Iowa Climate Statement 2017: It's not just the heat, it's the humidity!

Uncomfortable humidity, water-logged spring soils (1), extreme rain events, mold (2), and mosquitoes (3) are all expected to become more prevalent in Iowa due to a rarely discussed impact of climate change: increased humidity (4-6).

Discussions about climate change in Iowa usually focus on changes in temperature and rainfall. However, the rise in "absolute humidity" (moisture in the air) is likely to become the most pervasive factor in climate change across the state. Absolute humidity, which is typically measured by dew point temperature, increased in Dubuque during springtime by 23% from 1970 to 2017 (7). Increases in humidity have been measured across the Midwest (5, 8-13) and in Iowa across all seasons and at all long-term monitoring stations (7).

Humidity couples with temperature to create the "heat index" that is a measure of how hot it feels. For example, on August 10 last year the temperature of 92^{o}F and dew point of 77^{o}F combined to feel like 106^{o}F (14).

High levels of humidity create hazardous conditions for Iowa workers and sensitive populations through the danger of heat exhaustion and heatstroke (15). Allergic rhinitis and asthma are worsened by heightened exposures to mold and dust mite allergens in humid environments (2). There also is evidence for increased aggression and societal violence associated with hot, humid weather (16).

For Iowa agriculture, increased warm-season humidity leads to increased rainfall, extreme rain events, water-logged soils during planting season, soil erosion, and runoff of chemicals to waterways. Rising humidity also leads to longer dew periods and higher moisture conditions that elevate costs of drying grain and increase populations of many pests and pathogens harmful to both growing plants and stored grain (17). Increased nighttime temperatures coupled with humidity causes stress to crops (18), livestock and pets (19) and, in extreme cases, heat stress can cause loss of life.

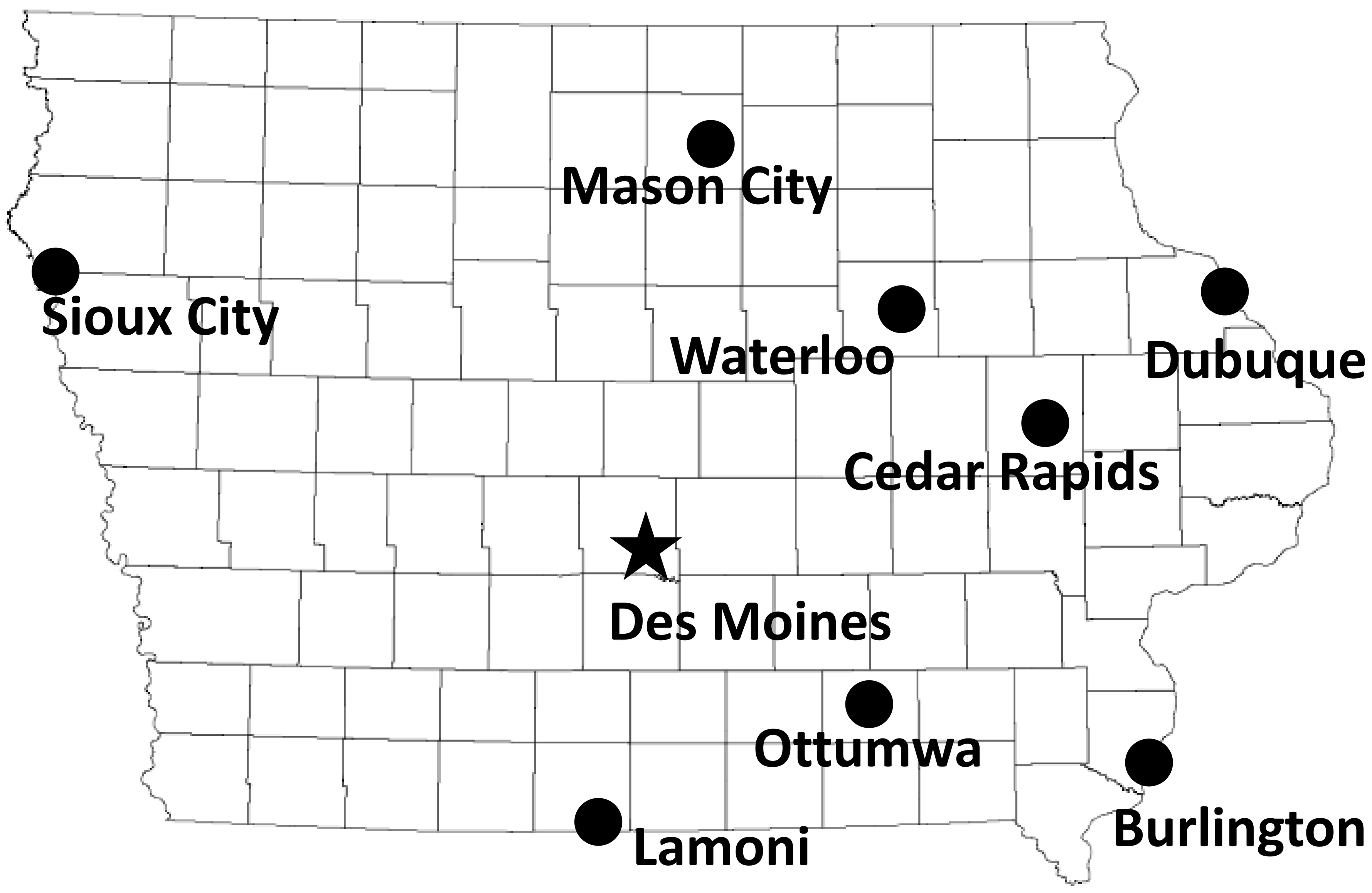
Humidity also affects materials, leading to more than just out-of-tune pianos and frizzy hair: increased moisture in the air accelerates metal corrosion, rot and warping of wood, and peeling of paint. Costs of air conditioning to protect materials and improve human comfort levels likewise increase with rising humidity (20).

