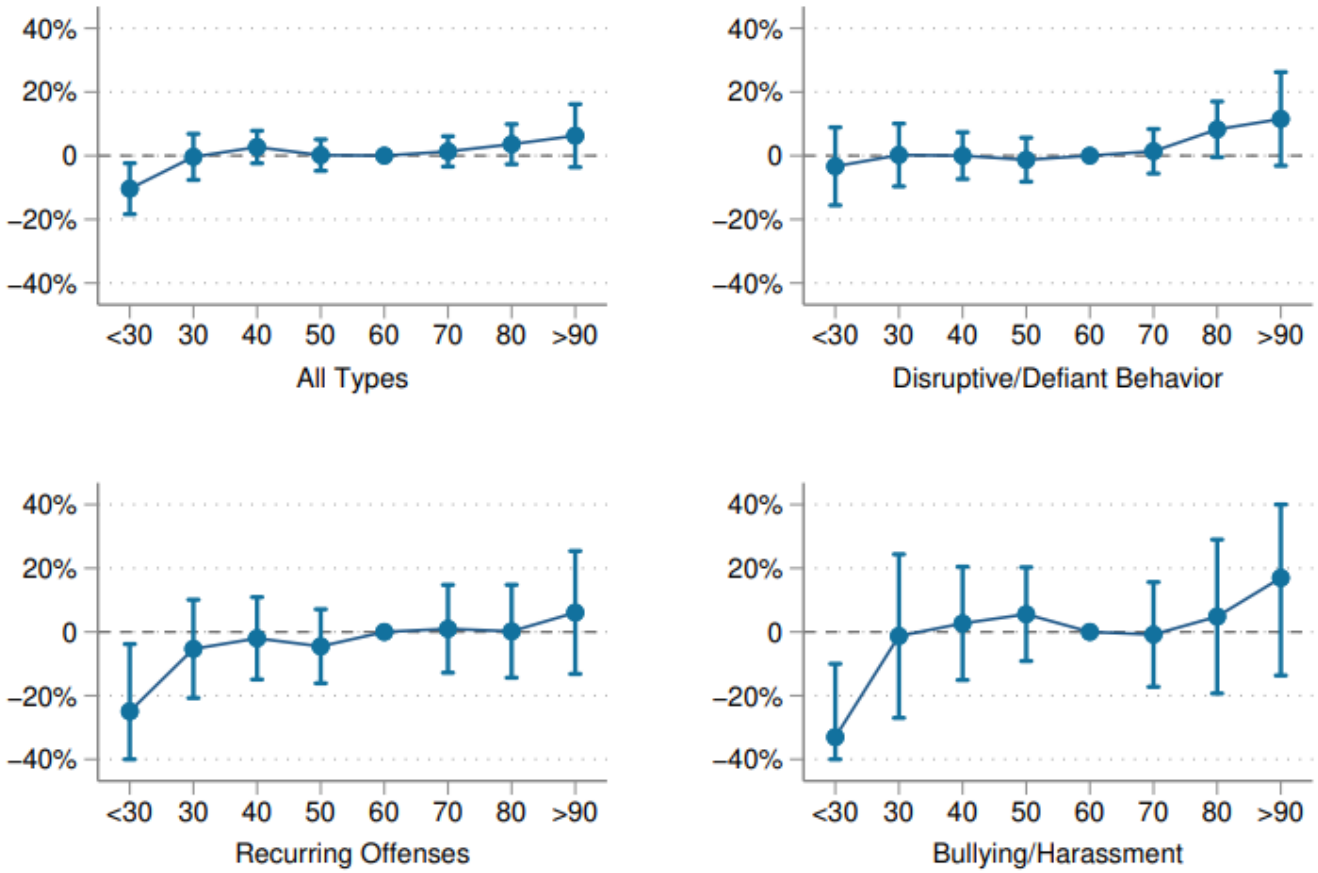
HEAT AND BEHAVIOR

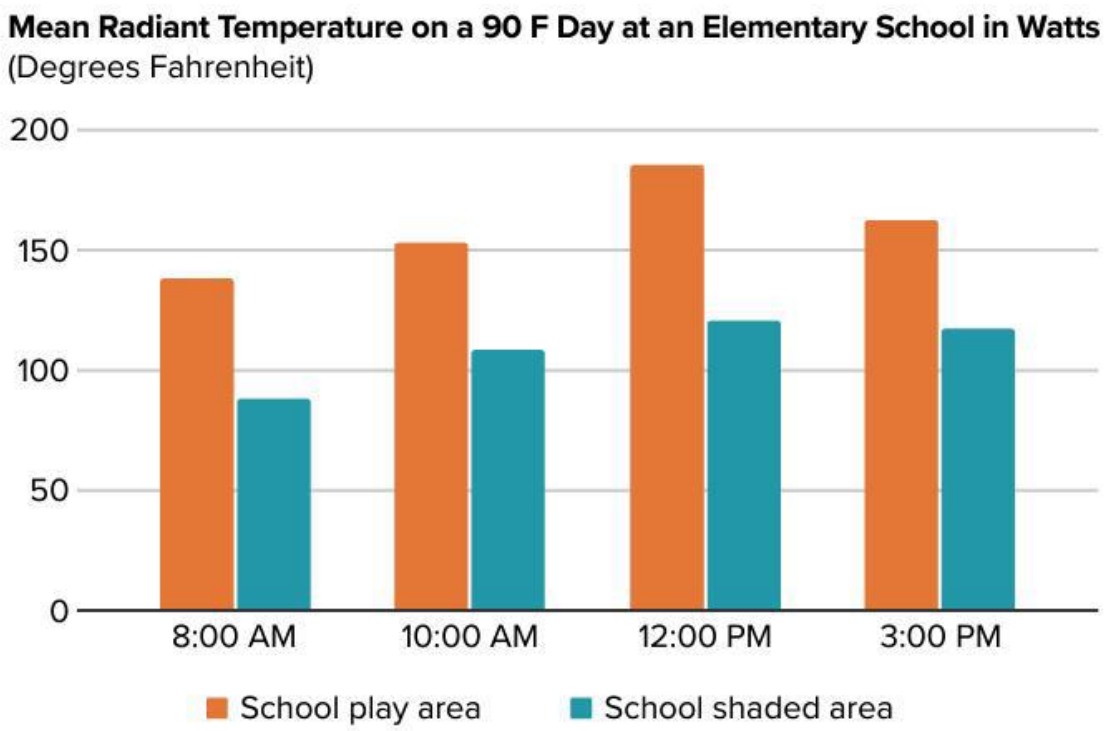
- Extreme temperatures exacerbate absenteeism, especially for minority and lower-income students
- Disciplinary referrals increase on hot days, with a significant effect only seen among students attending schools without air conditioning
- On days with temperatures between 80-90°F and exceeding 90°F, students are 4% and 9%, respectively, more likely to receive a disciplinary referral than on school days with temperatures between 60 and 70°F

