

Confronting Climate Change in Pennsylvania



Andrew Pitz
Natural Lands Trust
April 1, 2009

Responsibility and Stewardship





Meeting the Climate Challenge

Mitigation of heat-trapping emissions

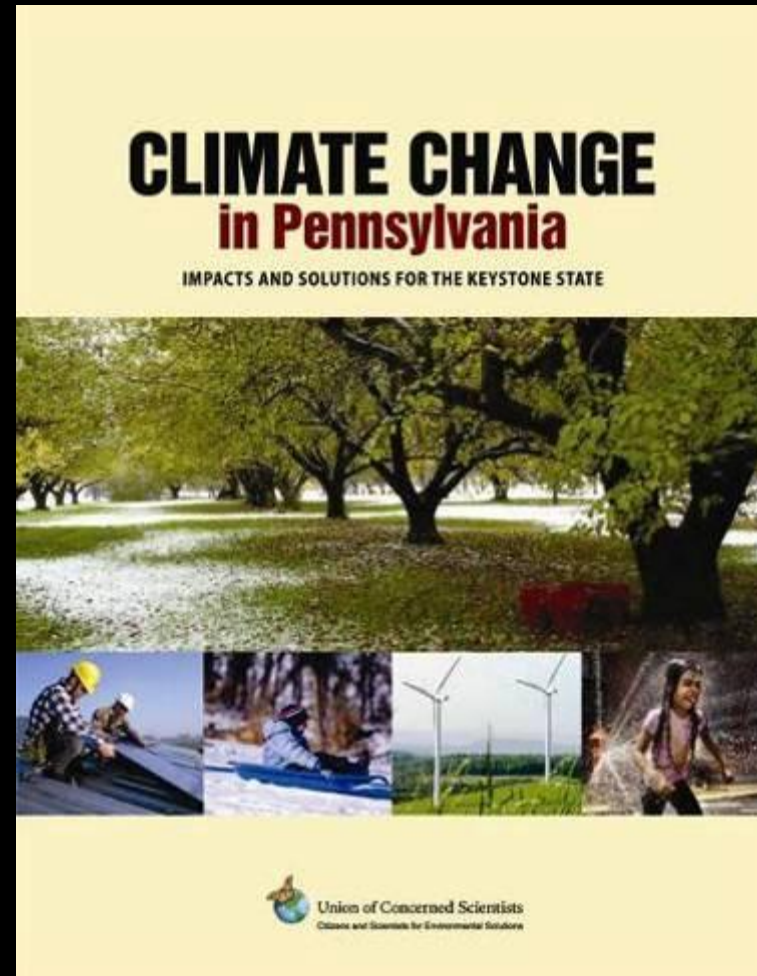
Adapting to changes already in store

New Pennsylvania Report October 2008



July 2007

Northeast Climate Impacts Assessment



www.northeastclimateimpacts.org/pa

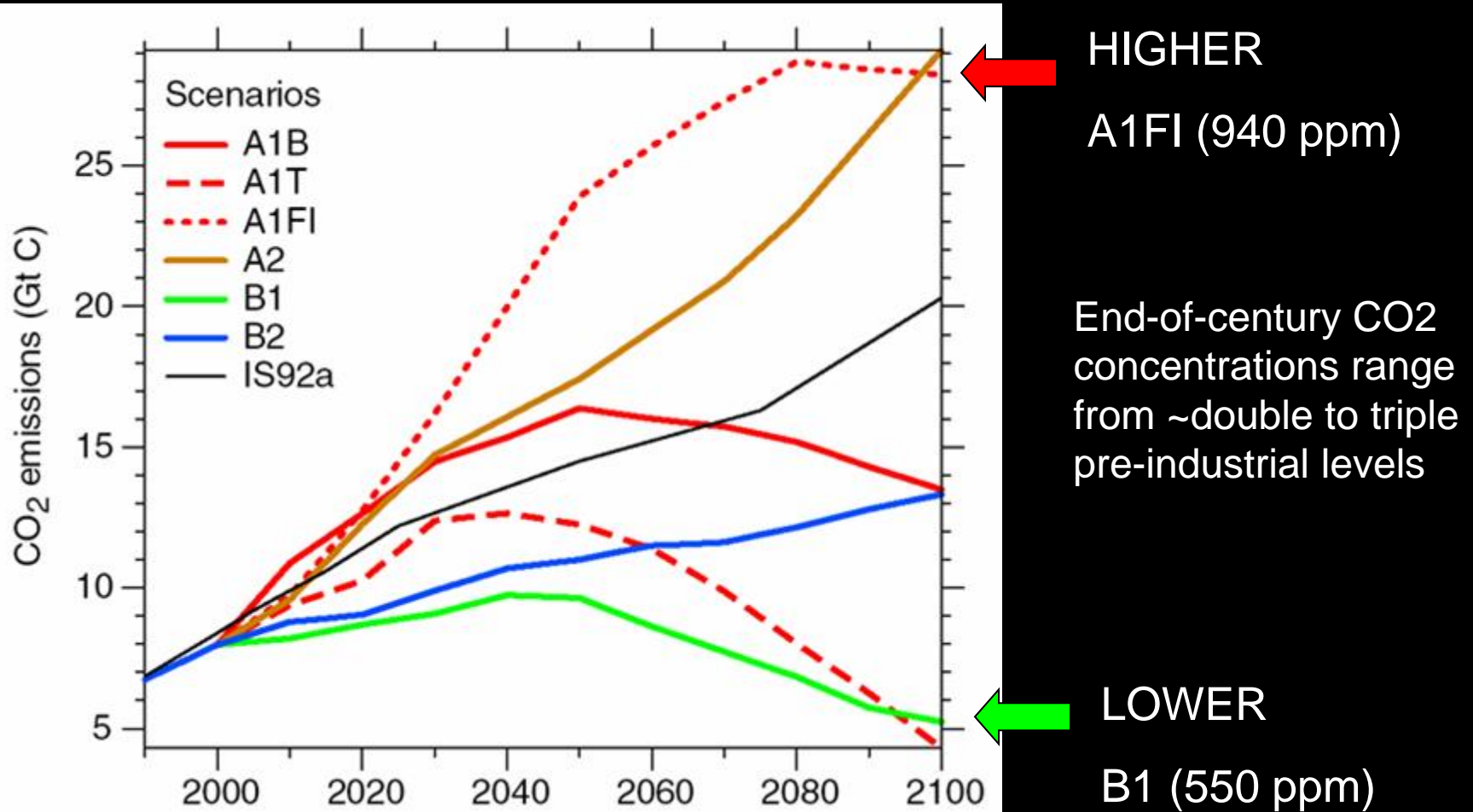
Climate across Pennsylvania is already changing

- Over the last century, average **temperature increased by 0.5°F**
- Since 1970 average temperature has increased by **~0.15°F per decade**
- Over the last century, annual **rainfall has increased 5-20%** across the state
- Winter **snowpack is decreasing**
- Since 1970 the number of **extreme heat days per year (over 90°F) has increased** in most cities

