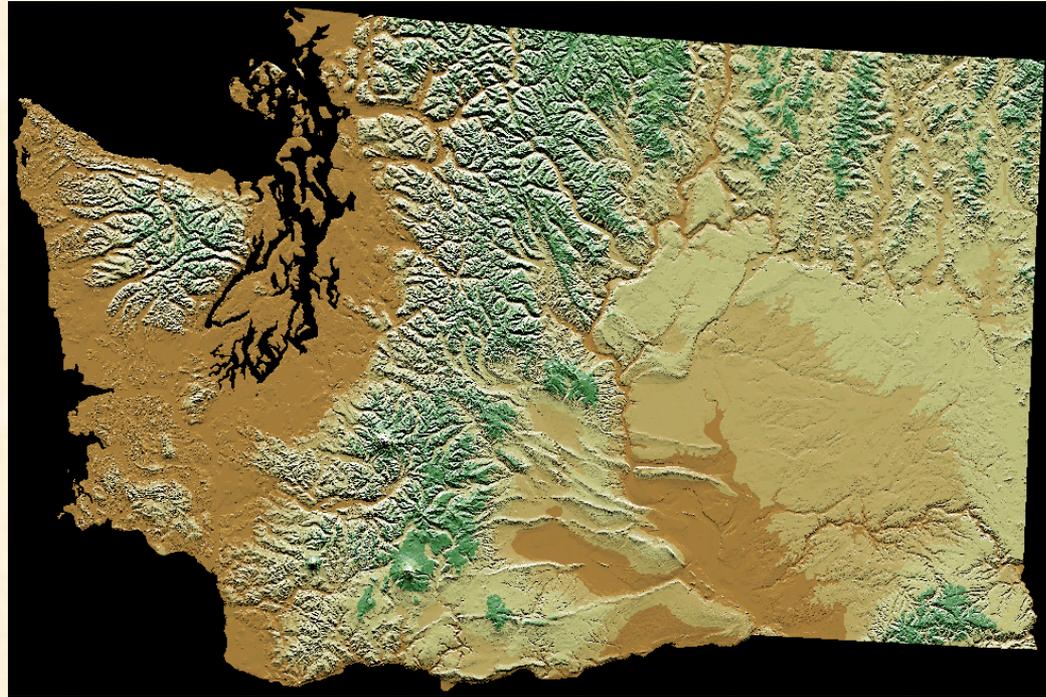
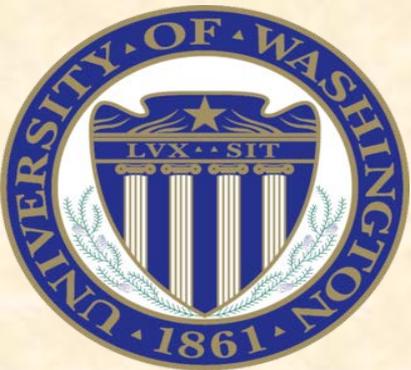