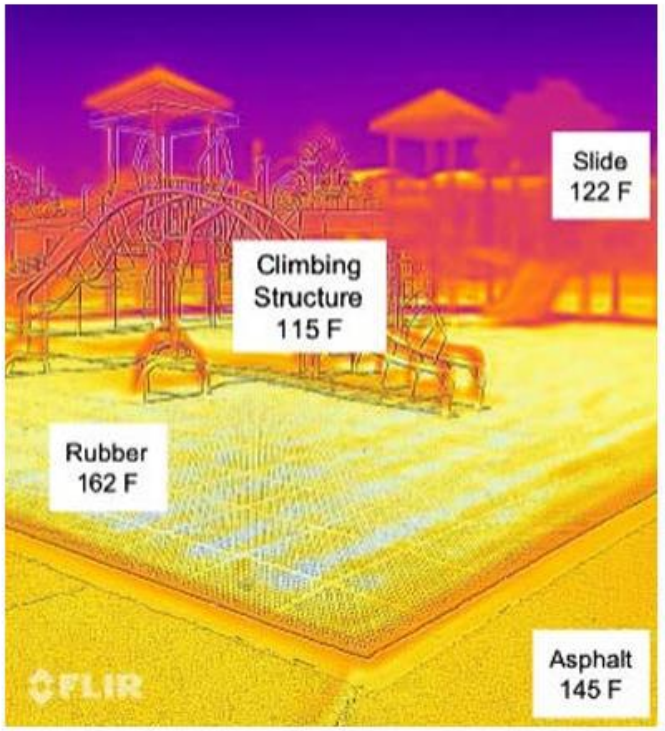


Education Under Extremes - McCormack 2024

HEAT AND PLAYGROUND MATERIALS

Figure 1. Illustrating heat burden from high surface temperatures in schoolyards with and without shade





Playgrounds and play equipment can reach dangerously high temperatures on hot days, but shade can help to reduce temperatures and mitigate risk. Source: V. Kelly Turner and Morgan Rogers, UCLA.

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Protecting-Californians-with-Heat-Resilient-Schools.pdf

HEAT AND ATHLETIC FIELDS

Table 4. Summary of the temperature data collected from four artificial and four natural turf fields.[1]

Field type	Time interval	Ambient temp. range	Surface temp. range	Surface temp. change	Surface temp. change per ambient degree change[2]
Town #1					
Art field	8:15-15:00	68-96°	75-130°	55°	2.0°
Nat field	9:10-16:00	72-95°	80-98°	18°	0.8°
Town #2					
Art field	8:20-15:00	63-83°	71-125°	54°	2.7°
Nat field	9:15-16:00	68-80°	69-86°	17°	1.4°
Town #3					
Art field	9:20-16:30	75-97°	91-125°	34°	1.5°
Nat field	10:15-17:50	80-96°	89-109°	20°	1.3°
Town #4					
Art field	8:20-14:40	78-98°	83-137°	54°	2.7°
Nat field	9:20-15:20	81-96°	80-98°	19°	1.2°

[1] All measurements are in degrees (°) Fahrenheit.
[2] Calculated as follows: surface temperature change/ambient temperature change.

CA Dept of Resources Recycling and Recovery - Turf Study 2010.pdf

NYSDOH - Crumb-Rubber Infilled Synthetic Turf Athletic Fields

- Synthetic turf fields absorb heat
- Generally, 35°F - 55°F hotter than natural grass
- Surface temperatures are much higher than the surrounding air
- Weather conditions that compound this effect
  - Sunny and clear, no clouds
  - Low humidity
- Highest temp variation published
  - 200°F field temp on a 98°F day (Williams and Pulley, 2002)

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FACTS & FIGURES: SUMMARY

- Children are especially vulnerable to the effects of extreme heat
- Long-term exposure to extreme heat inhibits cognitive skill development and reduces academic achievement
- Children already experiencing economic, environmental, and social disadvantages are the ones at the highest risk of exposure to extreme heat