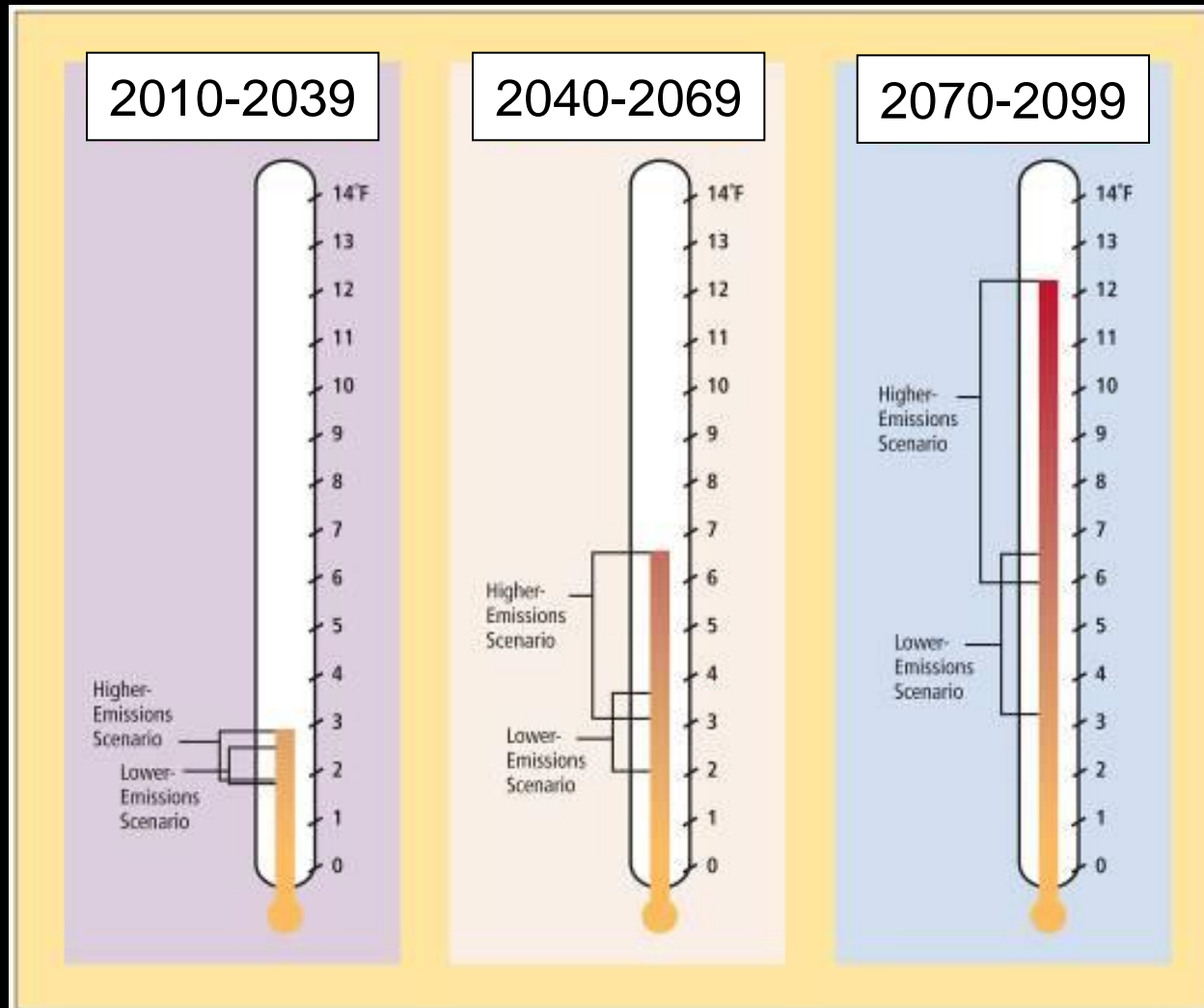


(c) Brian A. Morganti / www.stormeffects.com

Further warming depends on our emissions choices

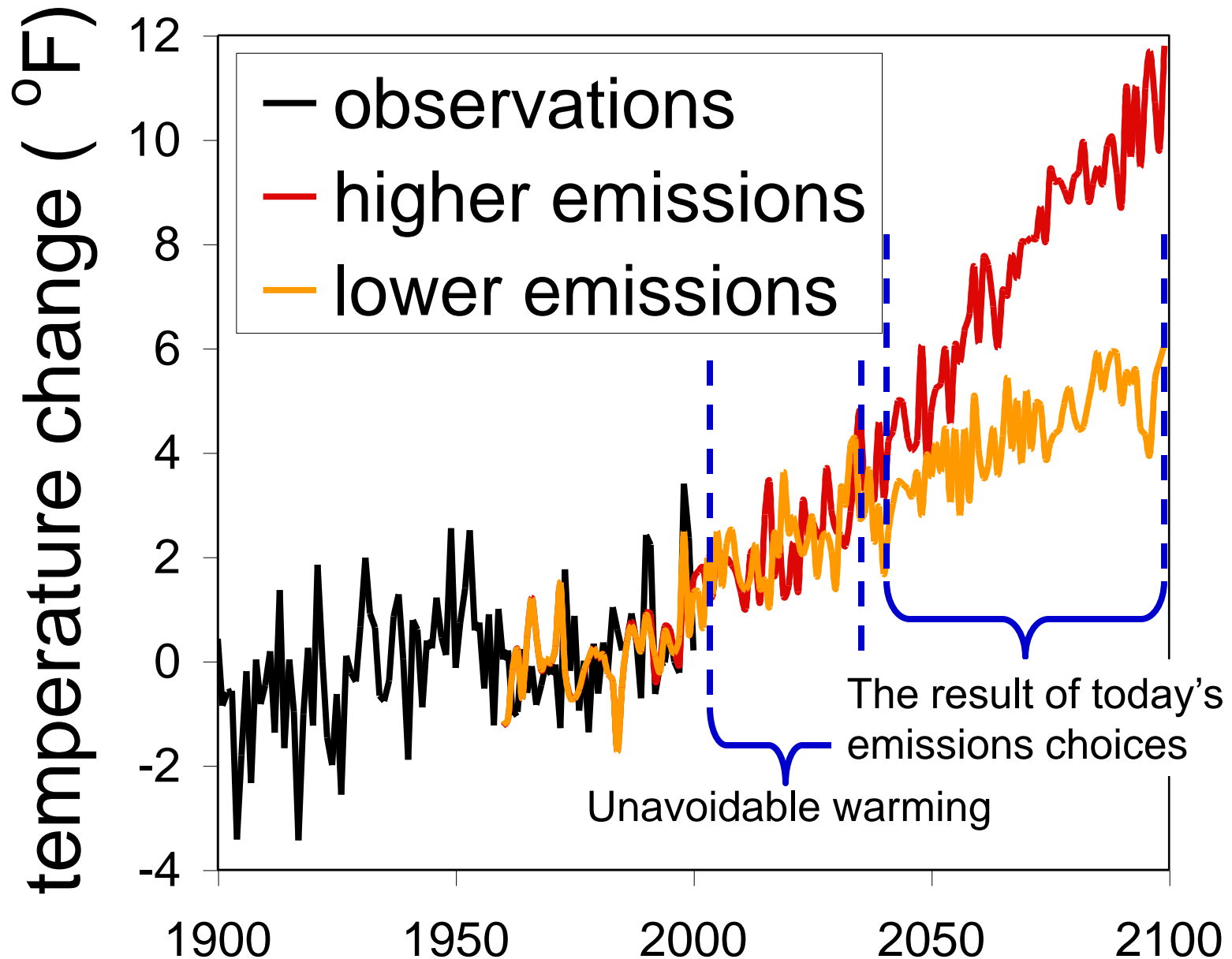


Projected Temperature Changes for Pennsylvania

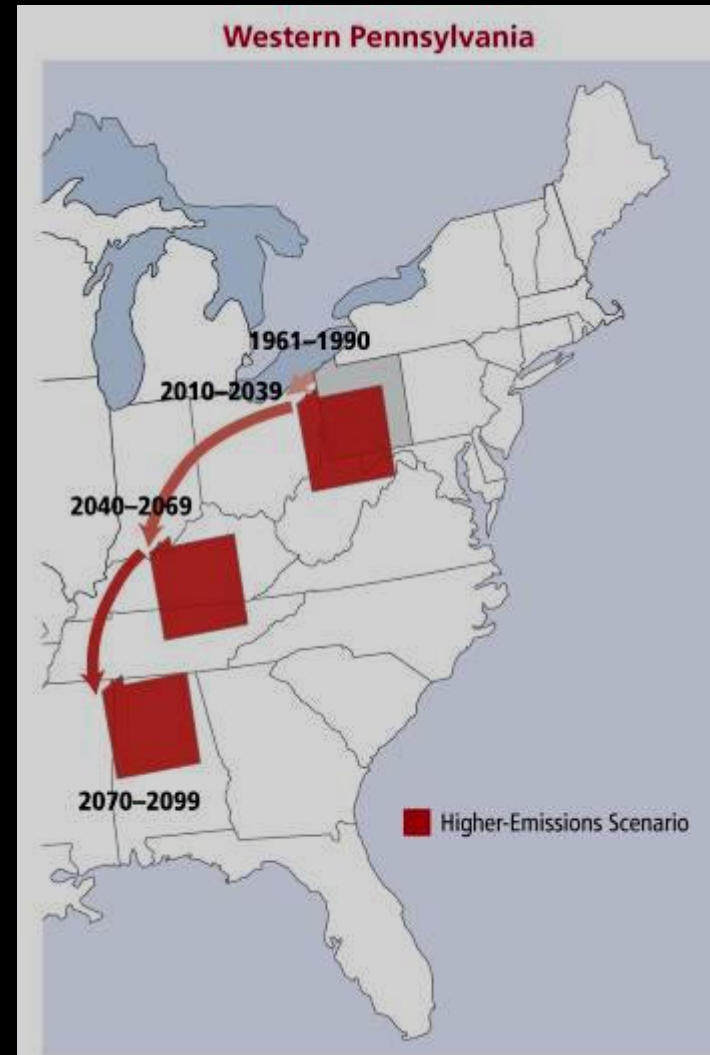
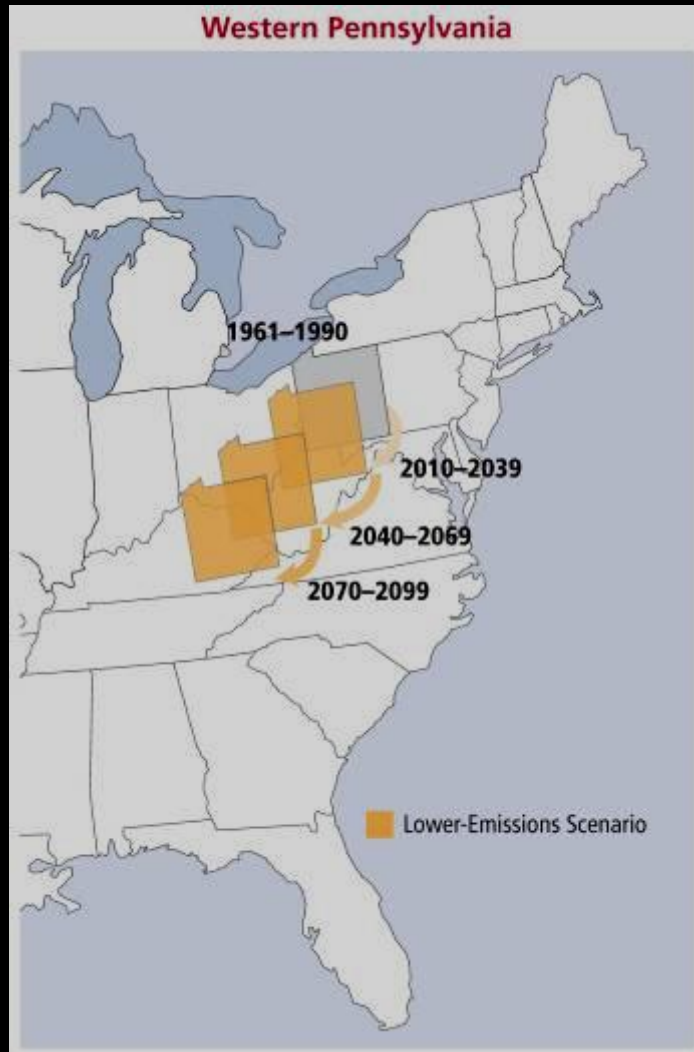


