

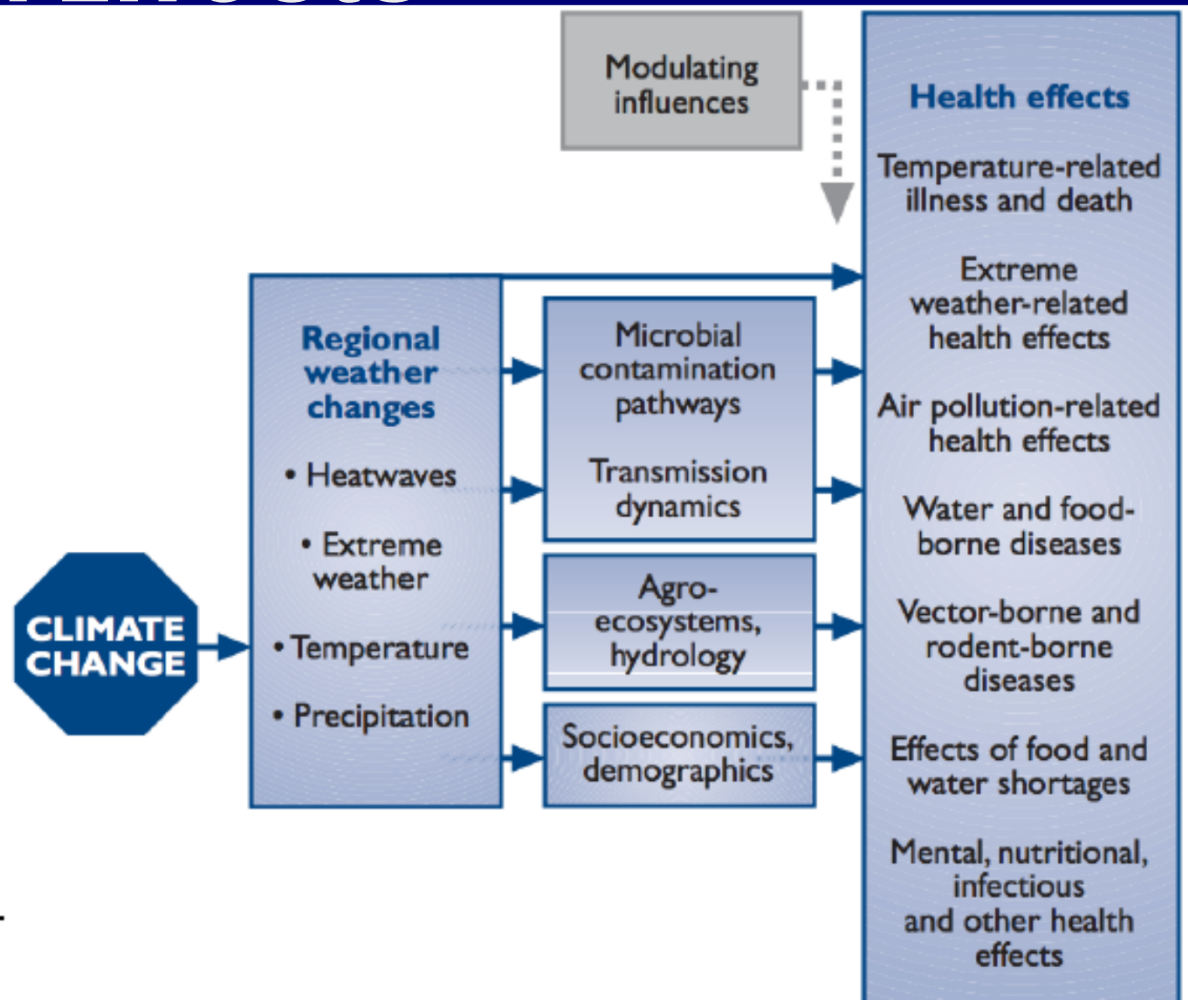
Impact of Climate Change on Public Health

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Thanks to Physicians for Social Responsibility;
David Grass, VT Environmental Health Surveillance Chief;
Matt Callihane, NH DHHS



Direct and Indirect Human Health Effects



J Patz et al,
Environmental Health
Perspectives, 108: 367-
376 (2000).



Vulnerable Populations

- Adds to existing health stressors for
 - Elderly
 - Very young
 - Chronically ill
 - Cardiovascular disease
 - Respiratory disease
 - Economically disadvantaged
 - Mentally ill





Severe Weather Events in NH

storms, floods, wind...