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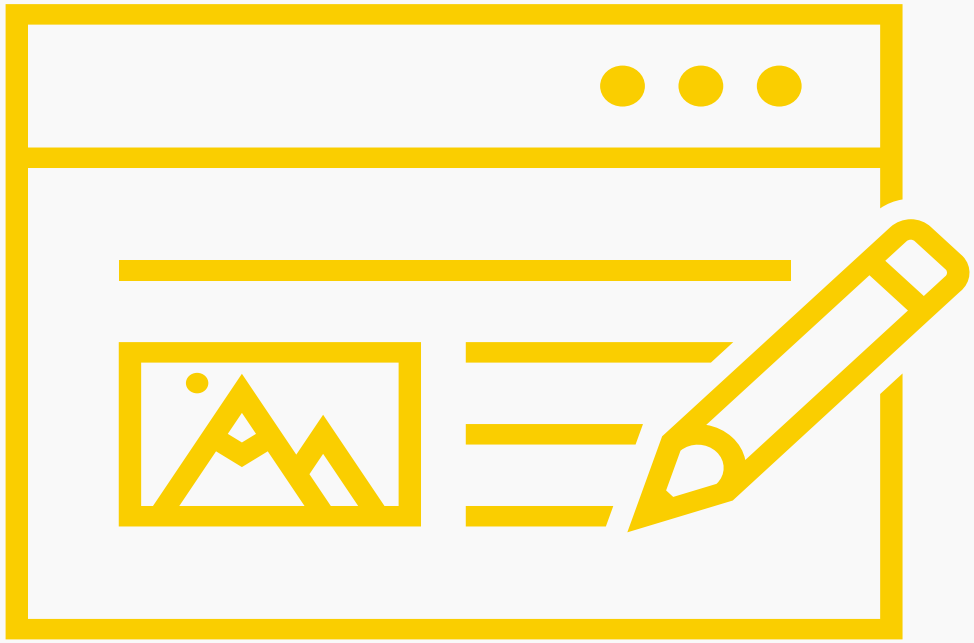
Part 2: Law & Order

LEGISLATION – MAXIMUM TEMPERATURE LAW

- **December 2024:** Education law was amended by adding a new section 409-n to set a maximum temperature in education and support service spaces
- Law is effective **September 1, 2025**



2024 - NY State Senate Bill - A9011A

New York Education Law Section 409-N

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ALL NYS PUBLIC SCHOOLS & BOCES

MUST Develop an Extreme Heat Policy

This should include:

- A policy for ensuring the health and safety of students, faculty, and other employees, on extreme heat condition days
  - ✓ Extreme heat condition days are defined as days when the occupiable educational and support services spaces are 82°F or greater

New York Education Law Section 409-N

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NEW SCHOOL REQUIREMENTS

- At 82°F, schools are required to take action to relieve heat-related discomfort in occupied spaces (kitchens are excluded)
- At 88°F, schools should have a plan to remove students and staff from occupied education and support spaces, when practicable

Remote Instruction in Emergency Conditions FAQ
New York State Education Department

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NYSED – OFFICE OF FACILITIES PLANNING

"Emergency remote instruction should only be provided if there is a board approved emergency remote instruction plan informed by the digital resources survey to ensure students have access to devices and internet at home to fully participate in instruction. These plans must be approved by the local board by September 1st and posted to the local website by October 1st per Commissioner's regulations."

Emergency Remote Instruction Plan Guidance
New York State Education Department

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HOW ARE WE DETERMINING TEMPERATURE?

Measure with a non-mercury thermometer:

- ✓In a shaded location
- ✓Three feet above the floor
- ✓Near the center of the room

New York Education Law Section 409-N

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NYSED – OFFICE OF FACILITIES PLANNING

Official Statement:

“88 Degrees may qualify as an extraordinary weather condition, and districts may choose to close school and provide remote instruction, but this is a local decision based on temperature and student safety, and no specific temperature will automatically trigger this provision. While this would likely be a problem in June, we note that districts cannot receive aid for more than five extraordinarily adverse weather days and must first exhaust their vacation days. Additionally, if remote instruction impacts the administration of Regents examinations, the Office of State Assessment has opined that schools may choose a location to administer the exams that differs from their typical practice if it complies with the requirements of the School Administrators Manual and provides a more conducive environment for student testing.”