Temperature change above 1961-1990 average

Projected Temperature Changes NE US

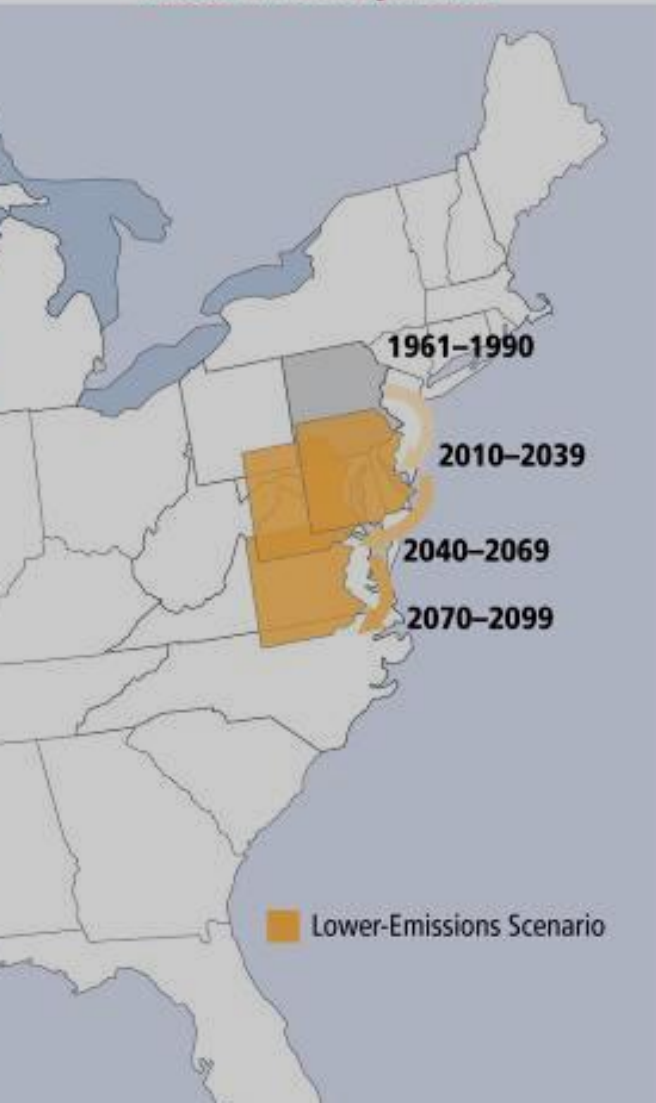


Summer Heat Index – migrating climates

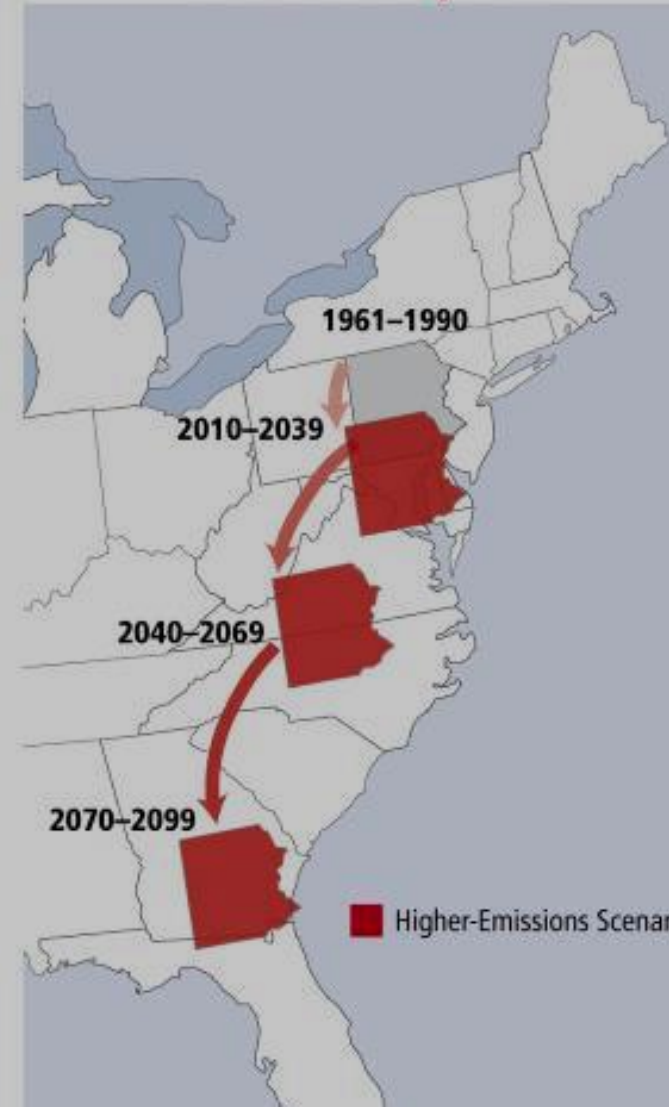


Heat index combines temperature and humidity how summers may “feel”

Eastern Pennsylvania

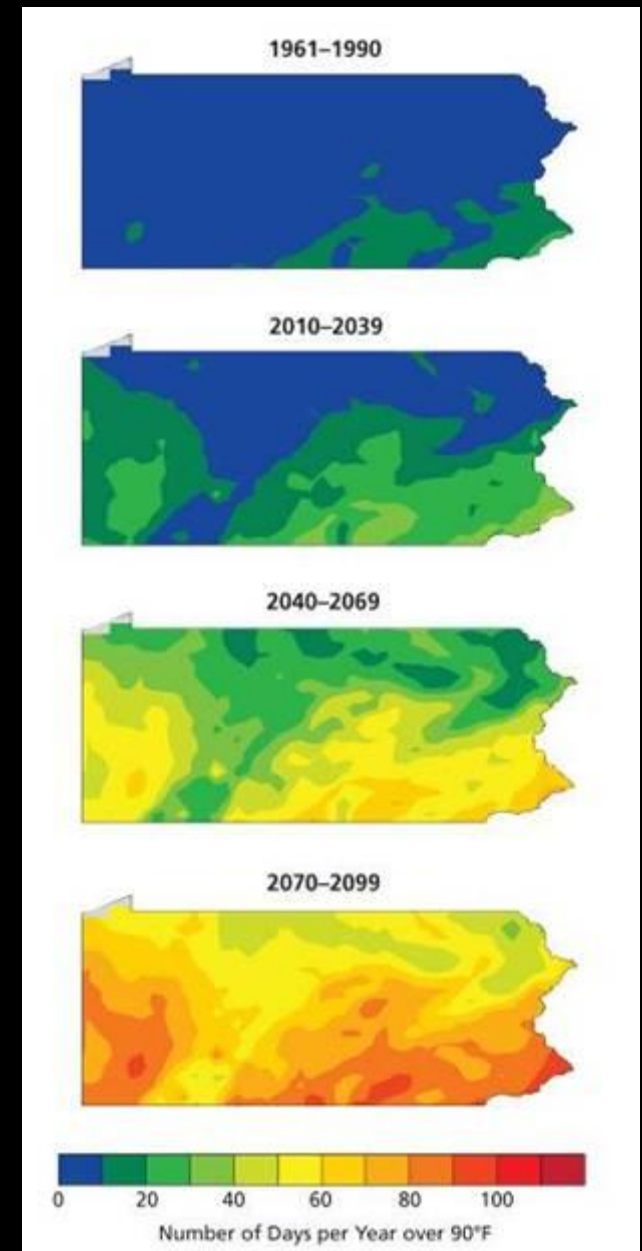


Eastern Pennsylvania



“Extreme Heat” Days over 90°F

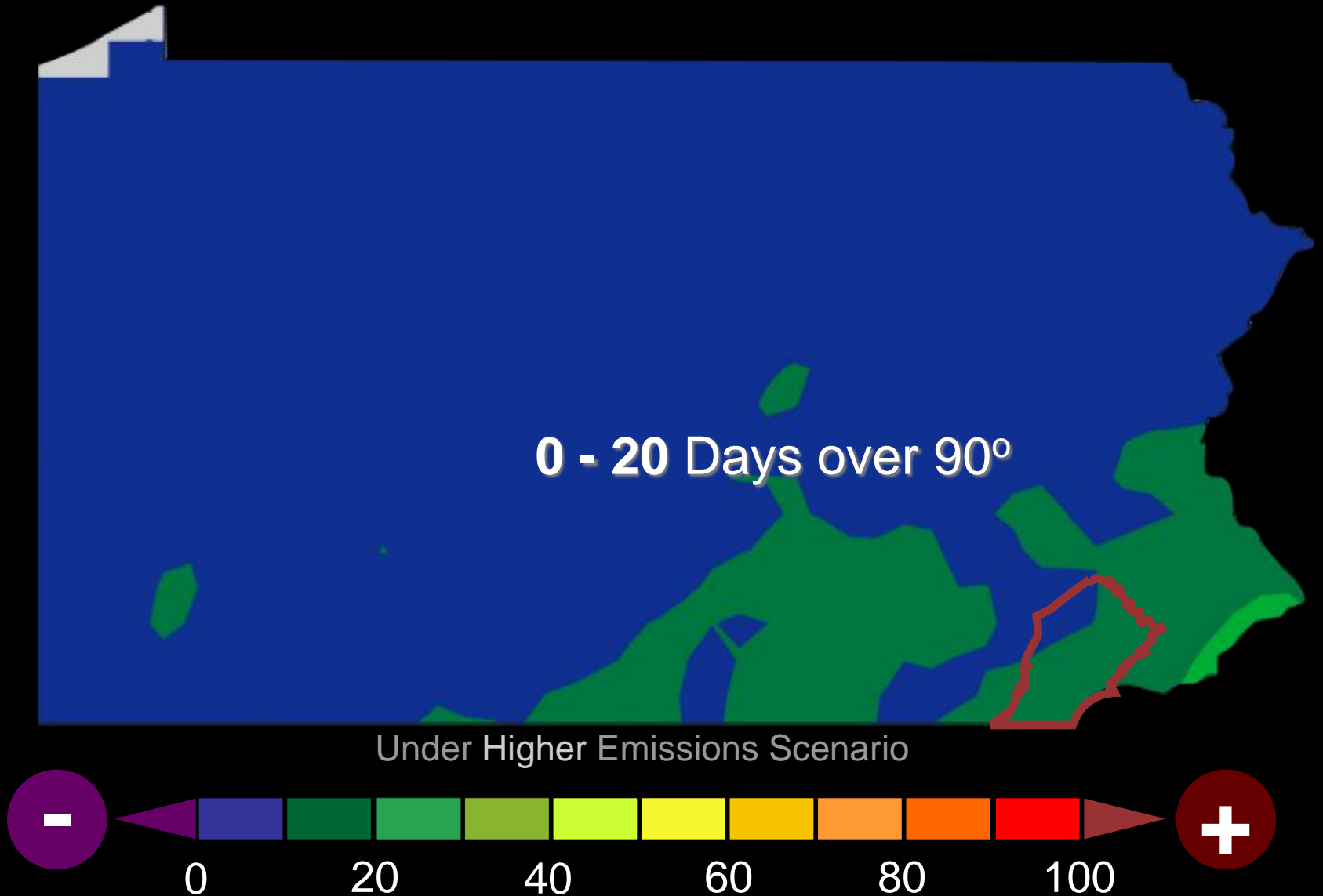
- In the *next several decades*, southern PA can expect almost a doubling in the number of extreme heat days
- By *mid-century*, SW and SE PA could experience more than 50 days a year over 90°F
- By *late century*, in the southern regions daytime temperatures could hover over 90°F for nearly the entire summer