Keene NH October 10, 2005

Lebanon NH July 2, 2013



Heavy Downpours and Exposure to Disease

Physical injury, Social Dislocation; homelessness; agricultural disruption; exacerbation of behavioral health disorders

Streams and rivers rise which contributes to flooding of homes, businesses, and critical infrastructure like sewer and storm water systems.

Climate change increases heavy downpours.

Sewage overflow from treatment plants, septic fields, and municipal lines can back up into people's homes.

Flooded materials in homes, schools, and businesses can cause molds to grow and be inhaled.

Floodwaters can become contaminated with agricultural waste, chemicals, raw sewage, and other pollutants.

Floodwaters can contain disease-causing bacteria, viruses, and parasites.

Storm Drain
Wastewater
Stormwater

Figure 9.10: Heavy Downpours and Exposure to Disease

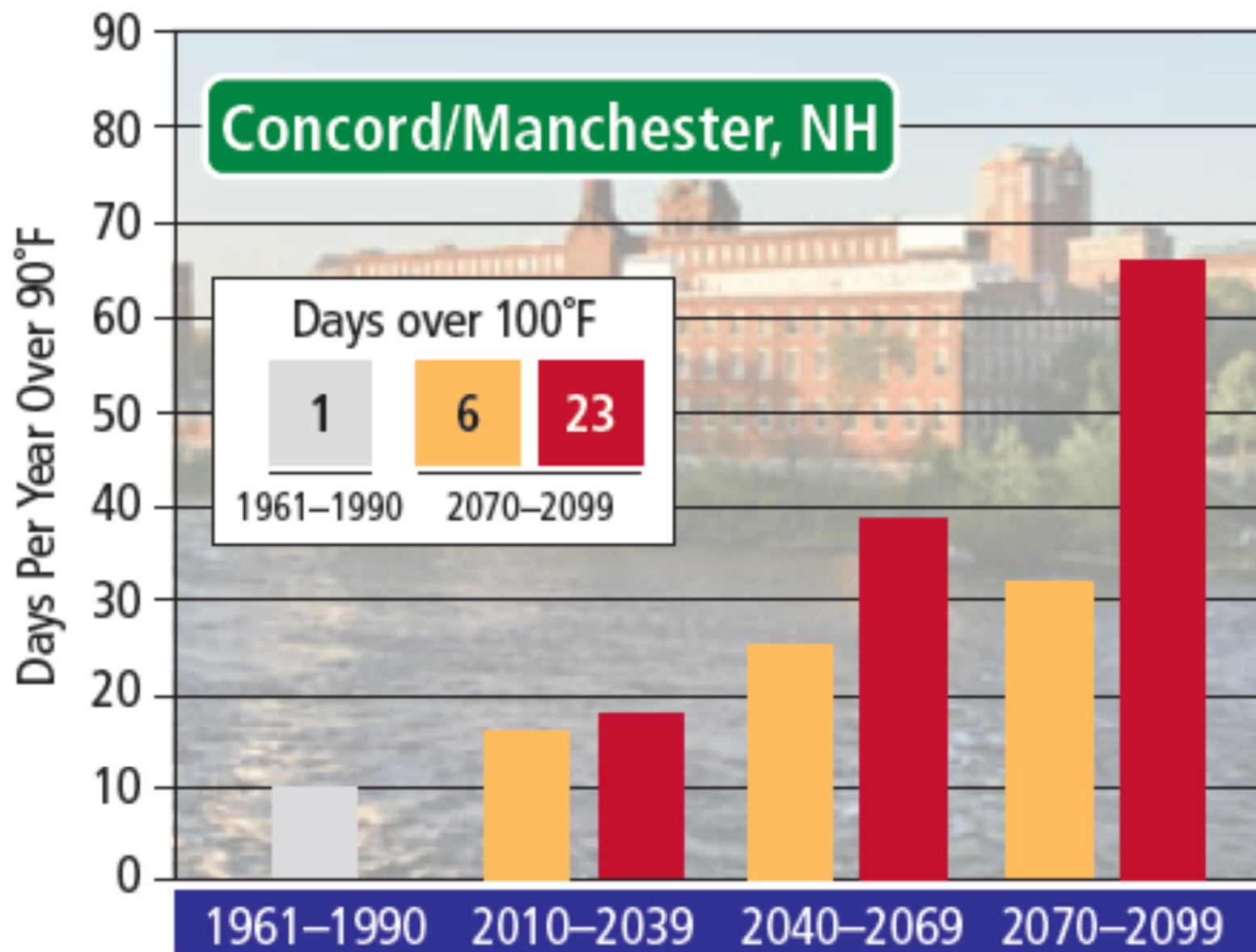
Grass 2013 Climate Change Adaptation Program
VT Dept of Health