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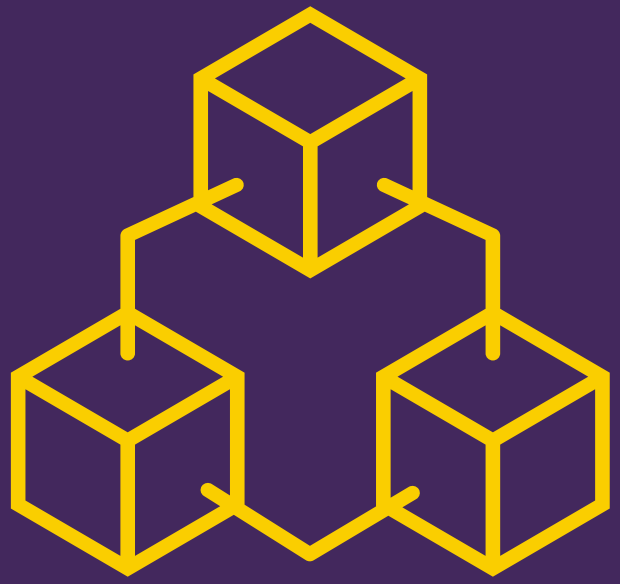
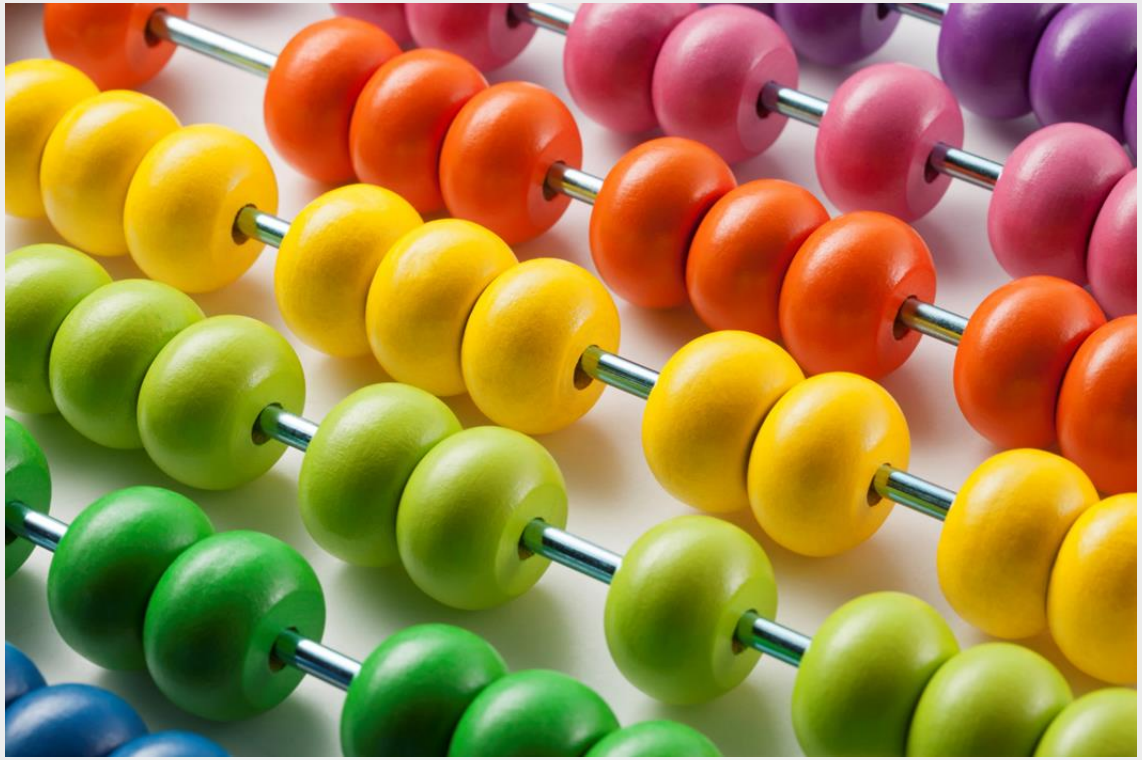
Part 3: Tips & Tricks



HEAT READINESS STRATEGY – WHAT IS IT?

- Proactive approach to build heat resiliency
- Practical steps for students, staff, and parents
- Recommendations for
  - Building Operation
  - Facility Upgrades



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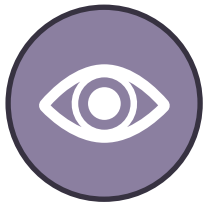
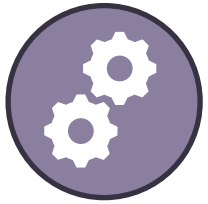
HEAT READINESS STRATEGY

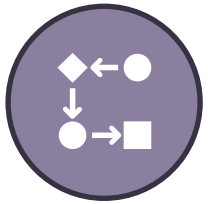


1. Evaluate

2. Take Action



3. Plan Ahead



4. Track Progress

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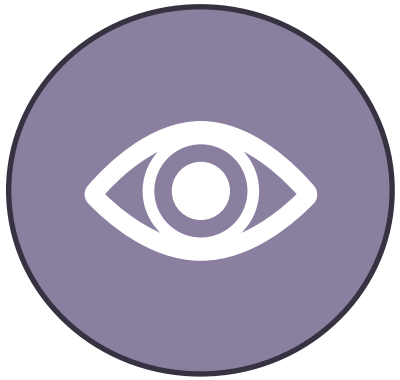

1. EVALUATE

- Environmental Conditions
- Prevention Strategies
- Staff Training
- Community Awareness

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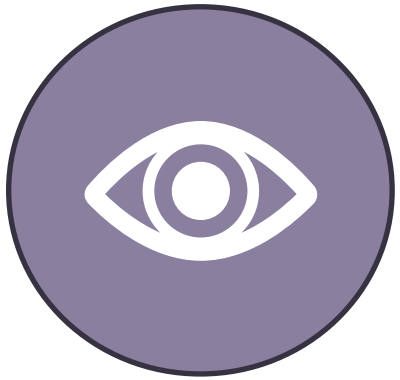

1. EVALUATE

- **Environmental Conditions**
  - ✓ Building Condition Questions:
    - What types of mechanical cooling are present, what is their condition, age, useful life left, and cost to replace?
    - Does the HVAC system provide air conditioning?
    - Does the school have window AC units in all education spaces?
    - When was the last time they received routine maintenance?

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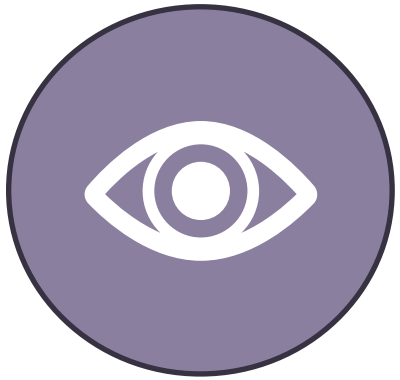

1. EVALUATE

- **Environmental Conditions**
  - ✓ Equipment Status
    - How old are the windows, and are they operational?
    - Do the windows have blinds or curtains that block UV light?
    - Are all classroom equipped with functioning fans?
    - Are all classrooms equipped with non-mercury thermometers?

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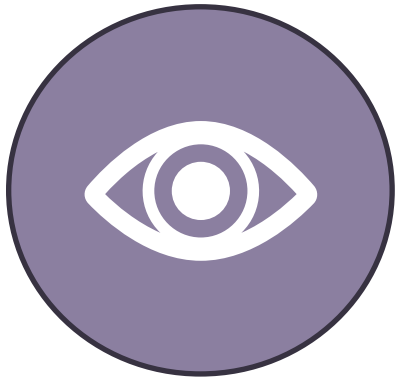

1. EVALUATE

- **Prevention Strategies**
  - ✓ Building Wide Strategies
    - What do we currently do on extreme heat days?
  - ✓ Facility Upgrades
    - Do we have any construction plans or capital projects in the works to address extreme heat?
  - ✓ Alternative Testing Facilities
    - Where are we sending students and staff if we need to relocate?