Climate and Health in Washington State



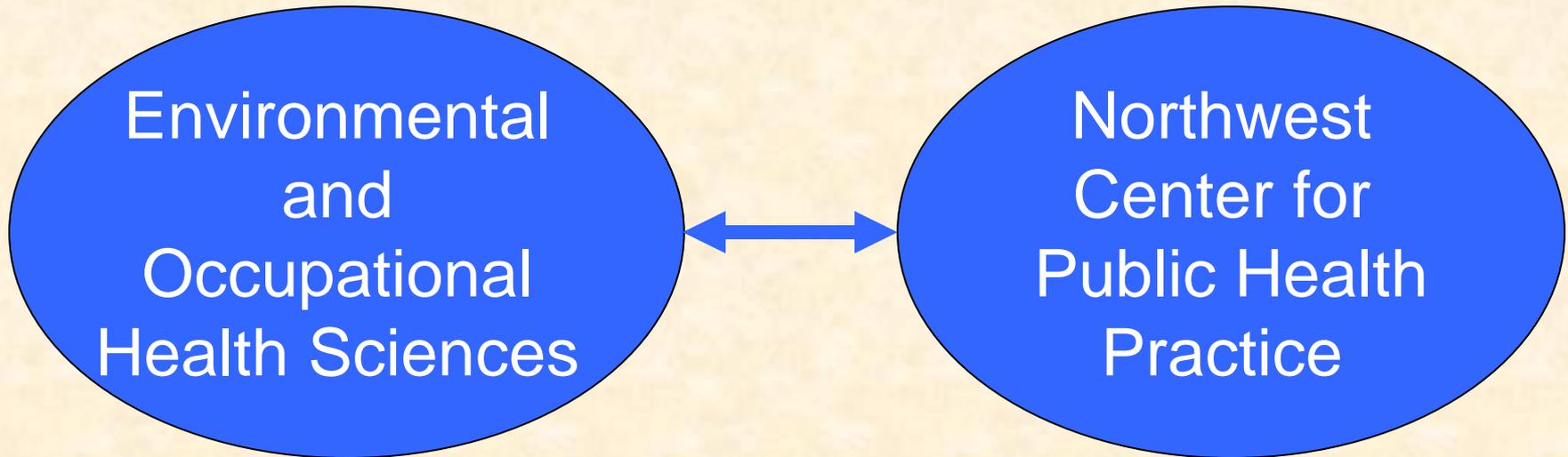
Richard Fenske

School of Public Health
University of Washington
January 31, 2013



Confronting Climate Change Health Risks in the Pacific Northwest

CDC Cooperative Agreement # 1U01EH000400



Michael Yost
Science Team Leader

Susan Allan
Practice Team Leader

County Partners



Clark

King

Spokane

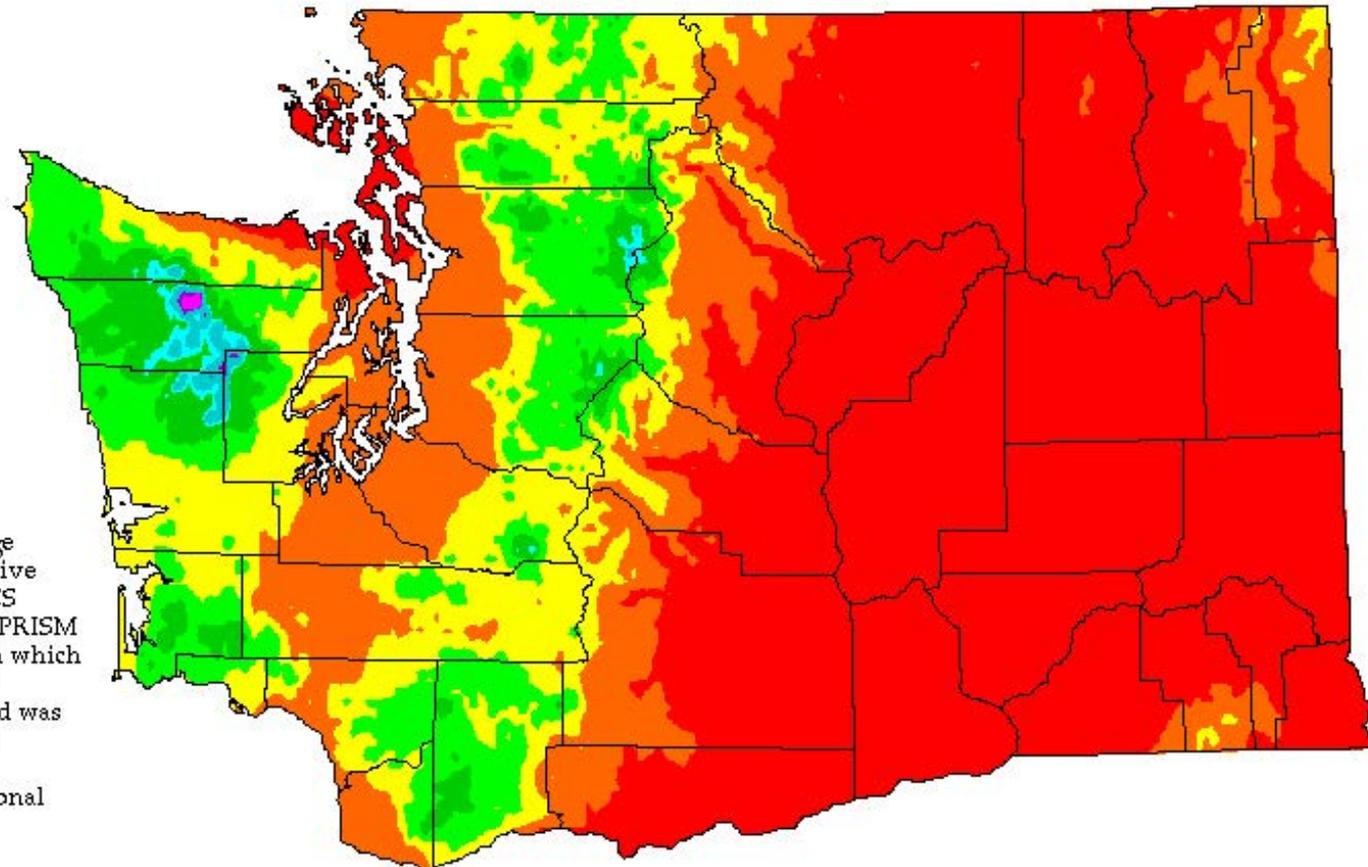
Average Annual Precipitation

Washington

Legend (in inches)



Period: 1961-1990



This map is a plot of 1961-1990 annual average precipitation contours from NOAA Cooperative stations and (where appropriate) USDA-NRCS SNOTEL stations. Christopher Daly used the PRISM model to generate the gridded estimates from which this map was derived; the modeled grid was approximately 4x4 km latitude/longitude, and was resampled to 2x2 km using a Gaussian filter. Mapping was performed by Jenny Weisburg. Funding was provided by USDA-NRCS National Water and Climate Center.

12/7/97

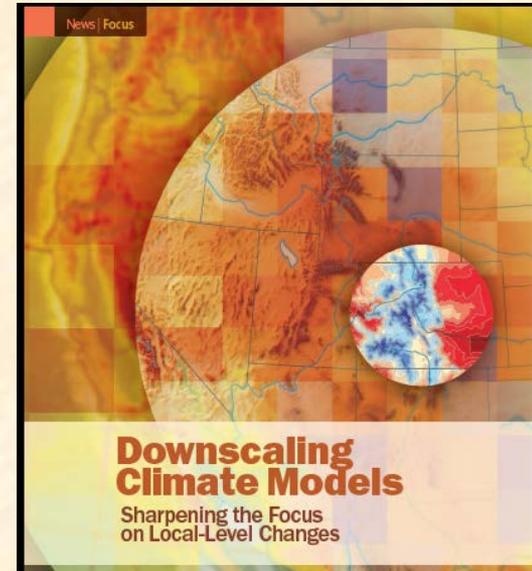
Extreme Heat Events: Historical Analysis