Thermal Stress

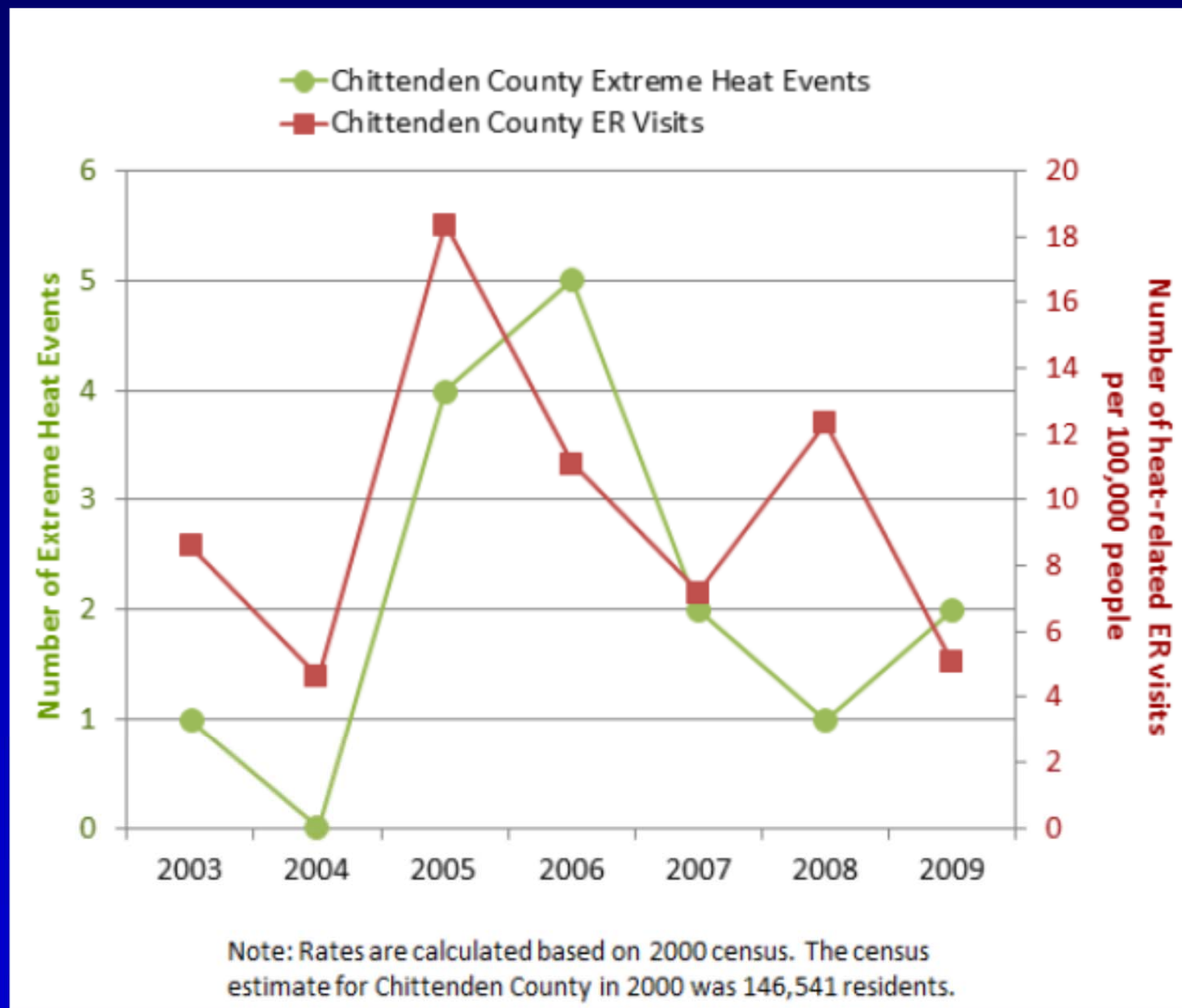
- Heat Illnesses
 - Cramps
 - Exhaustion
 - Stroke
- Elderly and chronically ill susceptible
- Chicago 1995 week-long heat wave – 700 deaths
- Europe 2003 heat wave – 70,000 deaths







Extreme Heat Drives ER Visits



Grass D. Climate Change Adaptation Program. Vermont Dept of Health 2013.