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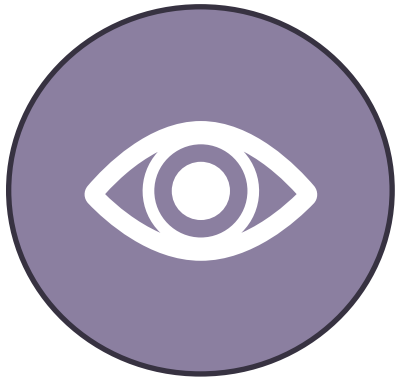

1. EVALUATE

- **Staff Training**
  - ✓ Do we have any administrative and environmental controls in place?
  - ✓ Do our staff and students know the signs and treatments for heat illness?
- **Community Awareness**
  - ✓ Are we communicating best practices for dealing with extreme heat to parents and guardians?

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2. TAKE ACTION

STAFF, STUDENTS, & GUARDIANS

- Stay informed
- Communicate frequently
- Administrative controls
- Environmental controls
- Heat illness information
- Best practices during extreme heat events

Extreme Heat and Health in New York State

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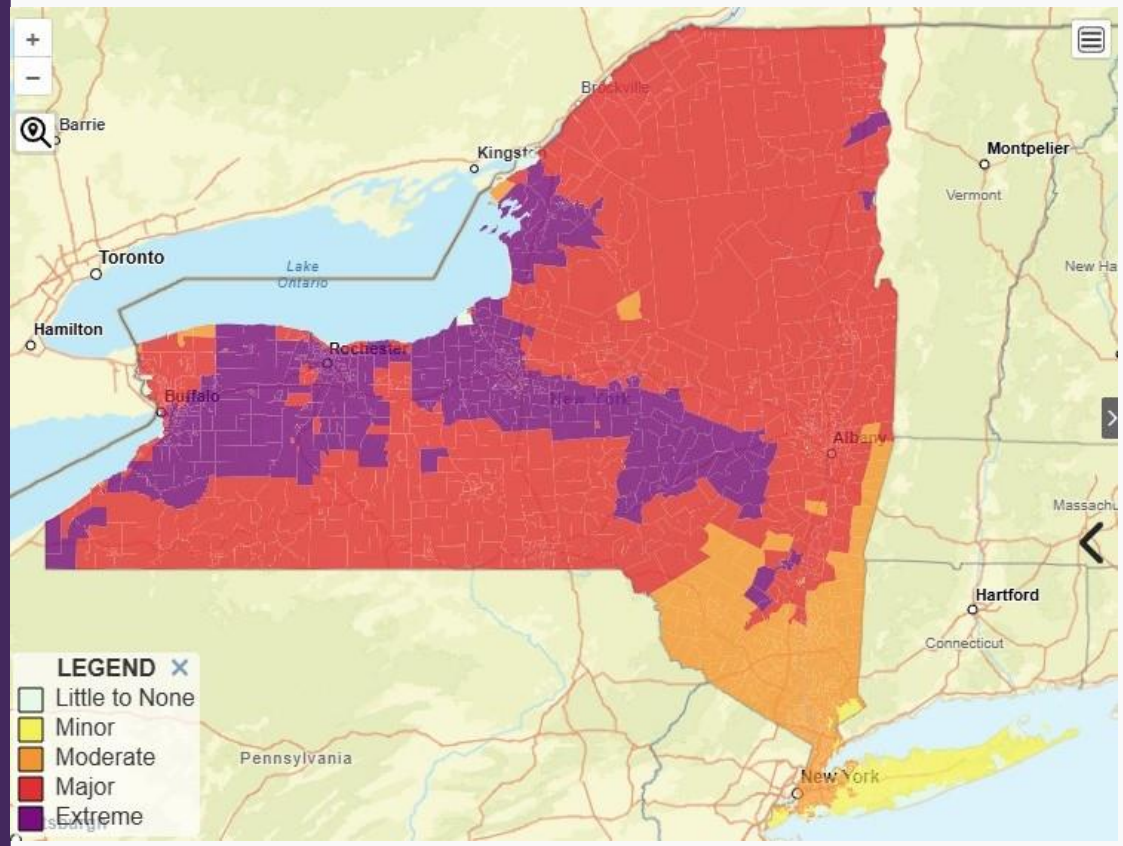
STAY INFORMED – NWS HEATRISK FORECAST