■ Climate Data

- UW Climate Impacts Group
- 26 year climate database: 1980-2006
- May through September
- Regional climate model downscaling to 4 km meteorological grid
- Humidex: combined temperature and humidity effects

■ Health Data

- Mortality: death certificates, 1980-2006
- Hospitalizations: CHARs, 1990-2006
- Non-traumatic cases

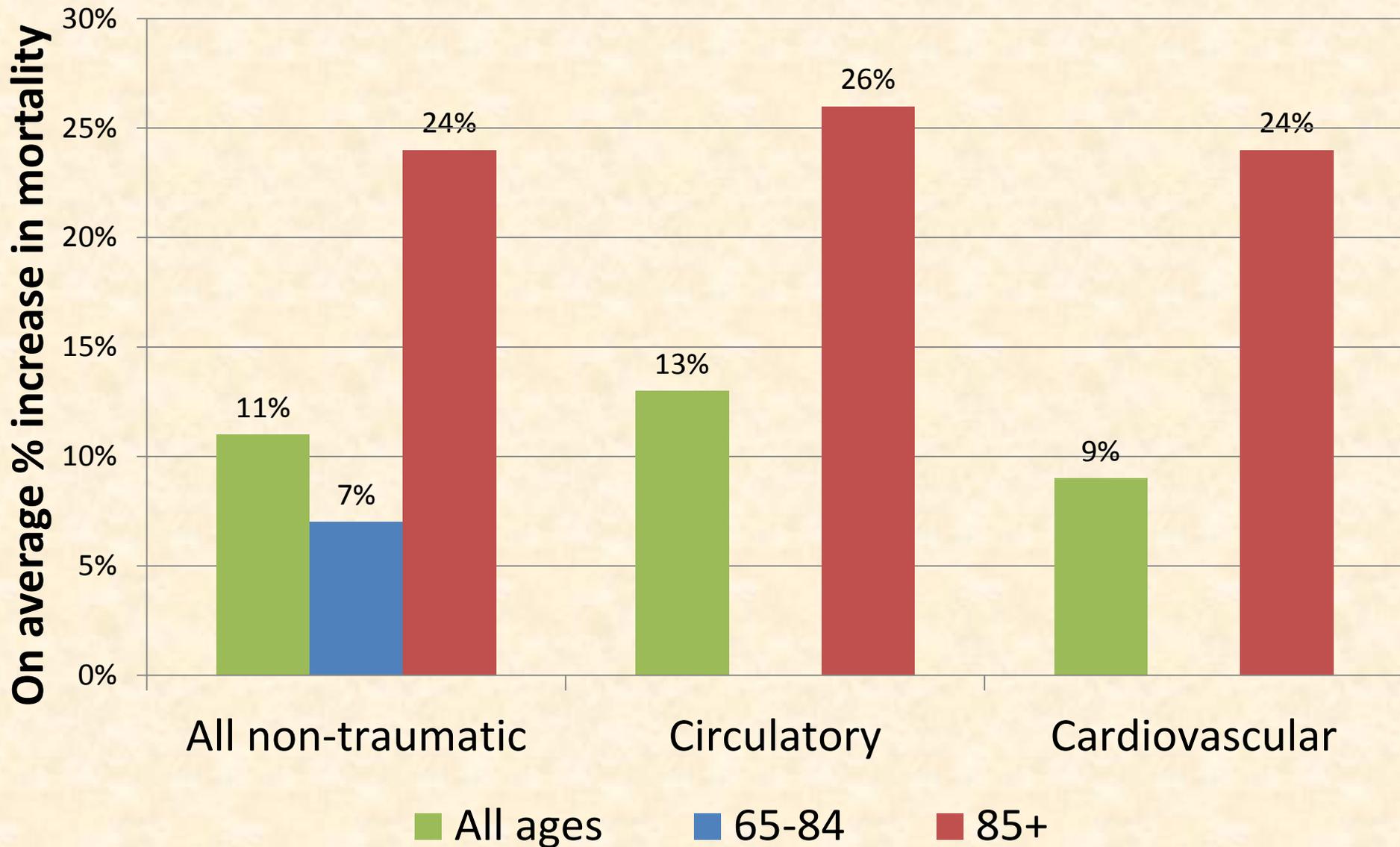


EHP

Volume 120

Jan 2012

King County Mortality Risk: Heat vs. Non-Heat Day $\geq 36.3^{\circ}\text{C}$ Humidex (feels like 97.3°F)