Confronting Infectious Diseases Emerging in the Upper Valley

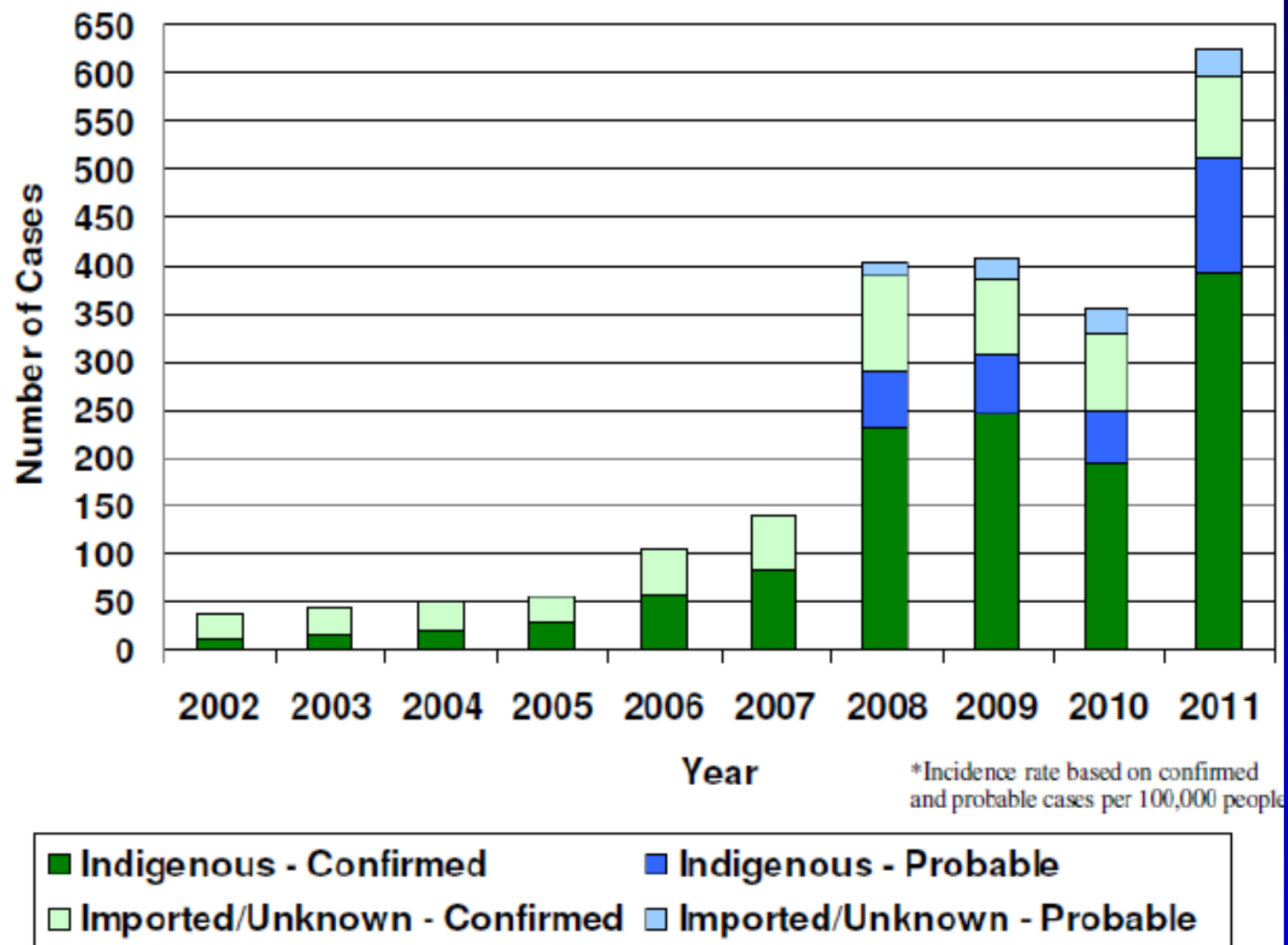
- Expanding range and Seasonal persistence of vectors
 - Lyme, EEE, West Nile
- Possibly more waterborne and food borne illness
- **At risk pops are widespread.**



