THE
ATMOSPHERIC RESERVOIR
Examining the Atmosphere and Atmospheric Resource Management

The Heat Index

By Mark D. Schneider

Temperatures and humidity combined to make weather conditions oppressive across North Dakota this summer. There were days when the heat felt overbearing and air conditioning became more of a necessity than a luxury. At first observation, the temperatures themselves weren't that unusual, with 85 to 95 degree readings for daily highs. However, the dew points, which are an indication of the moisture in the atmosphere, were the highest seen in many years.

Dew points during an average North Dakota summer typically reach 65 to 70 degrees. This summer, however, we experienced dew points most commonly seen along the U.S. Gulf Coast. Several locations in the state recorded dewpoint temperatures in the low 80s in the middle of July, almost unheard of in this part of the country. Reasons for this above normal moisture include evaporation from saturated soils and vegetation across the state and weather patterns, which frequently brought moist southerly flow from the central plains.

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	118	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | External Danger

Our bodies feel the greatest effects of heat when high humidity is combined with warm temperatures. We measure this using what's called the Heat Index (HI). The National Weather Service (NWS) defines the HI as: "an accurate measure of how hot it really feels when the Relative Humidity (RH) is added to the actual air temperature." The HI graphic shows the "feels like" temperatures at various temperatures and humidities. As you can see, dangerous HI can occur at temperatures as low as the mid-80s if the humidity is high.

There are other formulas to compute HI as well. Environment Canada computes HI using dew point temperatures instead of RH as its measurement of moisture. Both indices are very good at approximating how the outside air actually feels to us.

The physiological basis for the creation of the HI is that moist air doesn't allow our bodies to cool themselves as quickly as with dry air. This is explained by slower evaporation (and thus cooling) of sweat and perspiration in moist air versus drier air. If we're unable to cool off, conditions such as heat cramps and even heat stroke can occur. These health conditions are very serious and the NWS issues Excessive Heat Outlooks, Watches, Warnings, and Advisories when conditions are favorable for dangerous heat.

The HI on many July afternoons soared beyond the century mark and in some cases, dangerously approached 120 degrees. So if you think that the 90-degree heat this summer felt warmer than normal, you weren't just imagining it.

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