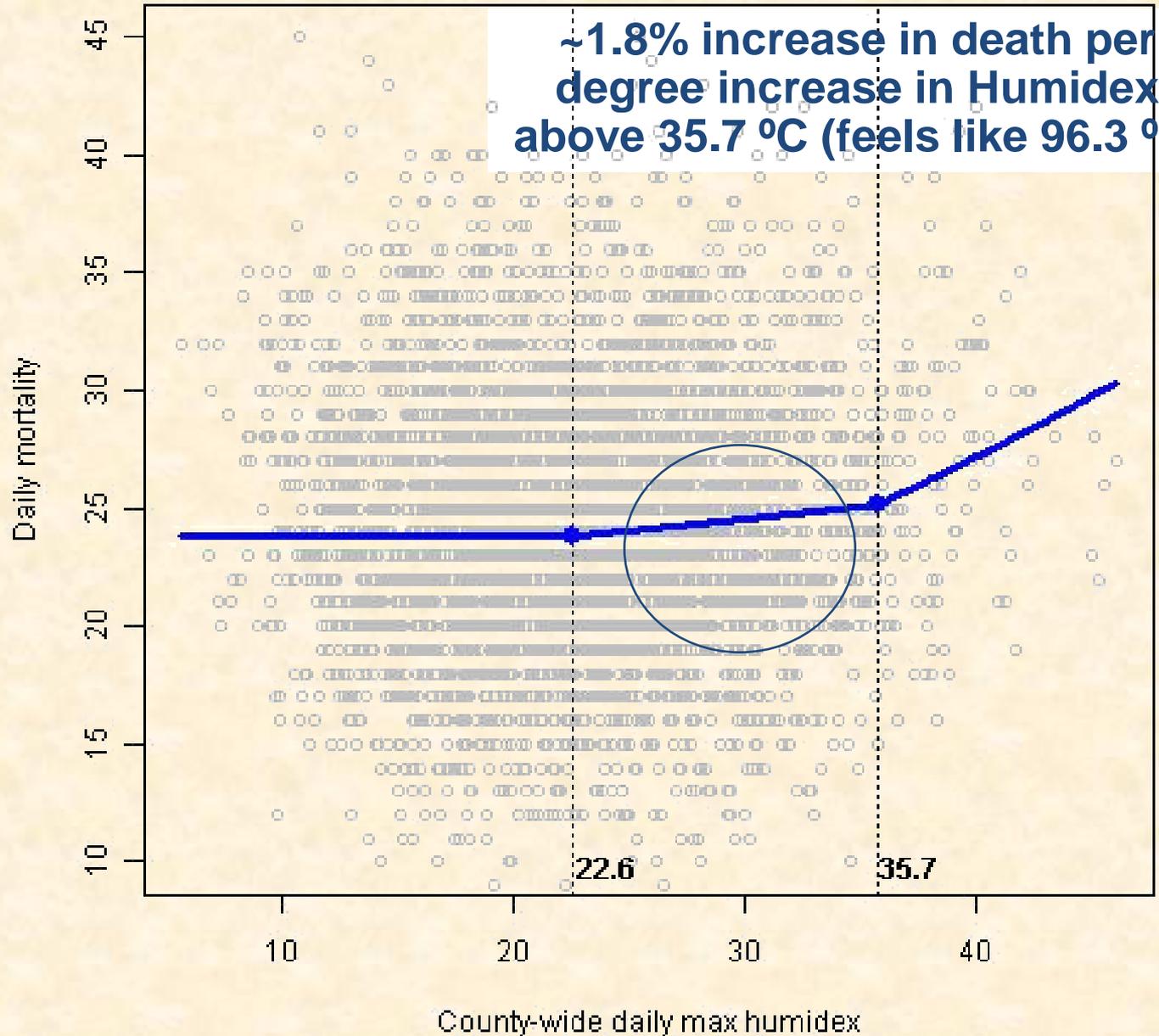
Time Series Analysis

King County

What is the change in daily mortality count associated with each 1 degree change in daily maximum humidex value?

King County

~1.8% increase in death per degree increase in Humidex above 35.7 °C (feels like 96.3 °F)