Source: *Confronting Climate Change in the U.S. Northeast: Science, Impacts, and Solutions* (NECIA, 2007)



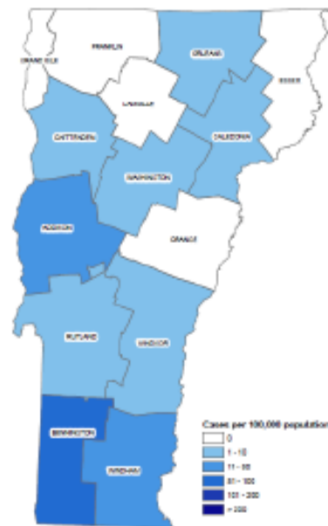
Figure 7: Lyme disease cases, Vermont, 2002-2011



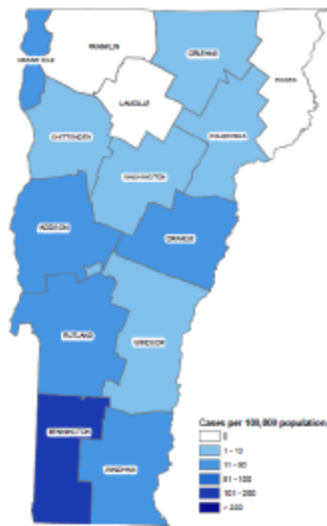
Grass D. Climate Change Adaptation
Program. Vermont Dept of Health 2013.