Days over 90°F under the
higher-emissions scenario

Extreme Heat: Days over 90°F

Historical: 1960 - 1991

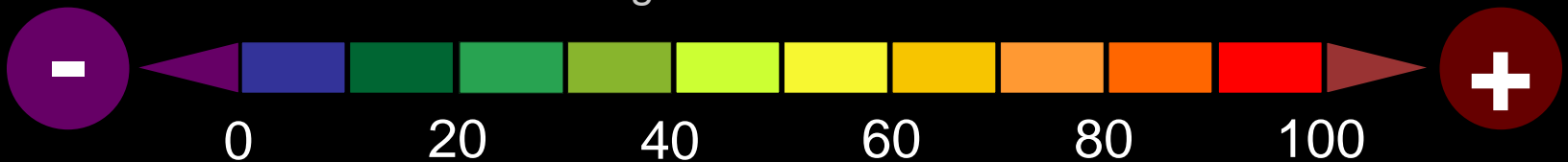


Extreme Heat: Days over 90°F

Next Several Decades: 2010 - 2039

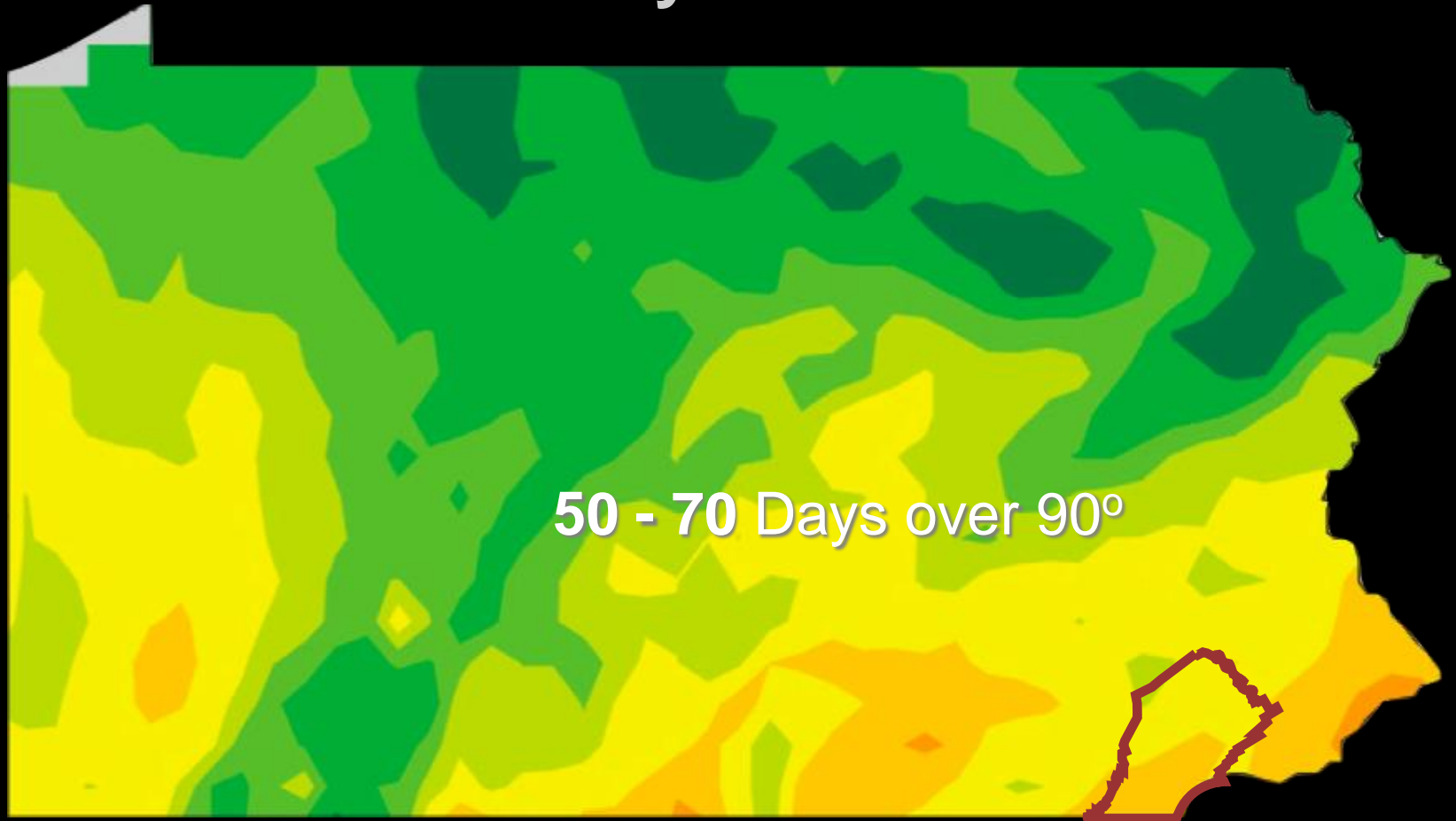


Under Higher Emissions Scenario

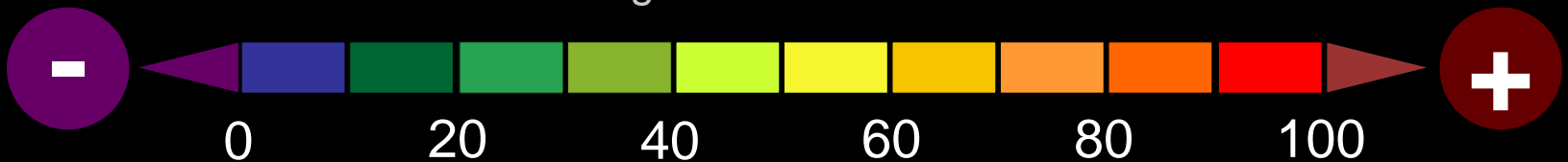


Extreme Heat: Days over 90°F

Mid-Century: 2040 - 2069

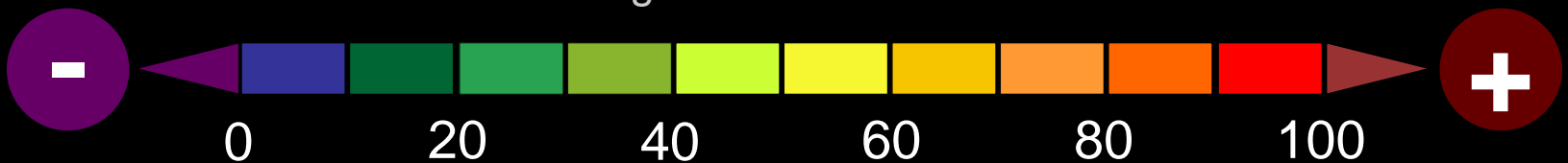
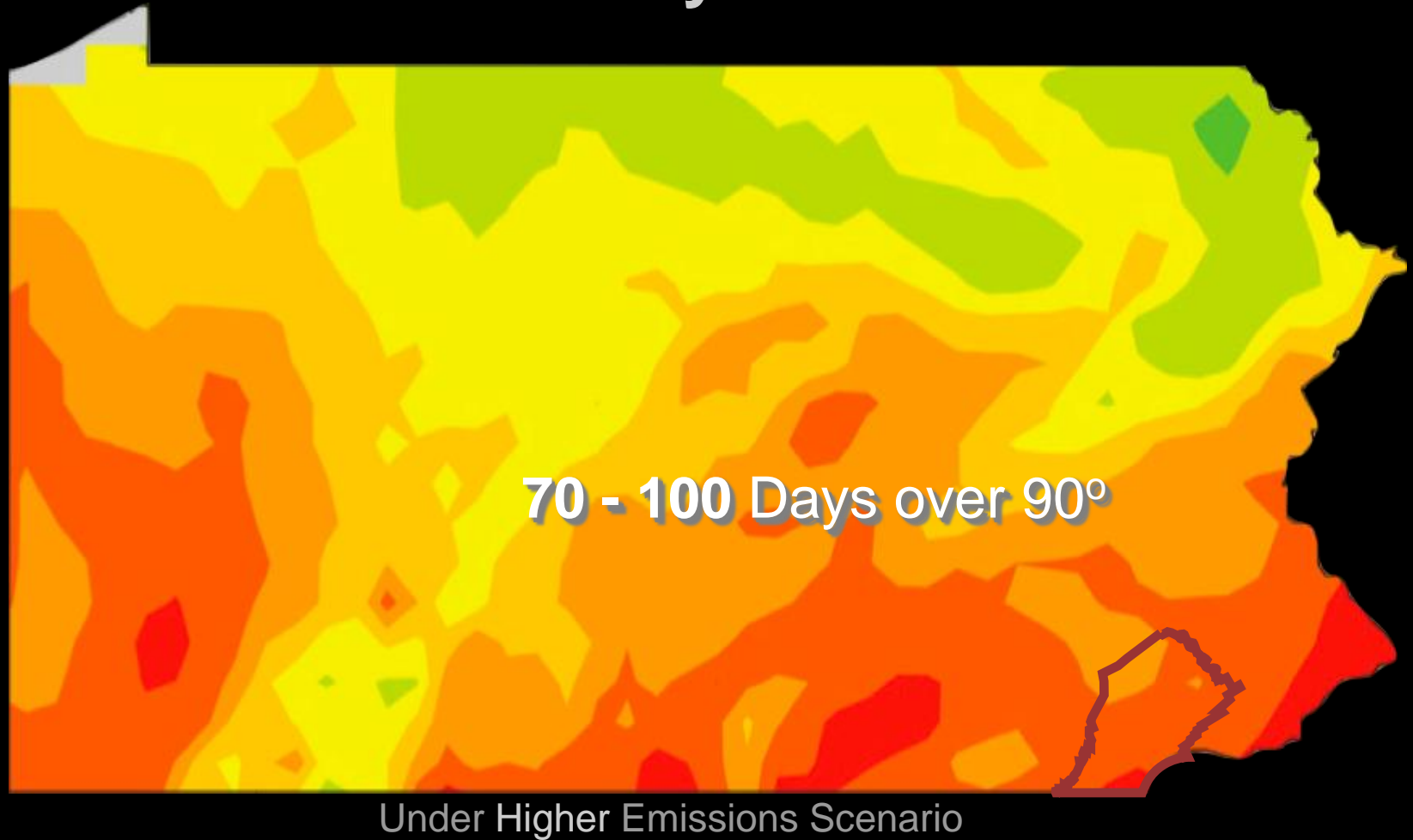