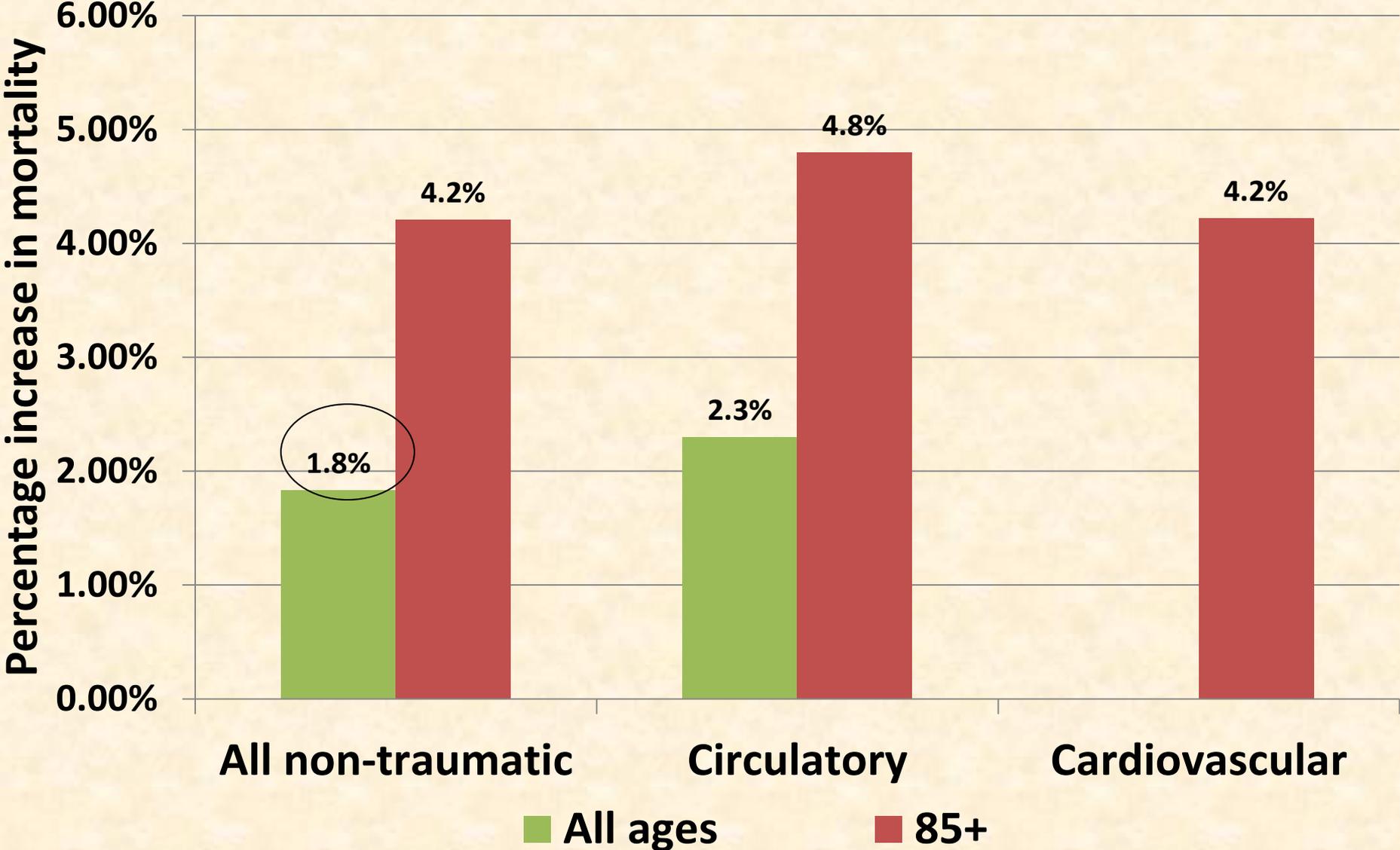


Time Series Analysis

All Ages

All Non-Traumatic Causes

Percent increase in **mortality per degree**
increase in Humidex above 35.7 °C (feels like 96.3 °F)



Vulnerable Populations

King County

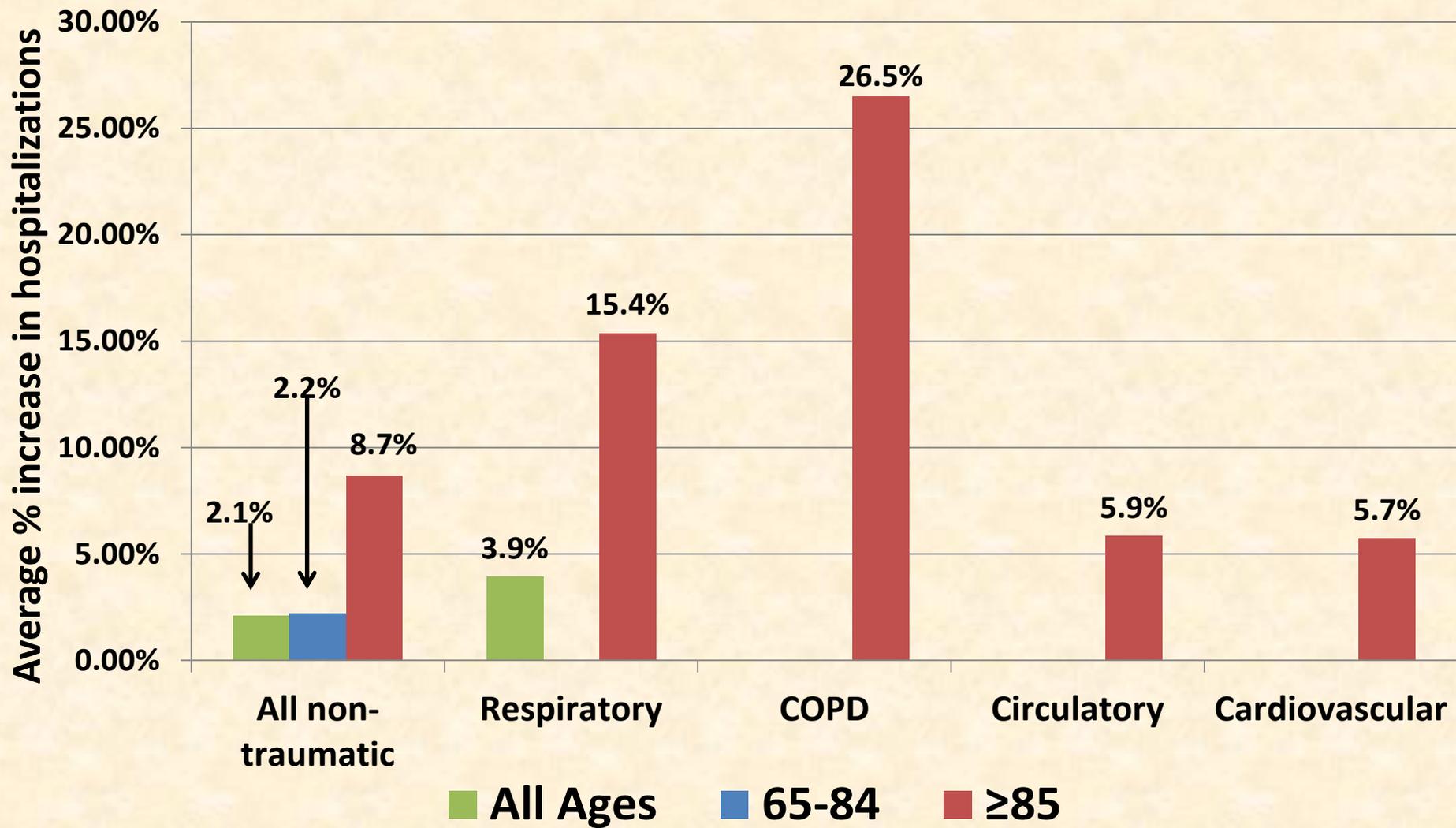
✓ Significant findings

- Age –elderly at greater risk

✓ Non-significant findings

- Gender
- Race/ethnicity
- Outdoor occupation
- Education (high school degree or not)