Lyme Disease

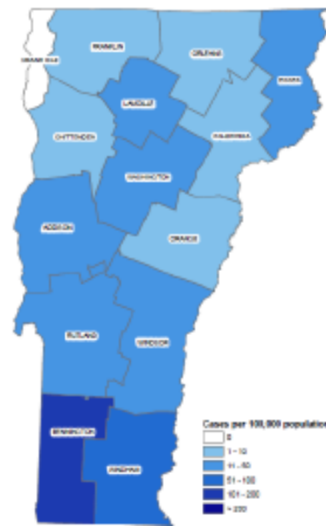
2005



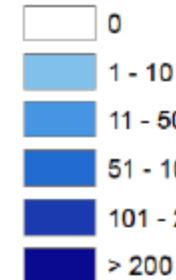
2006



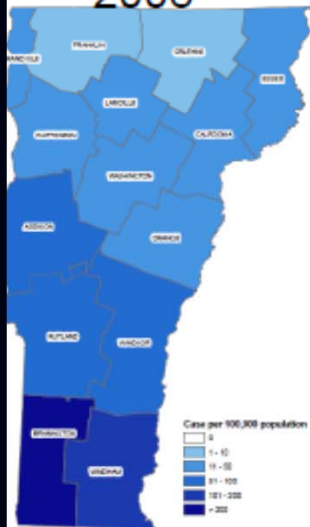
2007



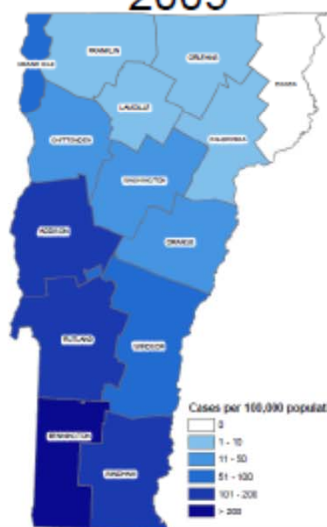
Cases per 100,000 population



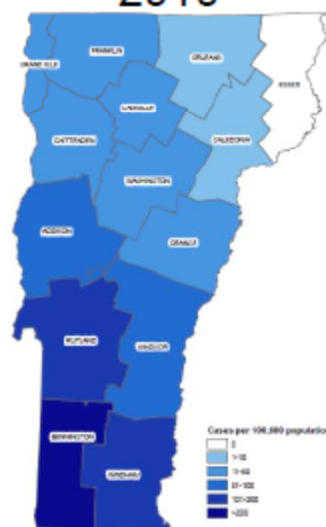
2008



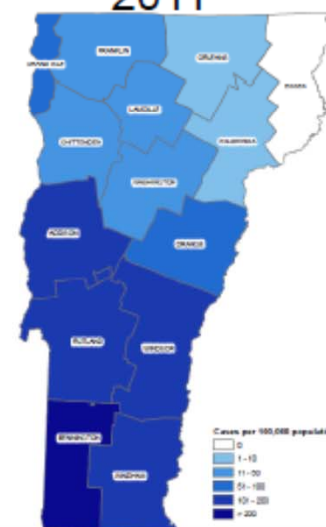
2009



2010



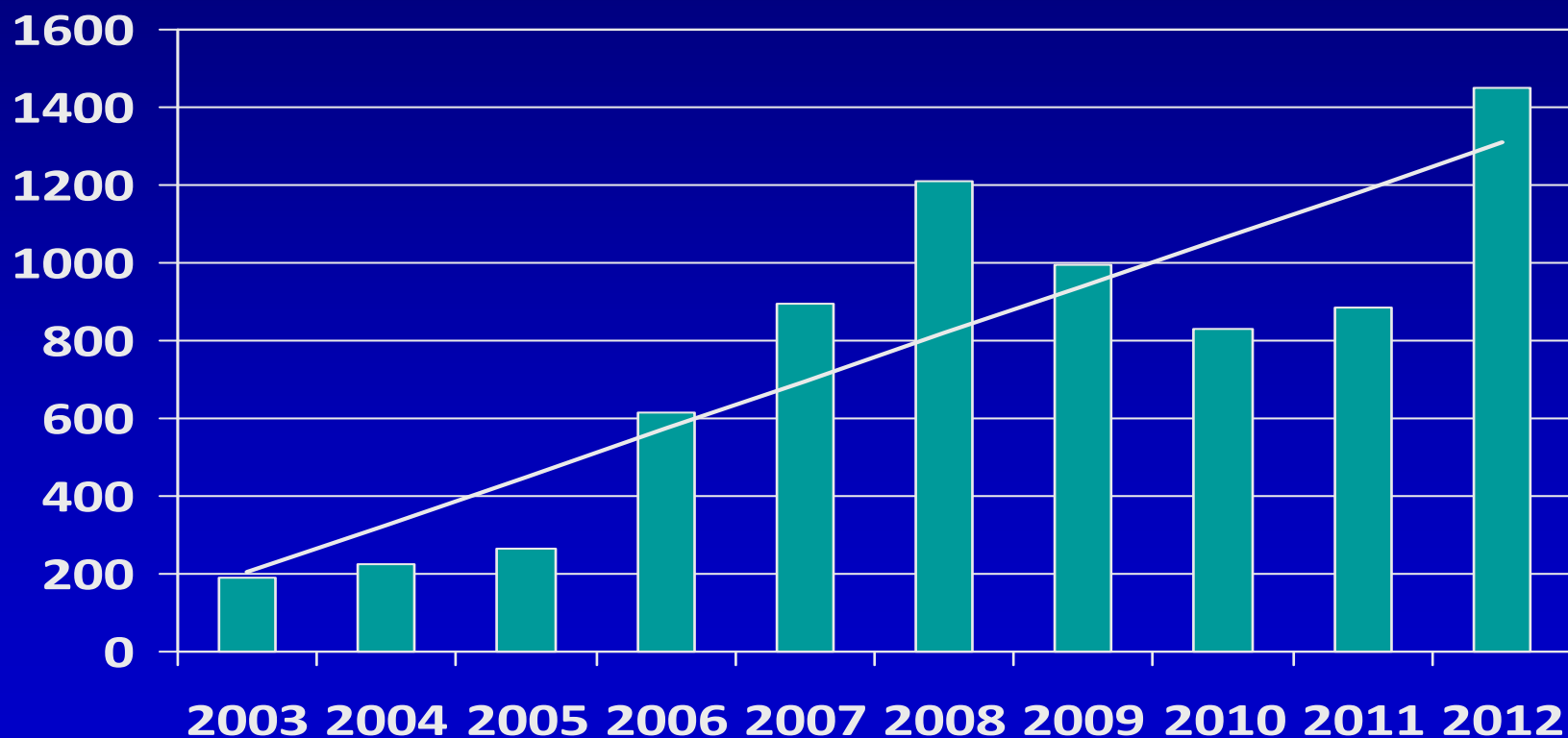
2011



Grass D. Climate Change Adaptation Program. Vermont Dept of Health 2013.