Under Higher Emissions Scenario



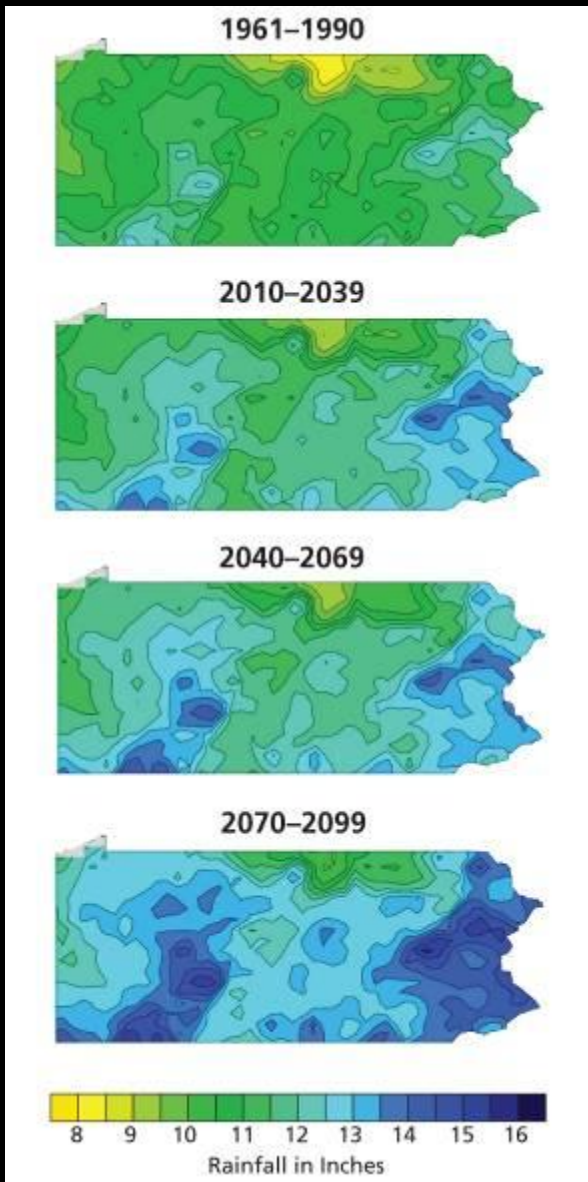
Extreme Heat: Days over 90°F

End of Century: 2070 - 2099



Precipitation

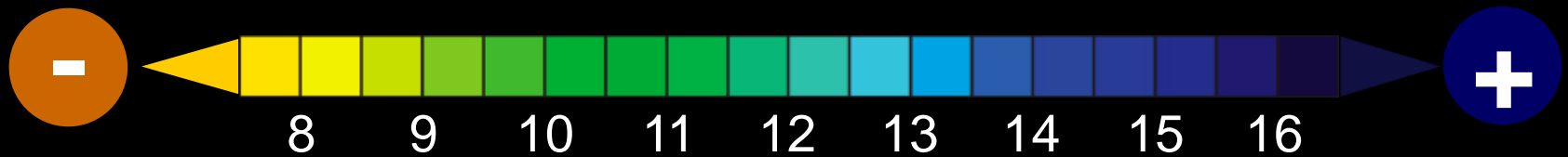
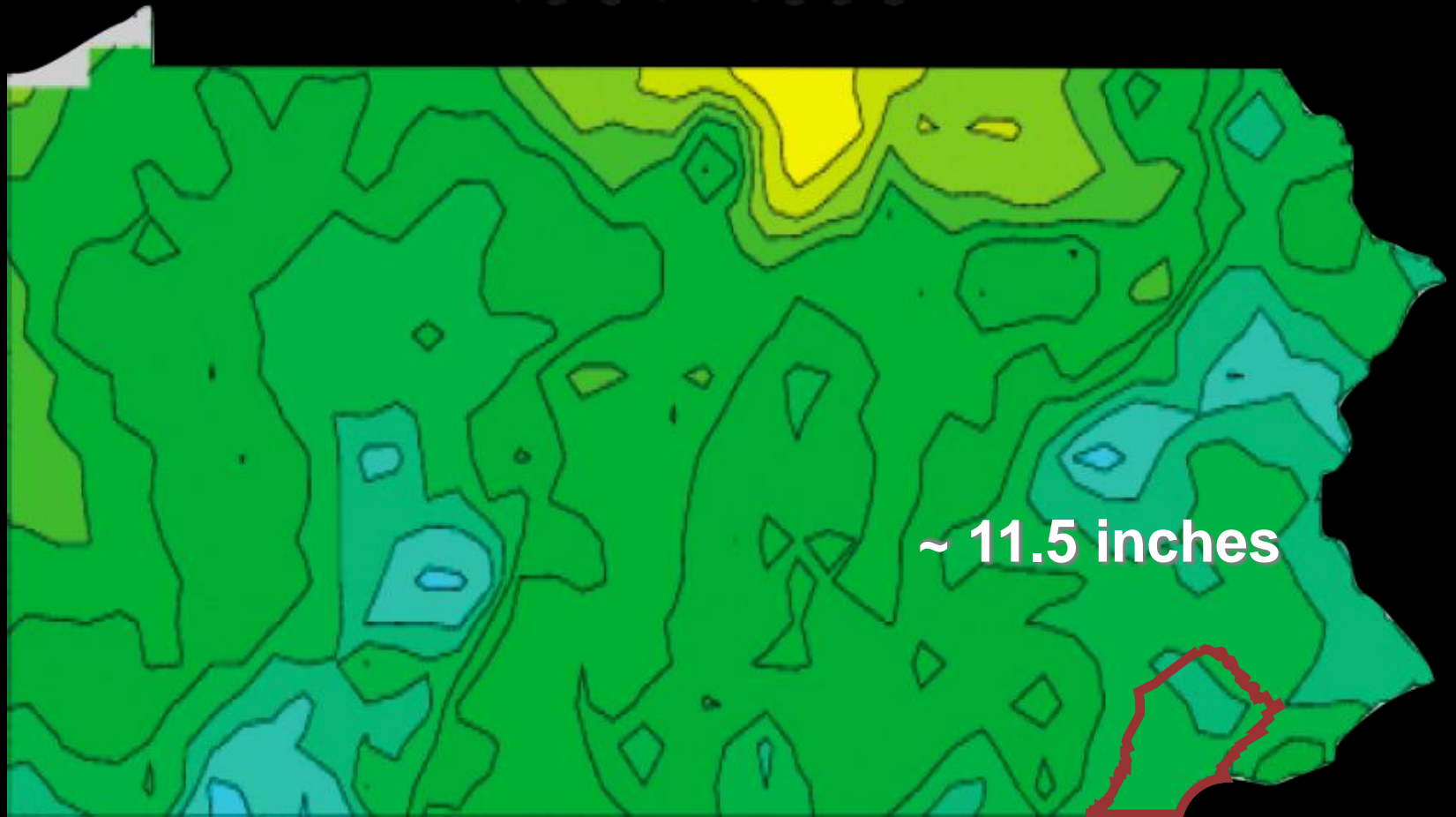
- Annual average precipitation rose from 38 to 44 inches over the last century
- Projections show this trend continuing under either emission scenario
- Rainfall projected to increase in spring and fall under either emissions scenario