Iowans should recognize that the damaging effects of increased humidity rival those of higher temperatures and heavy precipitation, and create unique needs for adapting our infrastructure. We must all do more to mitigate the effects of climate change, by curtailing emissions of heat-trapping gases, improving energy efficiency, and increasing use of clean and renewable energy.

Iowa Climate Statement 2017:
It's not just the heat, it's the humidity!

Absolute humidity, which is typically measured by dew point temperature, is increasing in Iowa in all seasons and at all long-term monitoring stations.

Long-term Monitoring Stations in Iowa

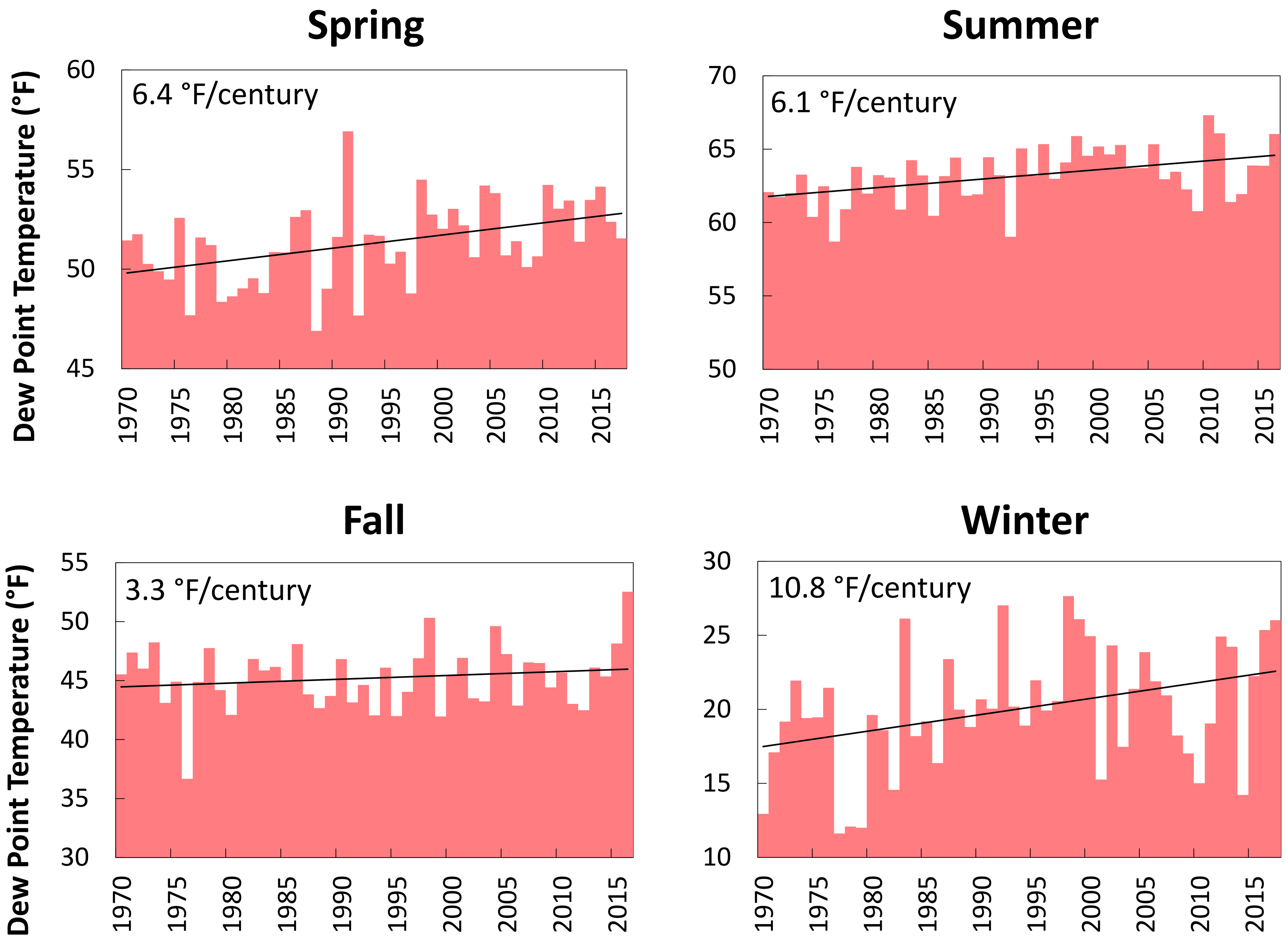


Increasing Average Dew Point Temperatures (°F/century)

	Winter	Spring	Summer	Fall
Burlington	**12.5**	**7.4**	**5.1**	3.6
Cedar Rapids	**12.5**	**12.7**	**7.3**	**10.0**
Des Moines	**10.8**	**6.4**	**6.1**	3.3
Dubuque	**11.4**	**12.4**	**16.4**	**9.5**
Lamoni	1.7	**6.1**	**5.5**	3.8
Mason City	**13.0**	**4.5**	**4.1**	2.6
Ottumwa	6.4	**6.8**	**5.5**	3.7
Sioux City	**8.9**	**4.7**	**5.8**	4.7
Waterloo	**17.2**	**5.8**	**7.3**	**5.8**

Bold indicates statistical significance at the 95% confidence interval
Winter is December, January, February; Spring is April, May, June; Summer is June, July, August; Fall is September October, November.

Dew point temperature increases in Des Moines (1970-2017)