Percent increase in hospitalizations per degree increase in humidex above 38.2°C (feels like 100.8 °F)



Vulnerable Populations

King County

✓ Significant findings

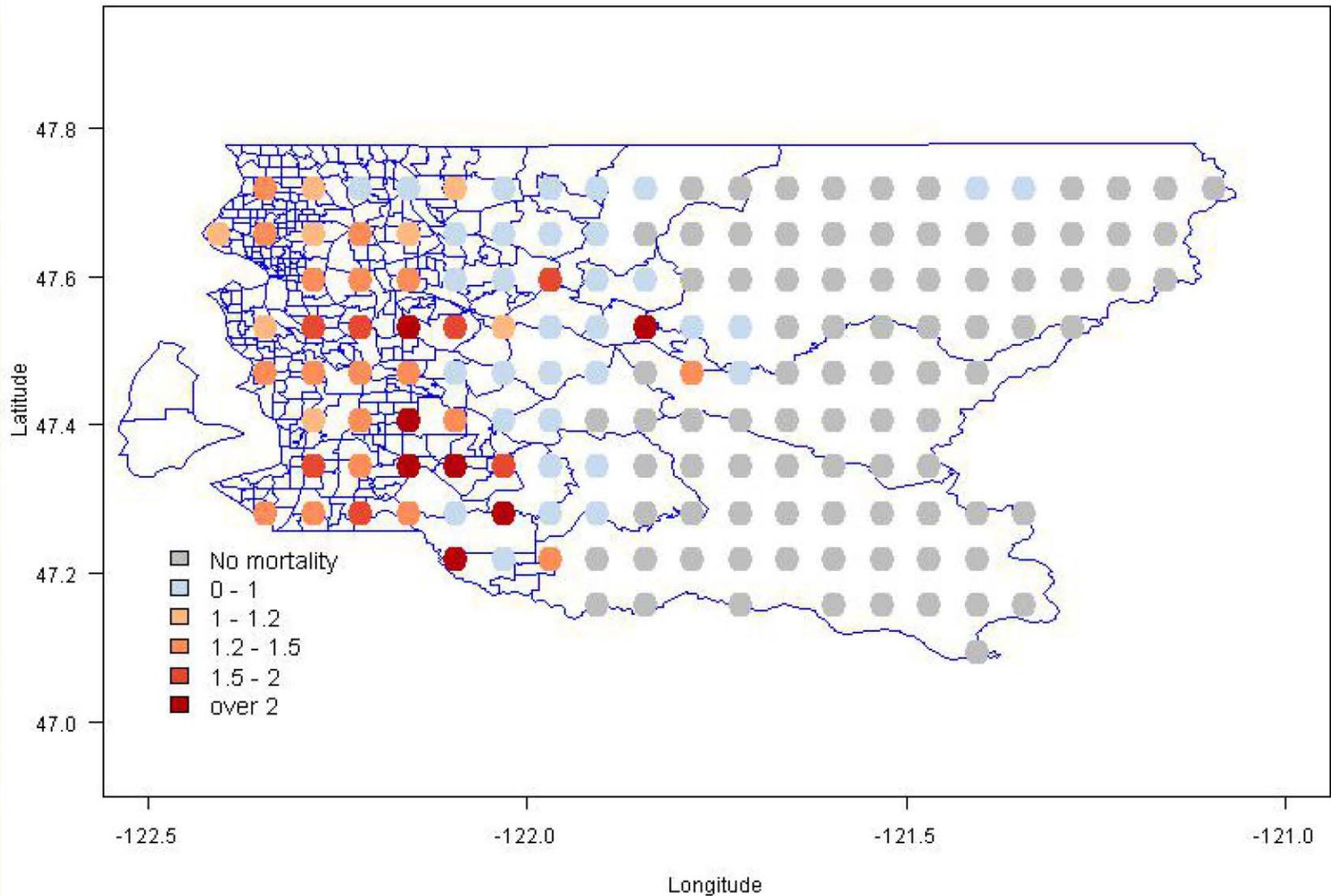
- Age

✓ Non-significant findings

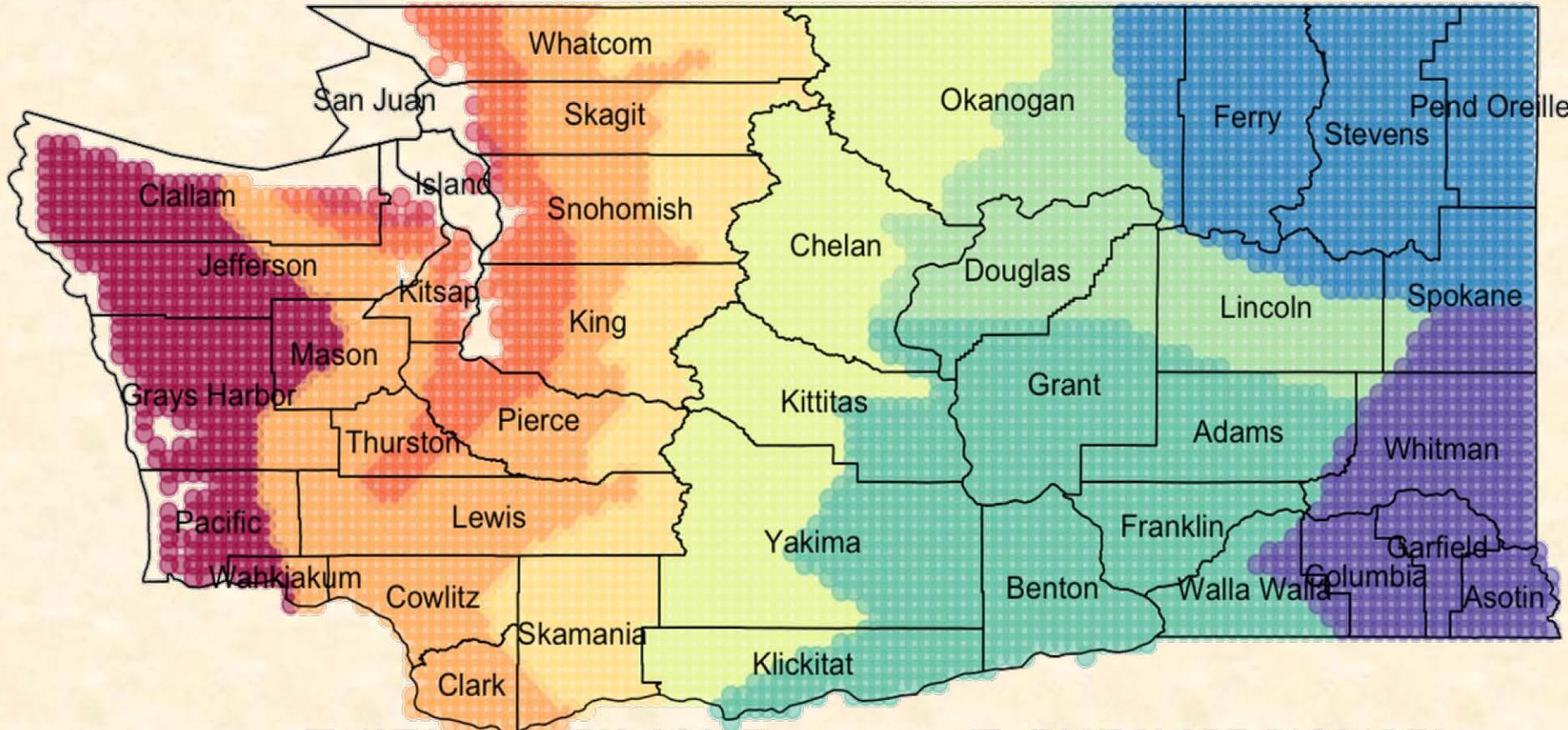
- Gender
- Type of admission (emergency vs. urgent)
- Source of admission (Emergency Dept vs. non-ED)
- Primary payment source (SES surrogate)

Risk Mapping, King County: Relative risk for 85+