Increasing Cases of Lyme Disease in NH





Degradation of Air Quality Increases Resp and Heart Disease



At risk: the young, the old and those with chronic conditions like asthma, allergy, chronic lung and heart disease

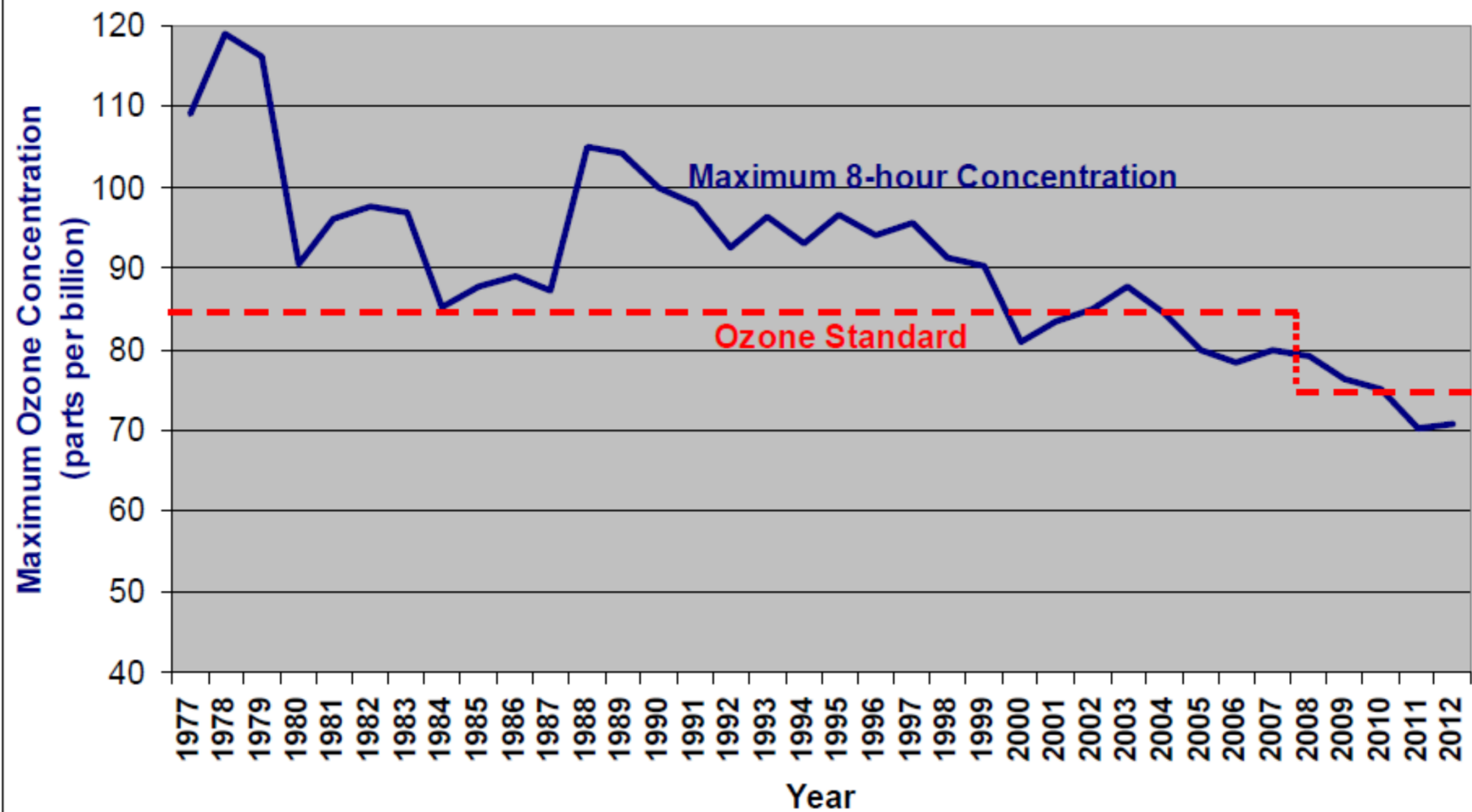


Allergens

- Warmer winters
 - Earlier start of pollen seasons
- Increase CO₂
 - Increases release of biological allergens



Ozone Trend in New Hampshire (1977-2012)



SOURCE: DES Air Resources



Heat Worsens Ozone Air Pollution Exacerbating Respiratory Diseases

- Ozone- 1^o component of smog
- Formed when NO_x and VOC's (vehicles, powerplants) interact in presence of heat & light
- Warmer temps increase ozone formation
- Temp. increase of 4°F could increase ozone conc. by 5%