Spring rainfall under the higher-emissions scenario

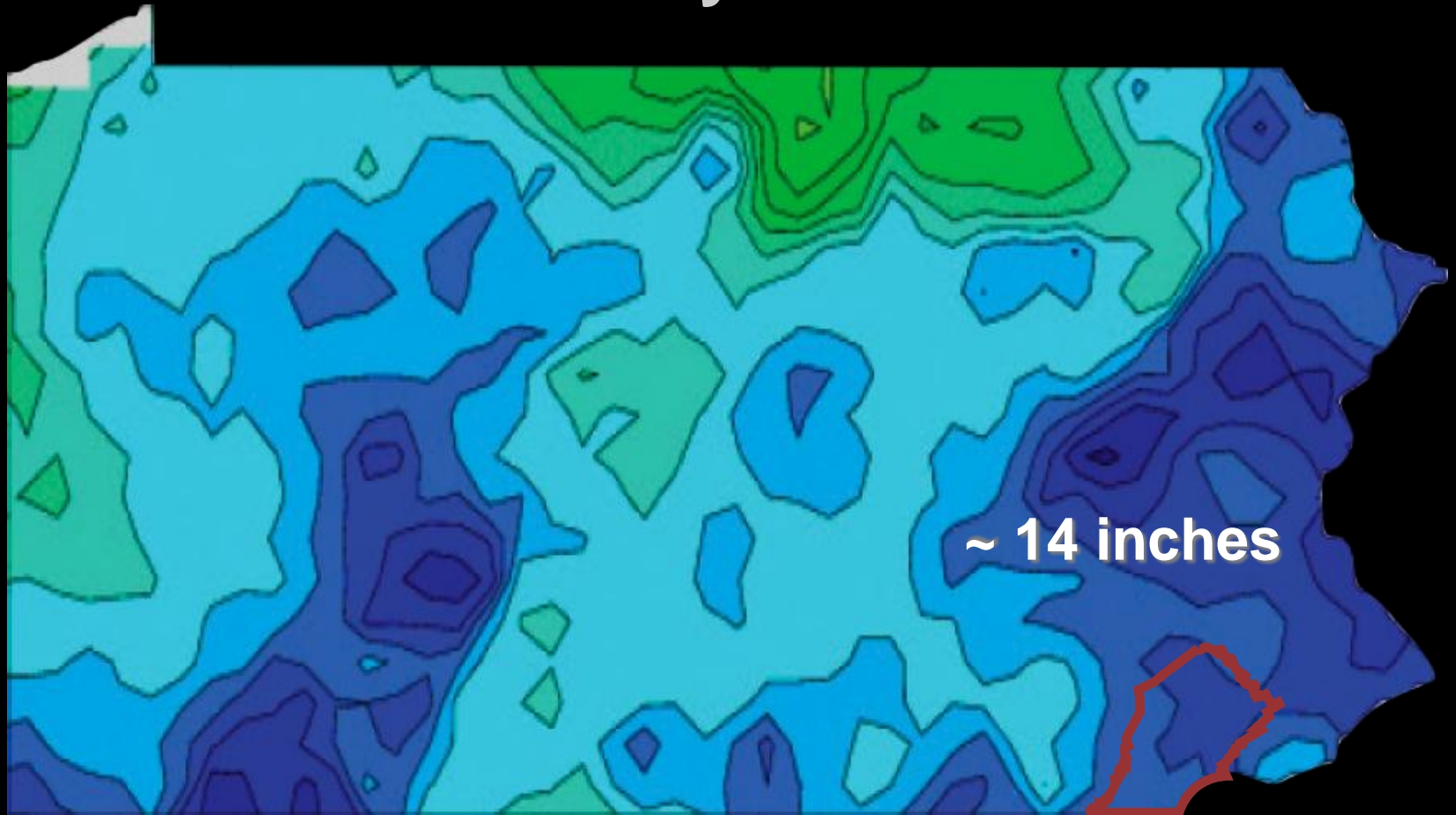
Spring Rainfall

Historical: 1960 - 1991

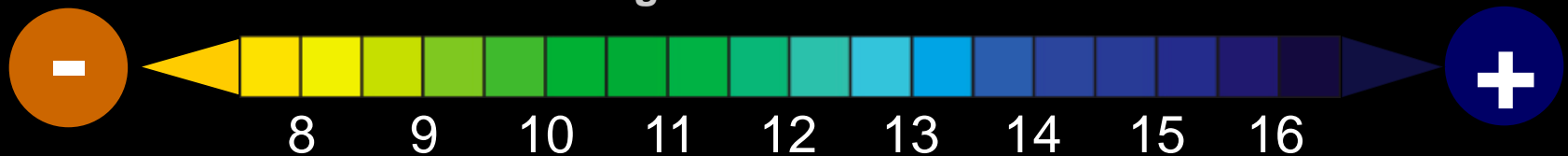


Spring Rainfall

End of Century: 2070 - 2099

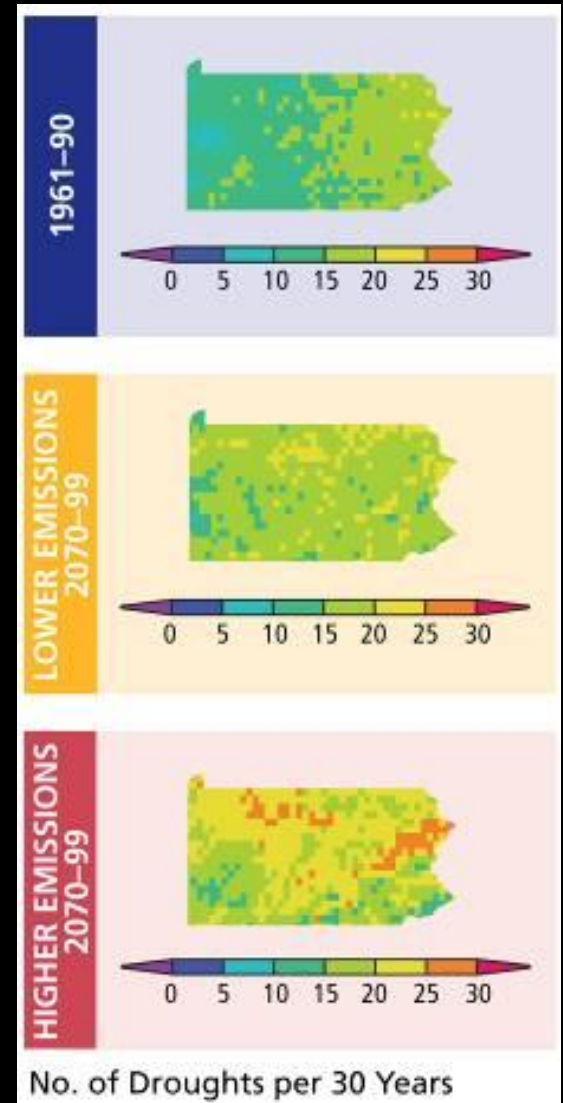


Under **Higher** Emissions Scenario



Increasing summer drought

- Hotter summers lead to increased evaporation and reduced soil moisture
- Under higher emissions, short-term droughts projected every 1-2 years in many parts of the state