Relative risk for 85+ and all non-traumatic deaths 1980-2006



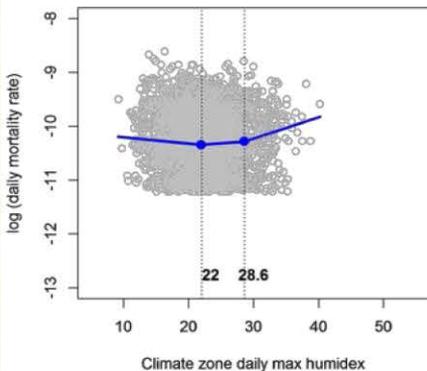
Washington State Climate Zones



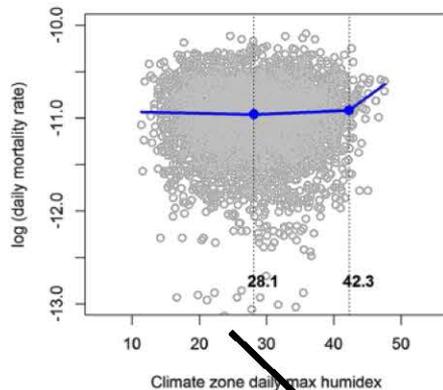
- | | |
|-------------------------------|--------------------------|
| ■ WEST OLYMPIC COAST | ■ EAST SLOPE CASCADES |
| ■ NE OLYMPIC SAN JUAN | ■ OKANOGAN BIG BEND |
| ■ PUGET SOUND LOWLANDS | ■ CENTRAL BASIN |
| ■ E OLYMPIC CASCADE FOOTHILLS | ■ NORTHEASTERN |
| ■ CASCADE MOUNTAINS WEST | ■ PALOUSE BLUE MOUNTAINS |