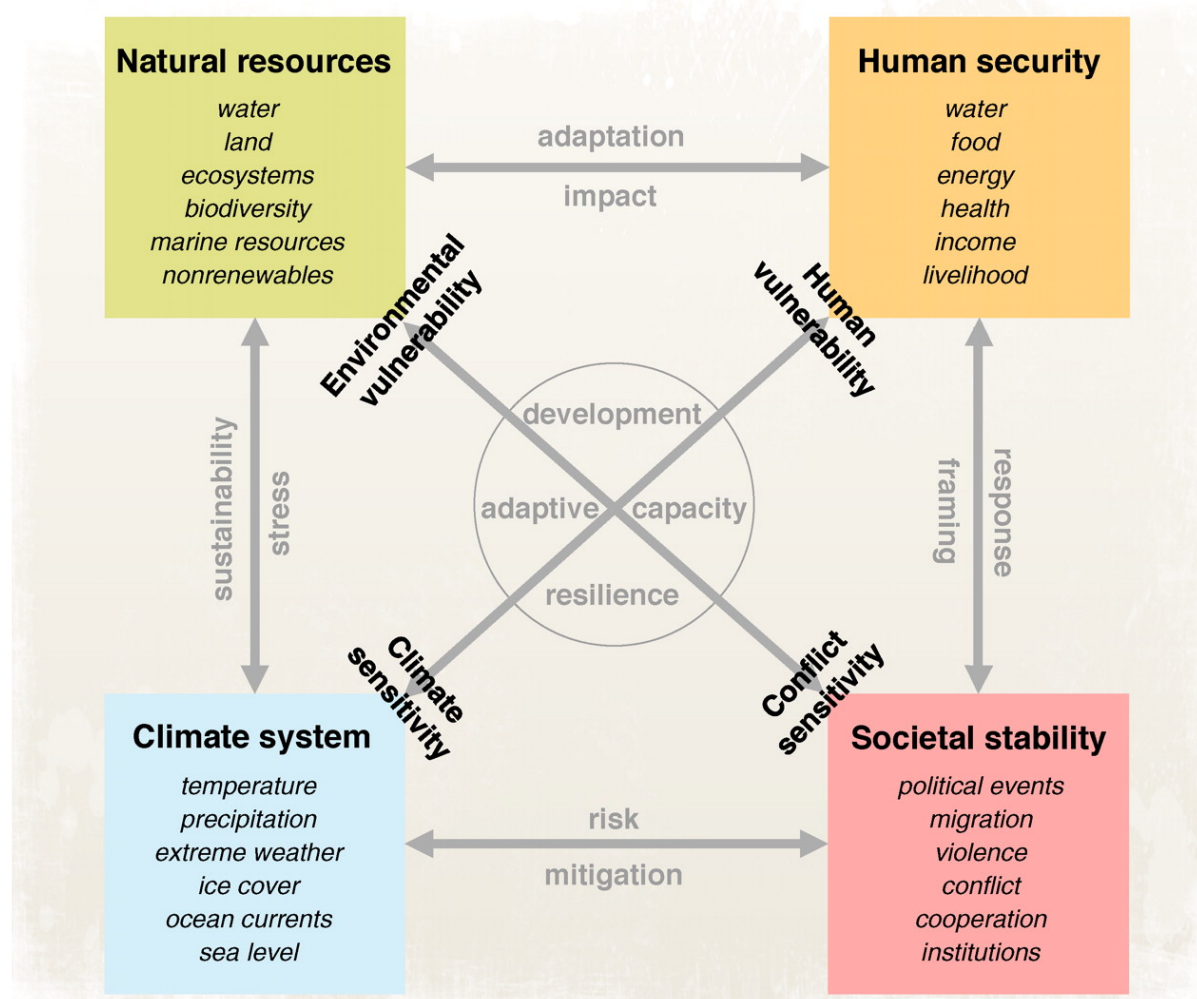


Heat Worsens Ozone Air Pollution Exacerbating Respiratory Disease

- **Impaired lung function**
- **Severe coughing, SOB, pain when breathing**
- **Lung, eye irritation**
- **Susceptibility to respiratory infection**
- **Increased hospital admissions & ER visits for asthma**
- **Increased risk of cardiovascular complications in at-risk populations**

Climate Change Increases Human Conflict

Fig. 1 Analytical framework of linkages between the climate system, natural resources, human security, and societal stability [based on (28)].



J Scheffran et al. Science 2012;336:869-871



Authoritative Assessments

- Intergovernmental Panel on Climate Change
- US Global Change Research Program
 - National Climate Change Assessment
- Vermont/New Hampshire Climate and Health Programs

