Heat, Humidity, And the Human Body

Belfast Climate Crisis Committee

- The human body has built in mechanisms to regulate its internal temperature to 98.6 deg F.

- The maximum skin surface temperature for a healthy person is 95 deg F. This 3.6 deg difference allows the heat generated by the body's metabolism to escape.

- Sweating, and the evaporation of sweat, is crucial to this cooling process, and will start when the difference between the skin temperature and the internal temperature narrows.

- When a combination of air temperature and humidity (water content) rises to a 'wet bulb' temperature of 95 deg maximum, the critical cooling mechanism of sweating no longer works, leading to organ and brin damage from high internal temperature **if maintained**.

- There are several factors which lower the critical wet bulb temperature for an individual:
  - Low blood circulation due to heart/vascular disease.
  - Amounts and types of clothing which block sweat evaporation.
  - Direct heating from solar radiation.
  - Exercise (work) which increases the metabolic heat generation.

- The brain, which absorbs ~30% of the body metabolic output, is high on the failure list, along with the heart and kidneys, when internal temperature rises out of control.

- Long exposure to high wet bulb temperature can lead to adaptation and increased tolerance: the sweat produced is lower in salinity, thereby slowing the loss of critical electrolytes. In Maine, these conditions are rare enough to preclude adaptation.

- ***An example of the critical wet bulb temperature that may be applicable to the climate in Maine: A temperature of 90 deg F with a humidity of 70% is at the beginning of the danger zone; at 80% the conditions are very dangerous if prolonged.***

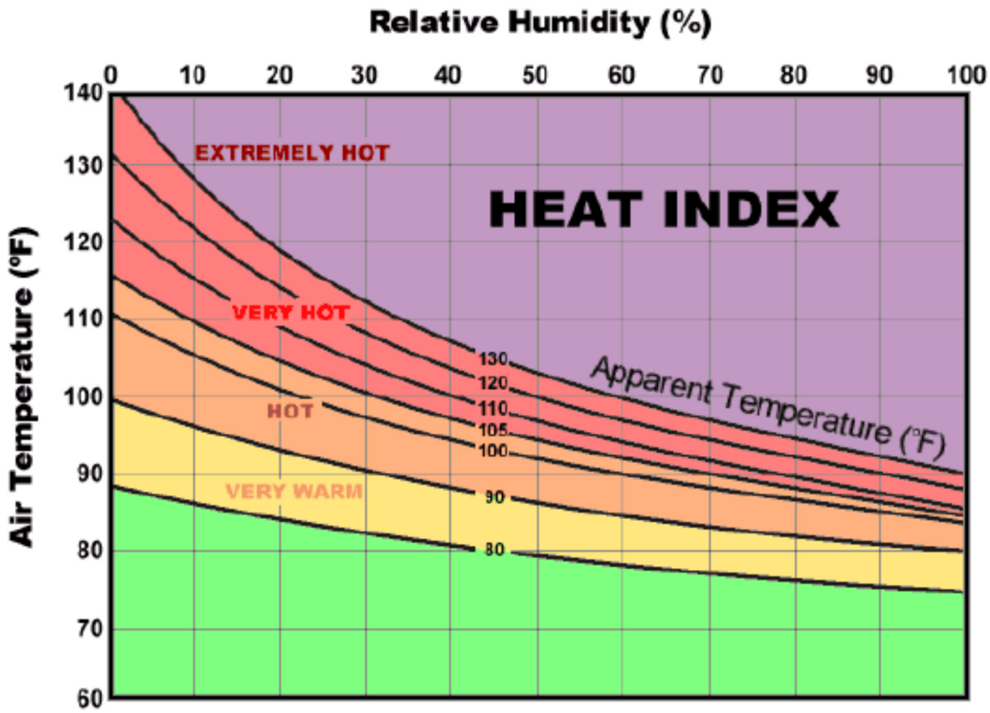
- Exposure to full sun and wind can increase the wet bulb temperature by as much as 15 degrees.

- Much more information is available at:

  http://www.weather.gov/safety/heat

- The figure below shows the relationship between air temperature, relative humidity, and the Apparent Temperature sensed by you body/.

Reference: https://www.weather.gov/oun/safety-summer-heatindex



How to read the chart...Follow the temperature line until it intersects the relative humidity line. Then read the Heat Index on the curved line. For example, an air temperature of 100°F and Relative Humidity of 40%. Follow the 100°F temperature line until it intersects the 40% relative humidity line. Then curved line that also intersects is the Heat Index of 110°F, or Very Hot. That is the temperature the body thinks it is and attempts to compensate for that level of heat. Remember, these values are in the SHADE. You can add up to 15°F to these values if you are in direct sunlight.

The chart below tells you the risk to the body from continued exposure to the excessive heat.

I	Extremely Hot	**130°F or Higher**	Heat/Sunstroke **HIGHLY LIKELY** with continued exposure
II	Very Hot	**105°F - 130°F**	Sunstroke, heat cramps, or heat exhaustion **LIKELY**, and heatstroke **POSSIBLE** with prolonged exposure and/or physical activity
III	Hot	**90°F - 105°F**	Sunstroke, heat cramps, or heat exhaustion **POSSIBLE** with prolonged exposure and/or physical activity
IV	Very Warm	**80°F - 90°F**	Fatigue **POSSIBLE** with prolonged exposure and/or physical activity