Regional Climate Zone Analysis – All Non-Traumatic Mortality

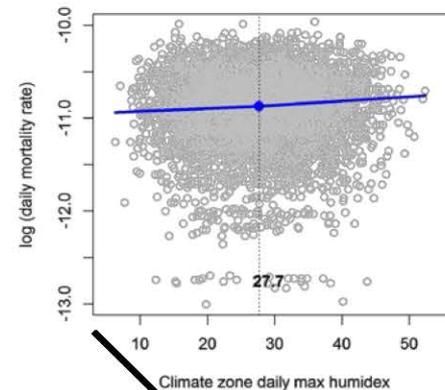
NE OLYMPIC SAN JUAN



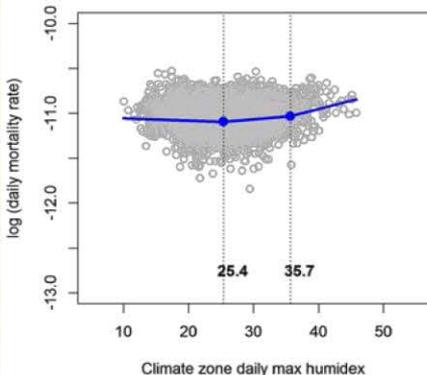
CENTRAL BASIN



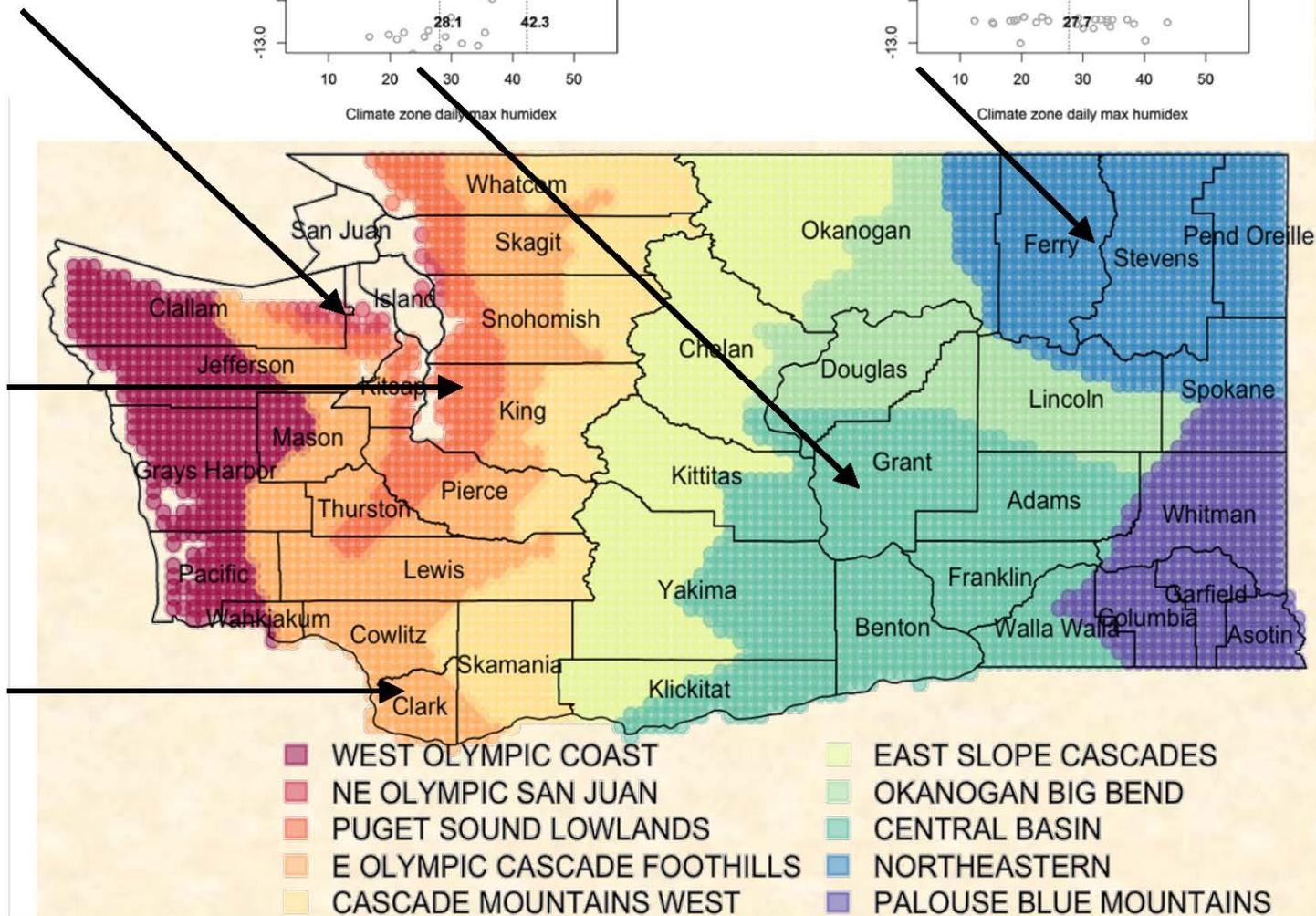
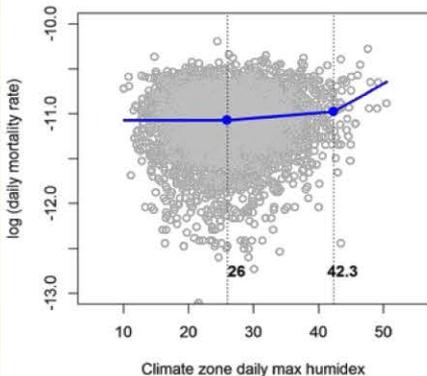
NORTHEASTERN



PUGET SOUND LOWLANDS



E OLYMPIC CASCADE FOOTHILLS



King County Heat Event Predictions

\geq Humidex of 35.7 ° C	Warming Scenario	Heat Days per Year	Avg. # of Days/Heat Event	Avg. Humidex / Heat Day	“Feels Like” ° F
2025	HIGH	16.3	2.8	39.7	103.5
	MIDDLE	9.3	2.4	38.8	101.8
	LOW	6.6	2.2	38.6	101.5
2045	HIGH	28.7	3.4	40.2	104.4
	MIDDLE	12.9	2.7	39.3	102.7
	LOW	8.5	2.2	38.5	101.3

Outcomes for County Partners

- ✓ **Seattle/King County Health Department**
 - Collaborations with other county departments
 - Recognition of public health consequences
- ✓ **Clark County Health Department**
 - *Growing Healthier Report* includes climate and health findings
 - Insertion of health chapter into comprehensive plan
- ✓ **Spokane County Health Department**
 - Climate change a politically controversial topic
 - Health department takes low profile
 - Findings used for health promotion messaging