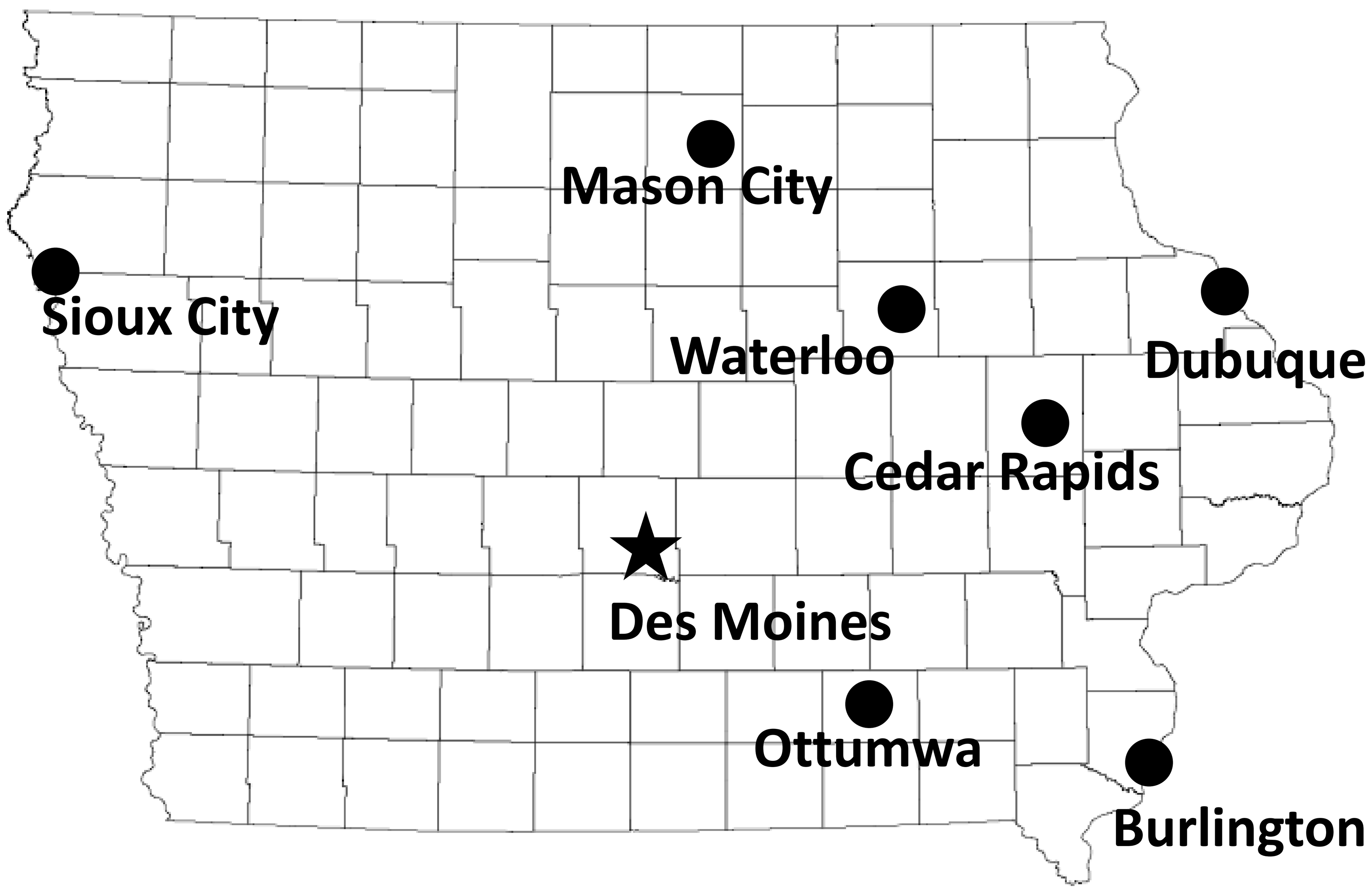
Data source: Iowa Environmental Mesonet, 2017: Dew point temperatures. Available online at mesonet.agron.iastate.edu

Graphics prepared by Sidney DeBie, Graduate Student, University of Iowa

Iowa Climate Statement 2017: It's not just the heat, it's the humidity!

Humidity is on the rise across the state, at all monitoring long-term monitoring sites and across all seasons.