NWS Heat Risk



Heat & Health Tracker | Tracking | NCEH | CDC

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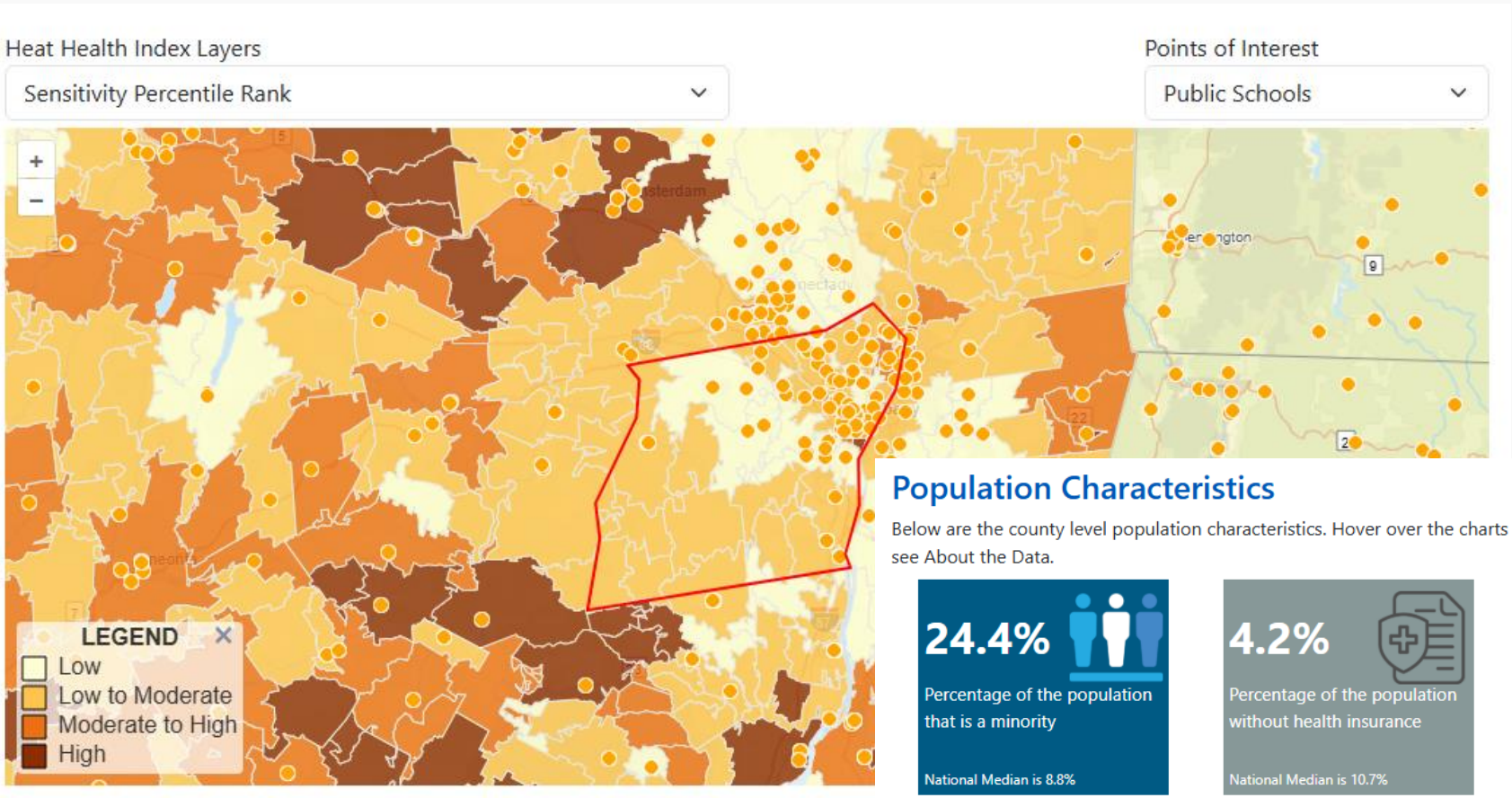
0 Green	Little to no risk from expected heat.
1 Yellow	**Minor** - This level of heat affects primarily those individuals extremely sensitive to heat, especially when outdoors without effective cooling and/or adequate hydration
2 Orange	**Moderate** - This level of heat affects most individuals sensitive to heat, especially those without effective cooling and/or adequate hydration. Impacts possible in some health systems and in heat-sensitive industries.
3 Red	**Major** - This level of heat affects anyone without effective cooling and/or adequate hydration. Impacts likely in some health systems, heat-sensitive industries and infrastructure.
4 Magenta	**Extreme** - This level of rare and/or long-duration extreme heat with little to no overnight relief affects anyone without effective cooling and/or adequate hydration. Impacts likely in most health systems, heat-sensitive industries and infrastructure.

STAY INFORMED – CDC HEAT & HEALTH TRACKER



Population Characteristics

Below are the county level population characteristics. Hover over the charts to see additional information. For more information on these measures, see About the Data.

24.4%
Percentage of the population that is a minority
National Median is 8.8%

4.2%
Percentage of the population without health insurance
National Median is 10.7%

4.5%
Percentage of the population with limited English-speaking ability
National Median is 1.7%