AP Photo: George Widman

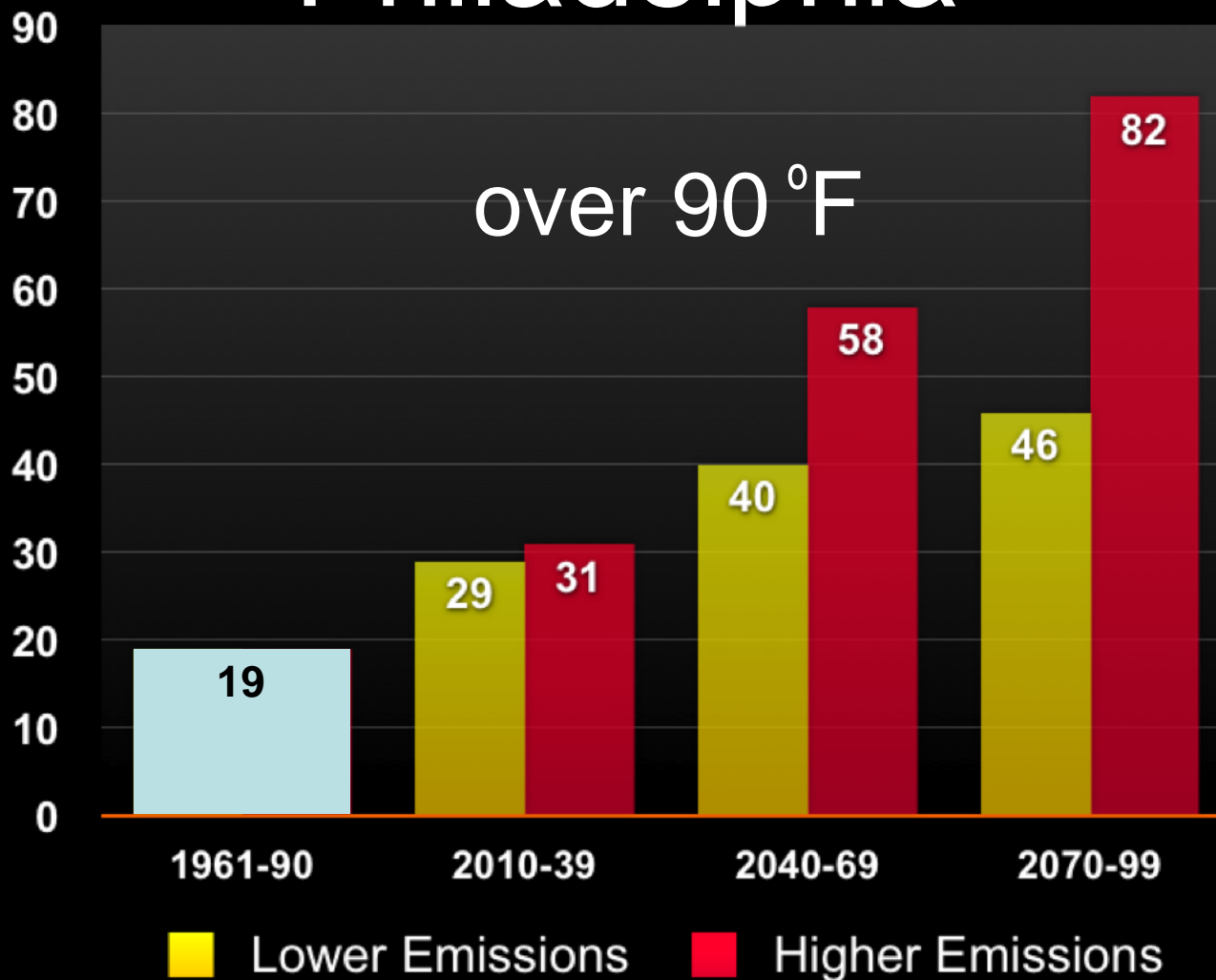
Impacts on Cities and Towns

- Extreme Heat
- Air Quality
- Asthma, Allergies
- Infrastructure

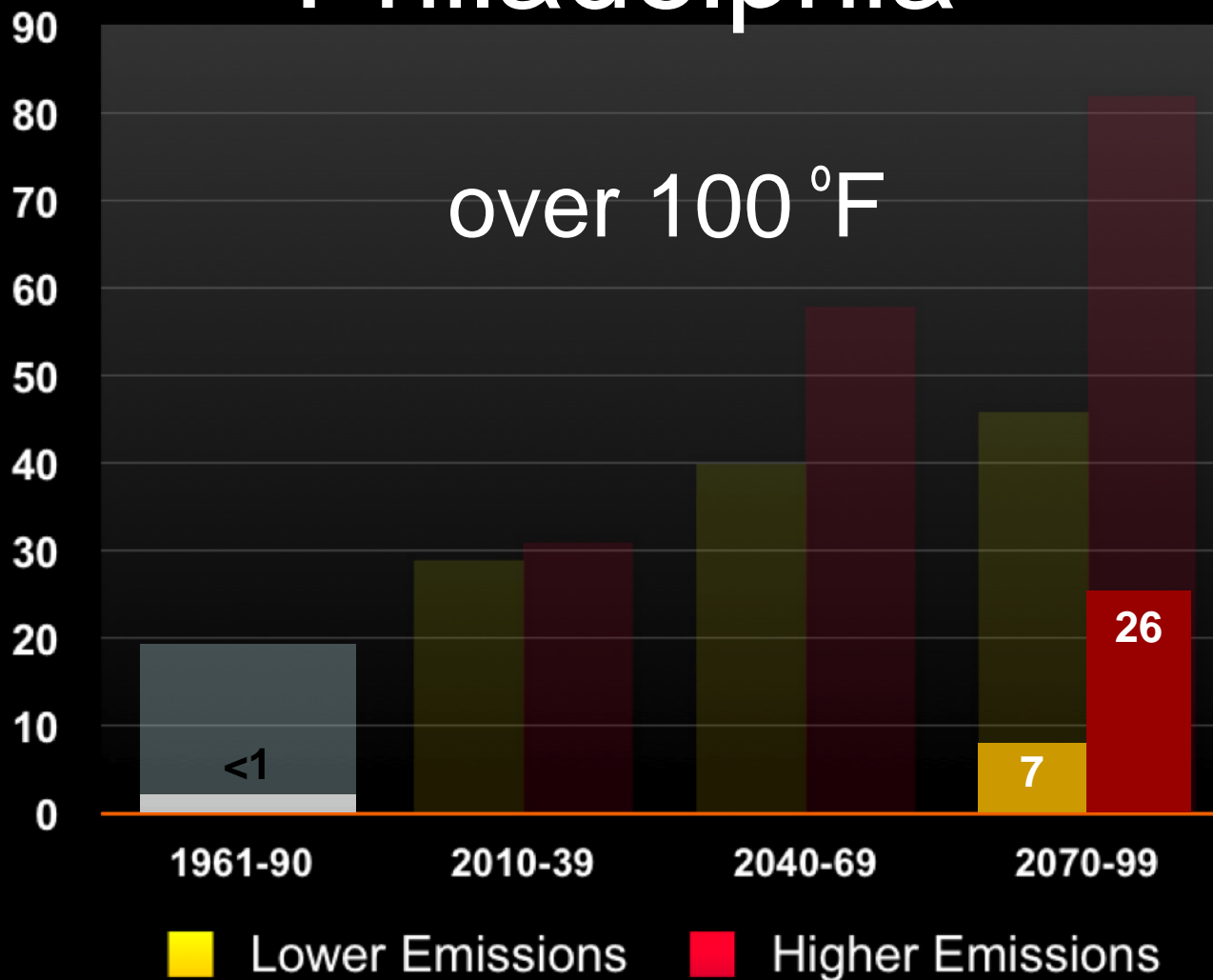
Extreme Heat – Cities and Towns



Heatwaves & Temperature Extremes Philadelphia



Heatwaves & Temperature Extremes Philadelphia



Pollen Allergens



Warmer temps + higher CO₂ levels →
more pollen allergen production

Air Quality



Infrastructure – sewage overflow

- With increased rainfall, sewage and stormwater systems in cities may not cope with flooding





Impacts on Agriculture

- Dairy
- Crops
- Pests and Weeds
- Adaptation

Vulnerability of milk production by late century under a higher-emissions future



For Farmers, Gardeners, Landscapers . . .

Climate change will bring new opportunities



And new risks and costs



iStockphoto.com/Kalulu

Crops Vulnerable to Rising Temperatures and Pests





iStockphoto.com/oooyoo

Impacts on Forestry

- Tree Species Habitat
- Fall Foliage
- Birds
- Coldwater Fish

Bird habitat

- Up to 25% reductions in forest habitat for ruffed grouse, American goldfinch and white throated sparrow



Fishing

- Warmer water and low flow in streams and rivers may impact popular sport fishing species like smallmouth bass and trout



PennFuture

Impacts on Winter Recreation

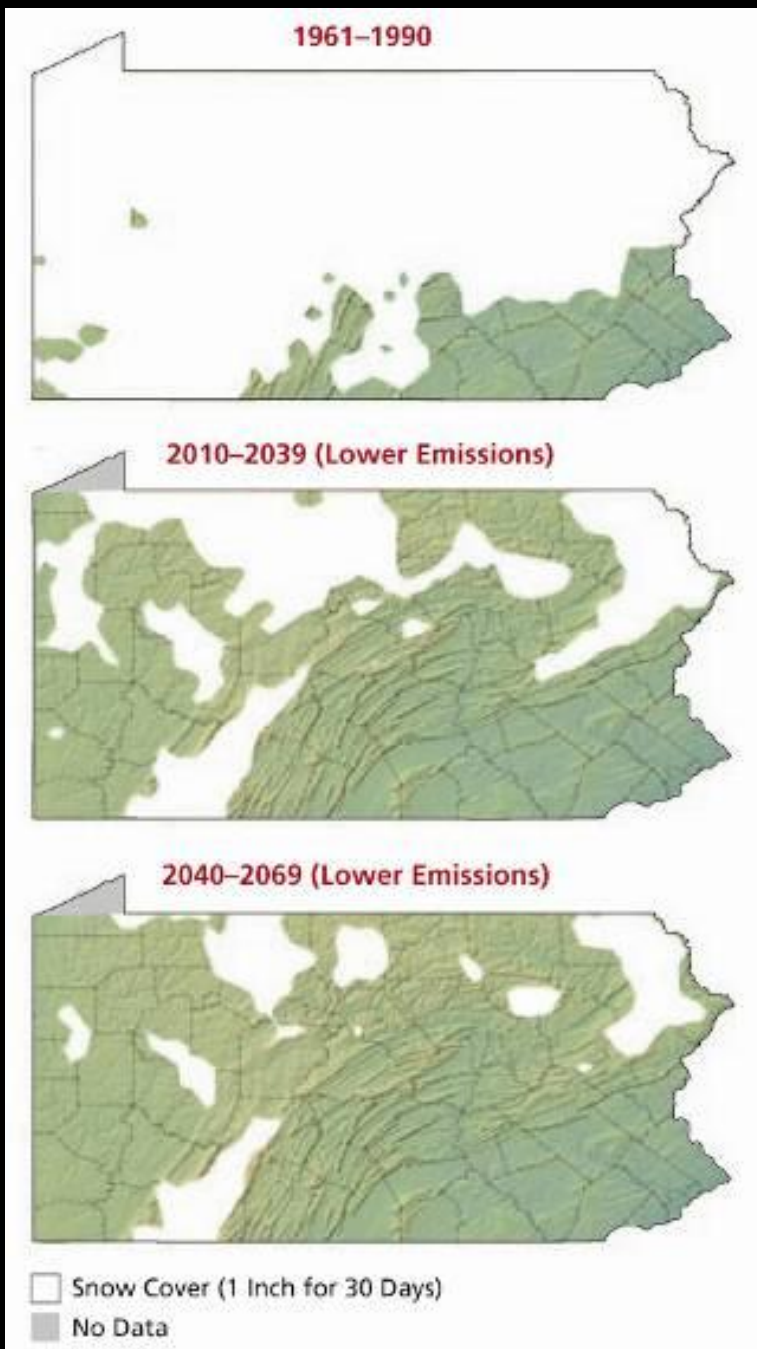
- Snow Cover
- Ski Industry
- Snowmobiling



Decreasing Snow Cover

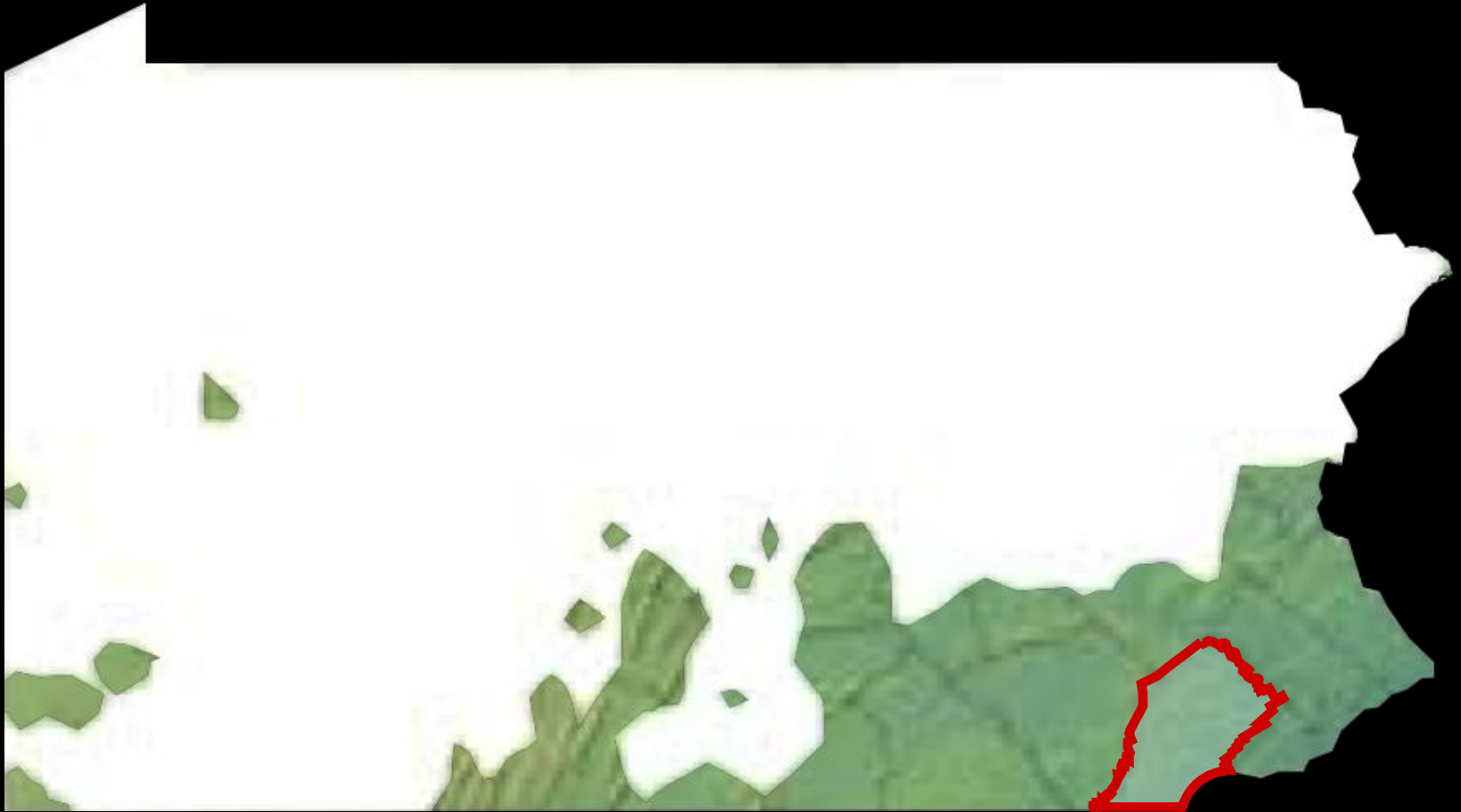


Under either emissions scenario, the ski season in PA is projected to be unviable by mid century



Shrinking Snowpack

Historical: 1960 - 1991



Area Covered by at Least 1" of Snow for at 30 Days
in the Average Year of the Period

Shrinking Snowpack

Low Emissions: 2010 - 2039



Area Covered by at Least 1" of Snow for at 30 Days
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Shrinking Snowpack