Long-term Monitoring Stations in Iowa

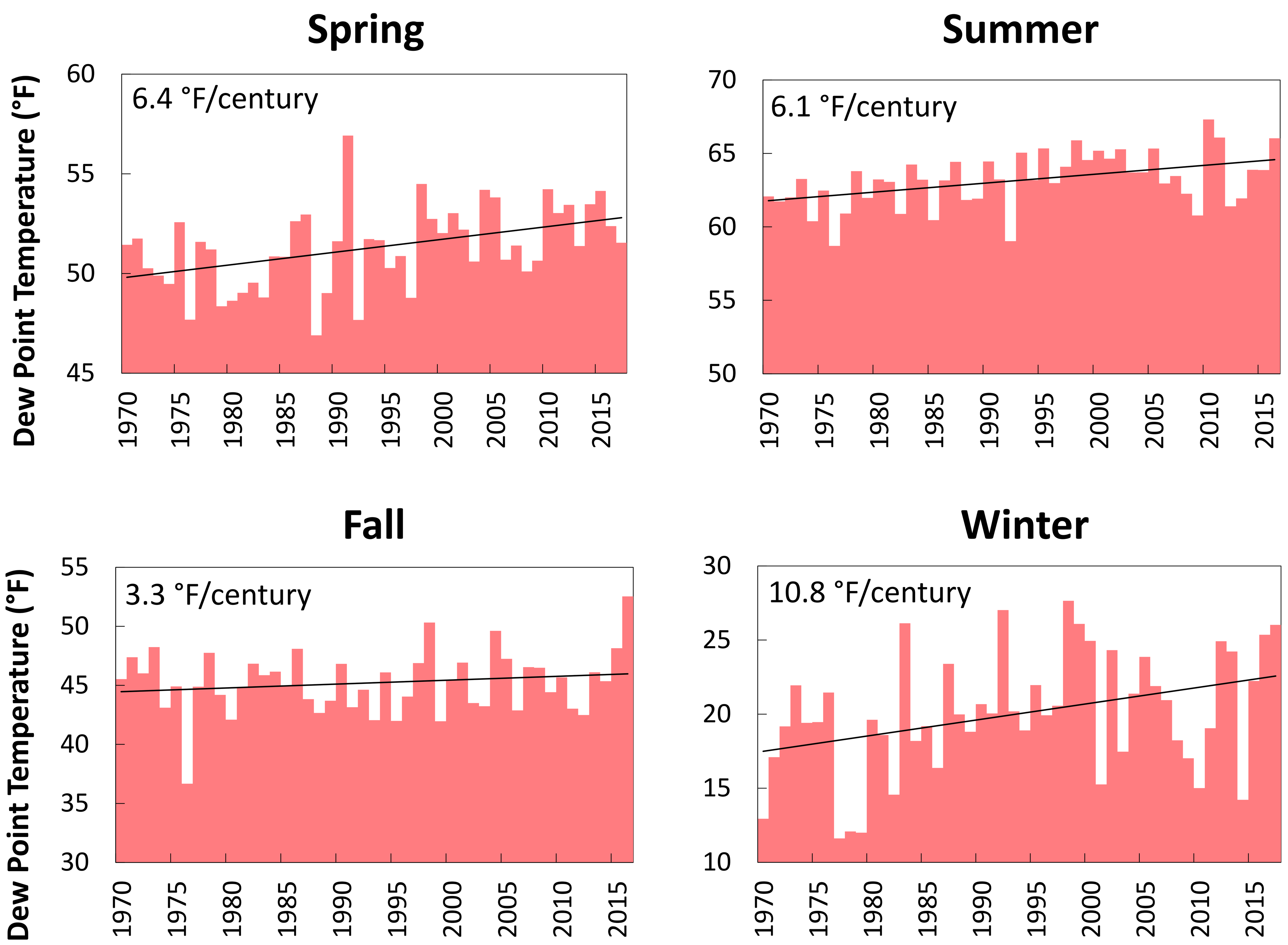


Average Increase in Absolute Humidity since 1971

Burlington	14.8
Cedar Rapids	22.2*
Des Moines	11.9
Dubuque	23
Mason City	8
Ottumwa	11.5*
Sioux City	9.2
Waterloo	10.7

*Average increase since 1973

Dew point temperature increases in Des Moines (1970-2017)



Data source: Iowa Environmental Mesonet, 2017: Dew point temperatures. Available online at mesonet.agron.iastate.edu

Graphics prepared by Sidney DeBie, Graduate Student, University of Iowa

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