11.3%
Percentage of the population living in poverty
National Median is 12.8%

Age Breakdown

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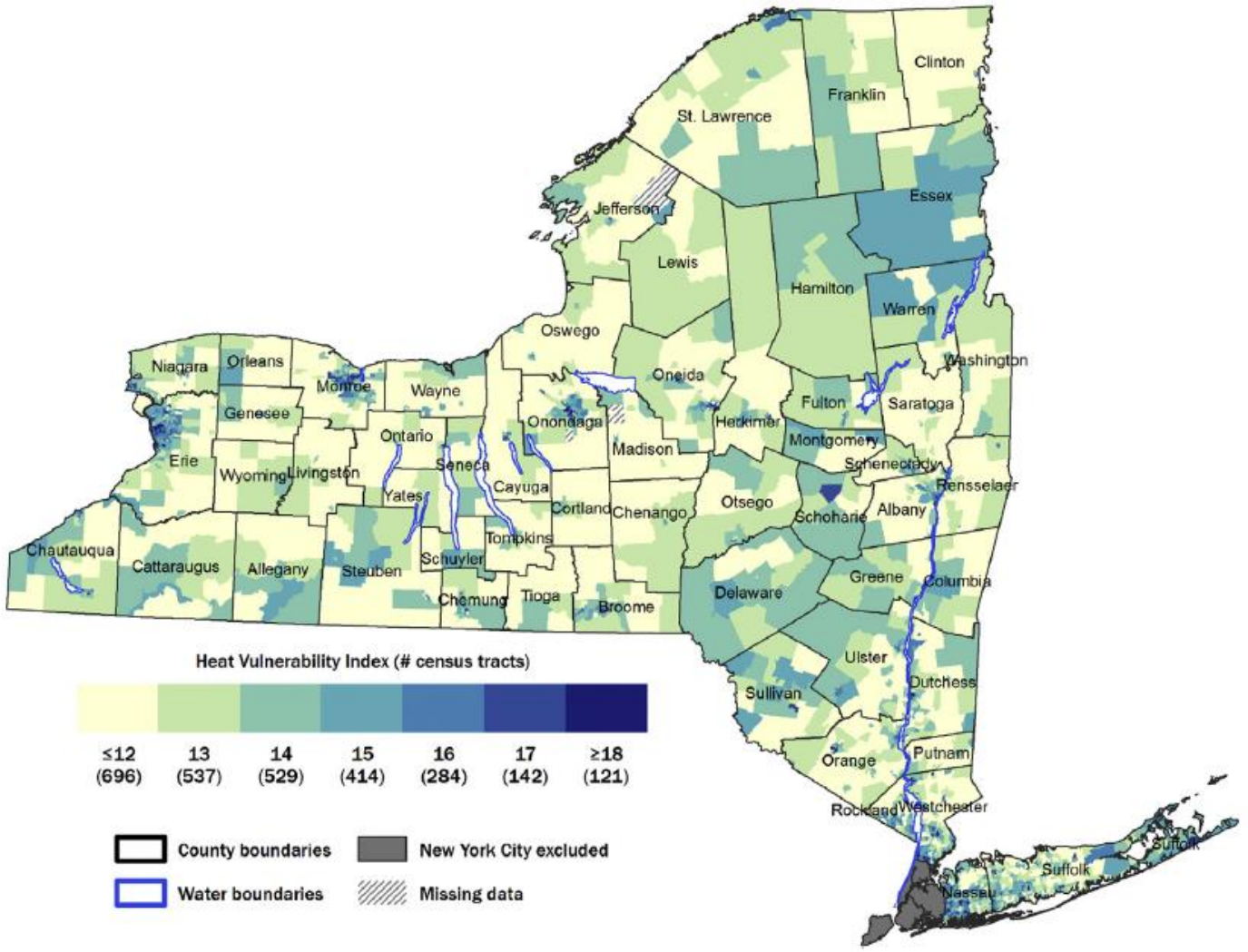
Heat & Health Tracker | Tracking | NCEH | CDC

STAY INFORMED – NYS HEAT VULNERABILITY INDEX

- Identifies geographic areas with populations that may be more vulnerable to extreme heat
- Helps direct adaptation resources based on characteristics of vulnerable populations
- Informs long-term heat adaptation planning efforts in the community



[Heat Vulnerability Index Maps]

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TAKE ACTION – ADMINISTRATIVE CONTROLS

For Faculty and Staff:

- Acclimation period (20% Rule)
- Modify Activities
- Scheduled rest/hydration breaks
- Increase the availability of cool drinking water (15°C/59°F)
- Move recess to before lunch
- Change times of outdoor activities

New York DOH - Extreme Heat Advice

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TAKE ACTION – ENVIRONMENTAL CONTROLS

- Pulling down shades
- Turning on fans
- Turning off unused electronics
- Providing water breaks
- Turning off overhead lights
  - While maintaining minimum lighting levels required by code for desk work, or during times of alternative activities
- Opening classroom doors and windows
  - Doors to the corridor must only be held open by approved code-compliant magnetic devices tied into the fire alarm and emergency systems

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TAKE ACTION - BEST PRACTICES FOR FAN USE

- Properly size the fan for the space
- Choose a quiet model
- Create a cross-breeze
- Draw in cool air and expel hot air
- Change ceiling fan rotation to counterclockwise, directing air downward

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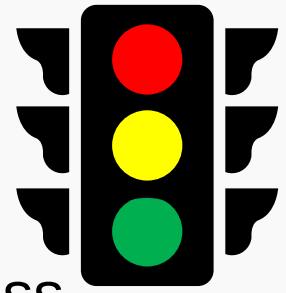
TAKE ACTION - WHAT ABOUT SPORTS?

New York State Public High School Athletic Association (NYSPHSSA) Heat Index Procedure

- The heat index (or feels-like temperature) on the field on should be measured **one hour** before the contest/practice by a certified athletic trainer, athletic director, or school designee **when the air temperature is 80 degrees (Fahrenheit) or higher**
  - Use the WeatherBug app or website and your location to determine next steps
  - If the heat index is in the "Recommended" range, the designated school personnel must re-check the heat at the midway point of the contest or practice
  - If the heat index is in the "Required" range, the contest must be suspended, or practice must be cancelled
  - Temperature of synthetic turf fields can be 35°F - 55°F hotter than grass



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Wet Bulb Globe Temperature: How and when to use it

	Feels Like Temp(Heat Index) under 79 degrees	Full activity. No restrictions
R **E** **C** **O** **M** **M** **E** **N** **D** **E** **D**	Heat Index Caution: Feels Like Temp (Heat Index) 80 degrees to 85 degrees	Provide ample water and multiple water breaks. Monitor athletes for heat illness. Consider reducing the amount of time for the practice session.
	Heat Index Watch: Feels Like Temp (Heat Index) 86 degrees to 90 degrees	Provide ample water and multiple water breaks. Monitor athletes for heat illness. Consider postponing practice to a time when Feels Like temp is lower. Consider reducing the amount of time for the practice session. 1 hour of recovery time for every hour of practice (ex. 2hr practice = 2hr recovery time).
	Heat Index Warning: Feels Like Temp (Heat Index) 91 degrees to 95 degrees	Provide ample water and water breaks every 15 minutes. Monitor athletes for heat illness. Consider postponing practice to a time when Feels Like temp is much lower. Consider reducing the amount of time for the practice session. 1 hour of recovery time for every hour of practice (ex. 2hr practice = 2hr recovery time. Light weight and loose fitting clothes should be worn. For Practices only Football Helmets should be worn. No other protective equipment should be worn.
REQUIRED	Heat Index Alert: Feels Like Temp (Heat Index) 96 degrees or greater	No outside activity, practice or contest, should be held. Inside activity should only be held if air conditioned.