Low Emissions: 2040 - 2069



Area Covered by at Least 1" of Snow for at 30 Days
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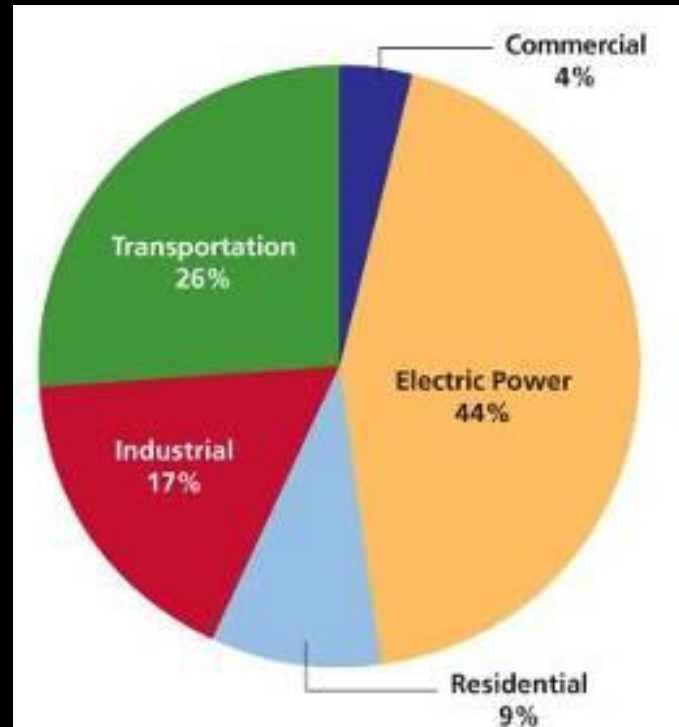


Meeting the Climate Challenge

Avoiding the unmanageable

Managing the unavoidable

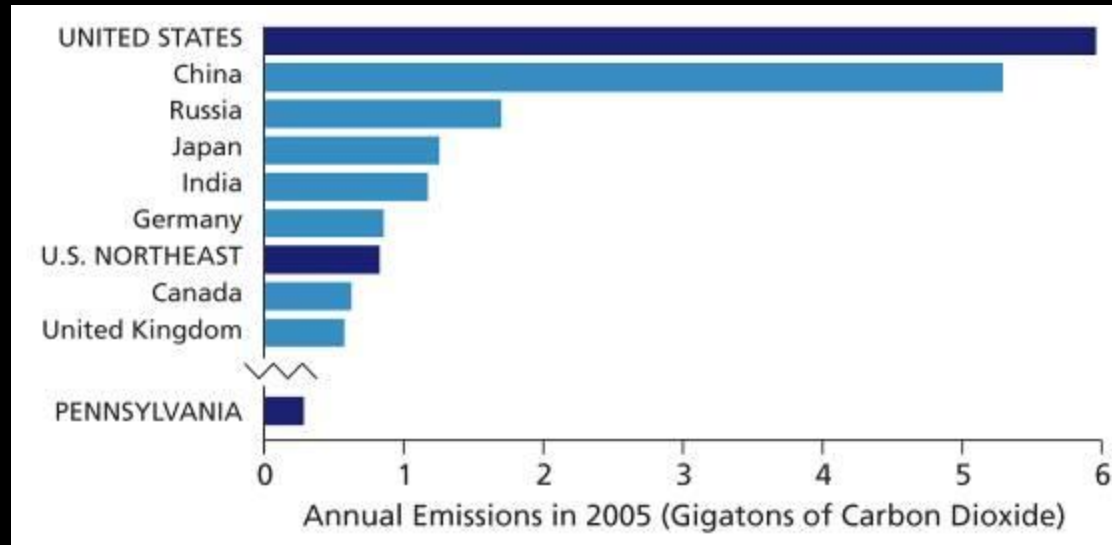
Heat-trapping emissions



EIA: 2005, *State Energy Data System*.

- Coal accounts for over 90% of CO₂ emissions in the state's electricity sector

PA on the global stage



EIA: 2005, *International energy annual*.

- 1% of global emissions
- Higher emissions than many countries
- Third highest US state

Solutions

Energy Efficiency
Electricity
Buildings
Transportation
Land Use



Scott Beveridge/Observer-Reporter



Community Energy, Inc.



Craig Miller Productions and DOE, NREL



Brad Feinknopf



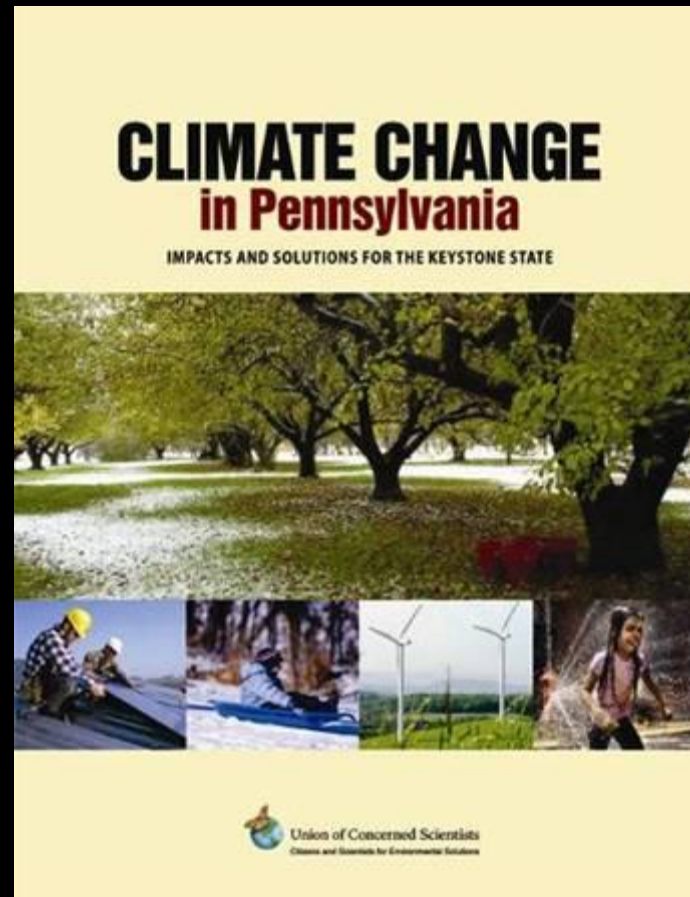
Jupiter Images

Motivating action in Pennsylvania

- Historically, a leader in innovation
- Opportunities for new green jobs and industries
- Responsibility to our children and grandchildren



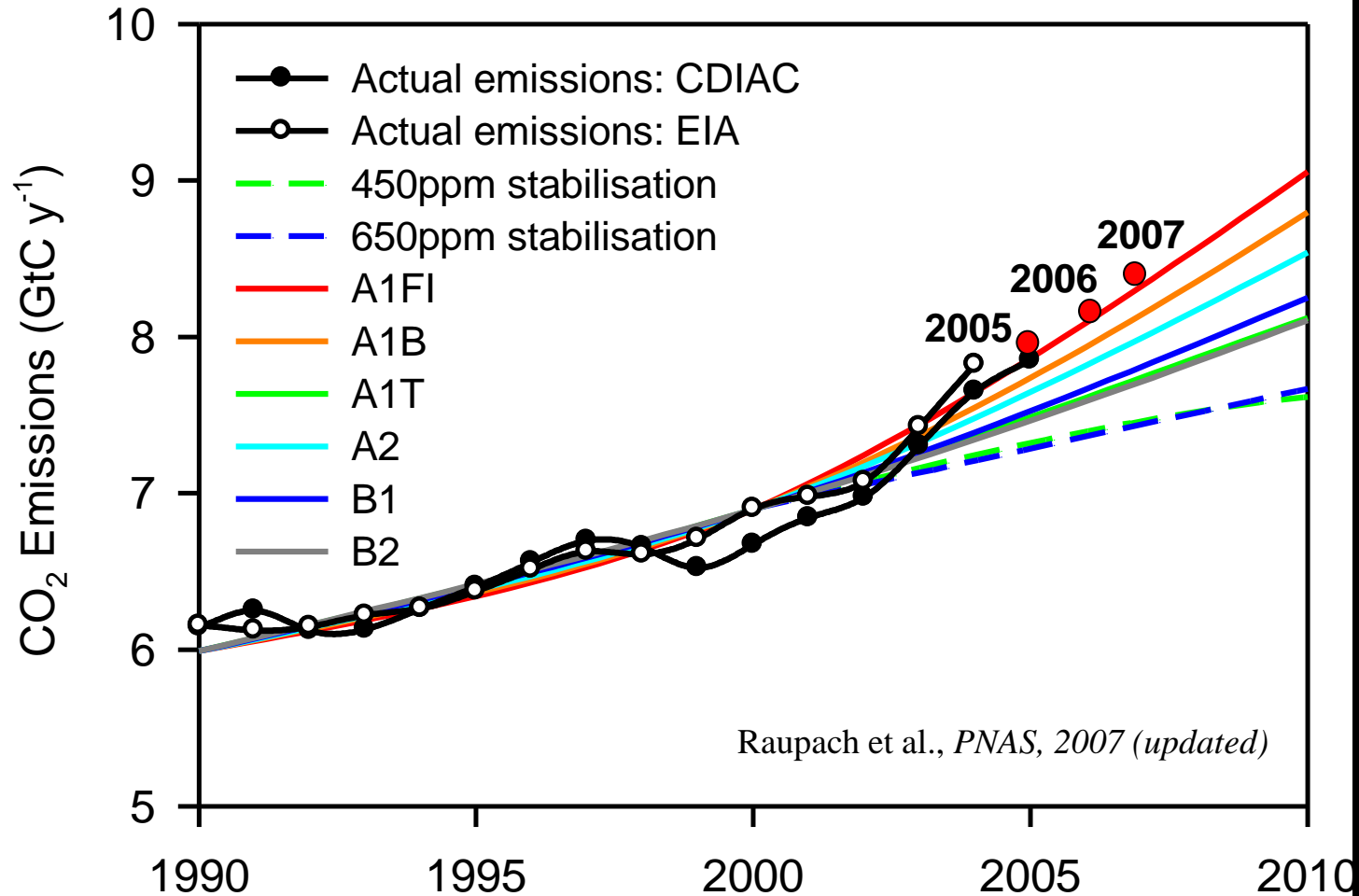
www.northeastclimateimpacts.org/pa
www.climatechoices.org/pa



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Current global emissions



A1FI (high) projections: +2.7% per year
Actual growth: +3.5% per year during 2000-2007

References

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Extreme Heat – Cities and Towns