Heat Illness	Signs & Symptoms	Treatment Actions
Heat Rash	• A group of small red to purple bumps (1 to 2 millimeters), like tiny pimples or blisters • Commonly found where skin touches skin	Get to a cool place, apply cool water to irritated area and allow to air dry. Wear loose fitting clothing. Seek medical attention if severe pain or itching accompany rash.
Heat Cramps	• Muscle spasms • Involuntary jerking movements • Severe muscle pain • Profuse sweating • Moist, flushed skin • Running a fever	Get to a cool place and drink lots of water to restore fluids and electrolytes. Seek medical attention if the symptoms do not improve with rest and rehydration.
Heat Exhaustion	• Heavy sweating • Cold, clammy skin • Muscle cramps • Lightheadedness or feeling faint • Headache • Decreased energy • Loss of appetite or nausea	Get to a cool place and drink lots of water to restore fluids and electrolytes. Seek medical attention if the symptoms do not improve with rest and rehydration.
Heat Stroke DOH - Extreme Heat Advice	• Hot, dry skin, body temp of 105°F or over • Confusion, hallucinations, and disorientation • Loss of consciousness • Nausea or vomiting • Trouble breathing • Fast, strong pulse • Weakness or dizziness	Seek medical attention immediately! Call 911 or go to an emergency room. Wrap ice packs in cloth and place at neck, wrists, ankles, and armpits while you wait for help to arrive.

TAKE ACTION – STUDENTS, PARENTS, AND GUARDIANS

- Alert students and guardians at least 24 hours in advance of expected heat events
- Closely monitor the situation and update as needed
- Recommend precautions
  - ✓ Apply sunscreen and lip balm prior to school
  - ✓ Dress in lightweight, breathable, school-appropriate clothing
  - ✓ Bring hats and sunglasses for outdoor activities
  - ✓ Have a water bottle
  - ✓ Hydrate adequately before, during, and after outdoor activity

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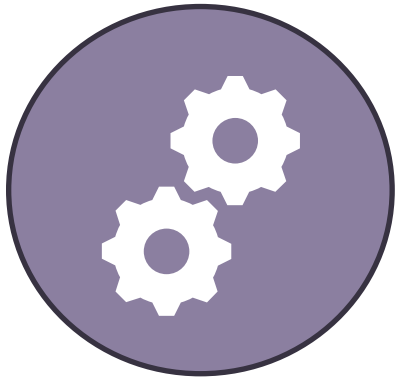
Tips to Keep Kids Safe When Temperatures Soar - HealthyChildren.org



3. PLAN AHEAD

Prevention Strategies:

- Improve infrastructure
- Upgrade facilities
- Focus on upgrades that improve heat resilience

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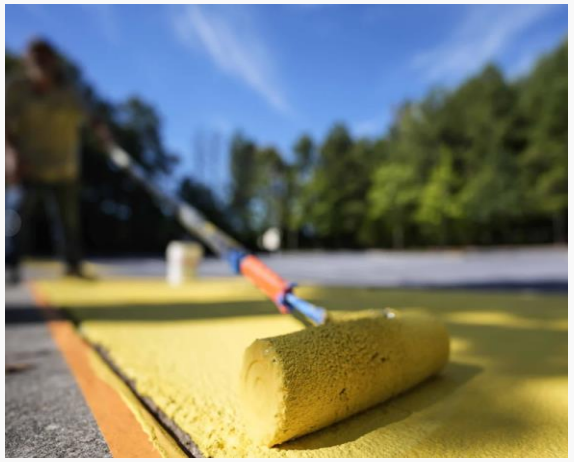
FACILITY UPGRADES



- Plant trees
- Cool roof installation
- Heat pump/HVAC installation
- Seal windows
- Add sun-blocking structures
- Decrease asphalt
- Increase permeable surfaces
- Re-design play space to avoid surfaces that radiate heat
- Increase water access
- Check with SED about permitting and funding initiatives

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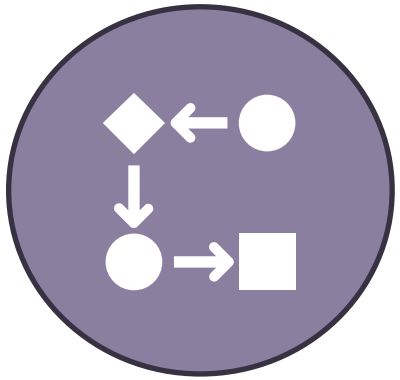
Be Creative!



4. TRACK PROGRESS

YOU CANNOT MANAGE WHAT YOU DO NOT MEASURE

- Record
- Reevaluate
- Communicate

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THANK YOU!

Contact Information

Phone: 518-402-7800

Email:
School.Environmental.Health@health.ny.gov

Website:
https://www.health.ny.gov/SchoolEnviroHealth

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Program Staff: New York State Department of Health, Center for Environmental Health

- Michele L. Herdt, PhD, MPH
- Amanda St. Louis, MSPH
- Alicia Lee, MPH
- Todd Crawford
- DJ Gilmore, MPH
- Emma Heubel, MPH
- Tomi Mile
- Joelle Burnham, MS
- Jessica Marble
- Erin Gibson, MPH
- Kathryn Connell, MPH, CHES
- Christina Bridge, MHS

Department of Health