Presenter

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Building Resilience Against Climate Effects in Vermont

VERMONT
DEPARTMENT OF HEALTH

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September 16, 2015

Outline

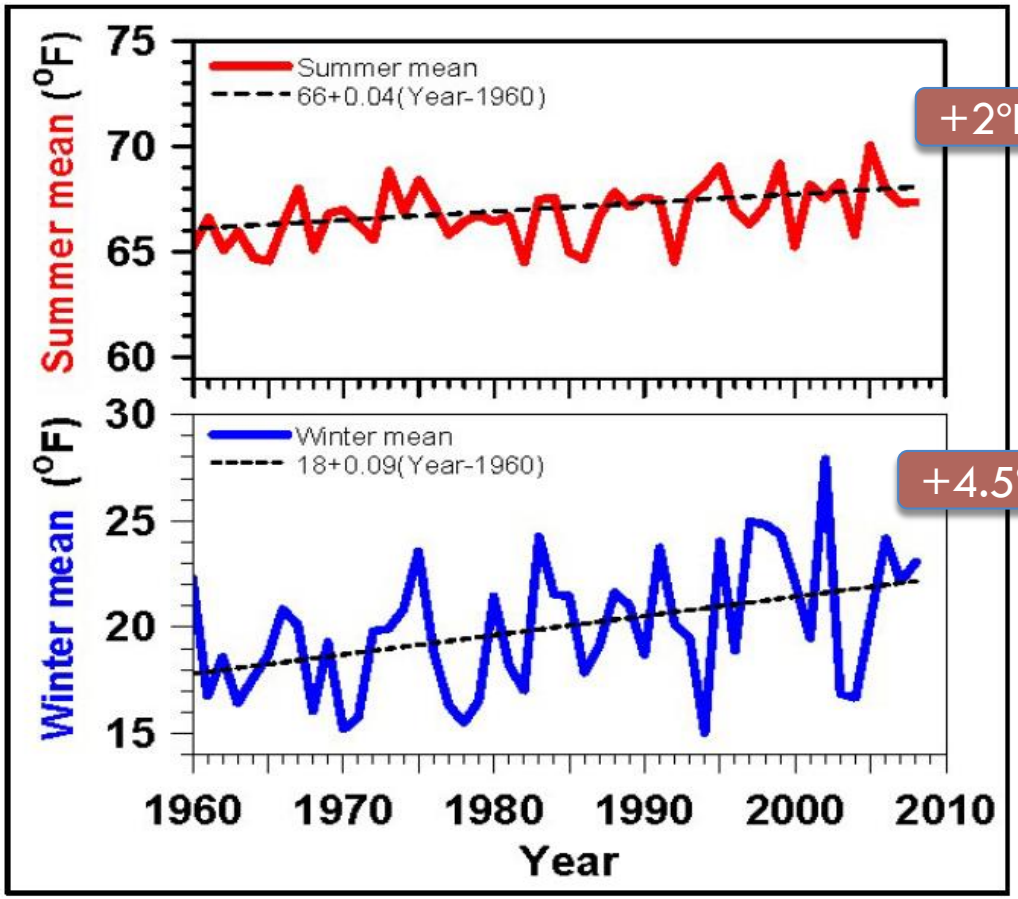
- Analysis:
  - Climate change in Vermont
  - Priority health concerns
  - Disease burden analysis
- Adaptation
  - Health department actions
  - Partnerships
- Next steps




Climate change in Vermont

Temperatures have been increasing

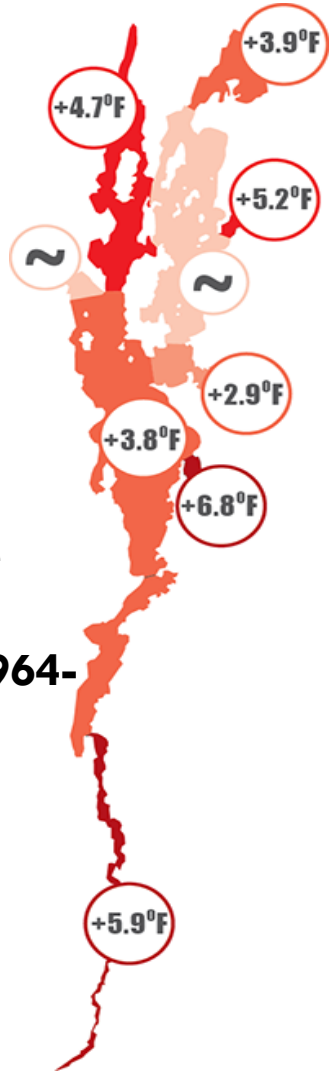
Vermont ambient temperatures, 1960-2010



Based on data from 4 stations in Vermont, 1960-2010

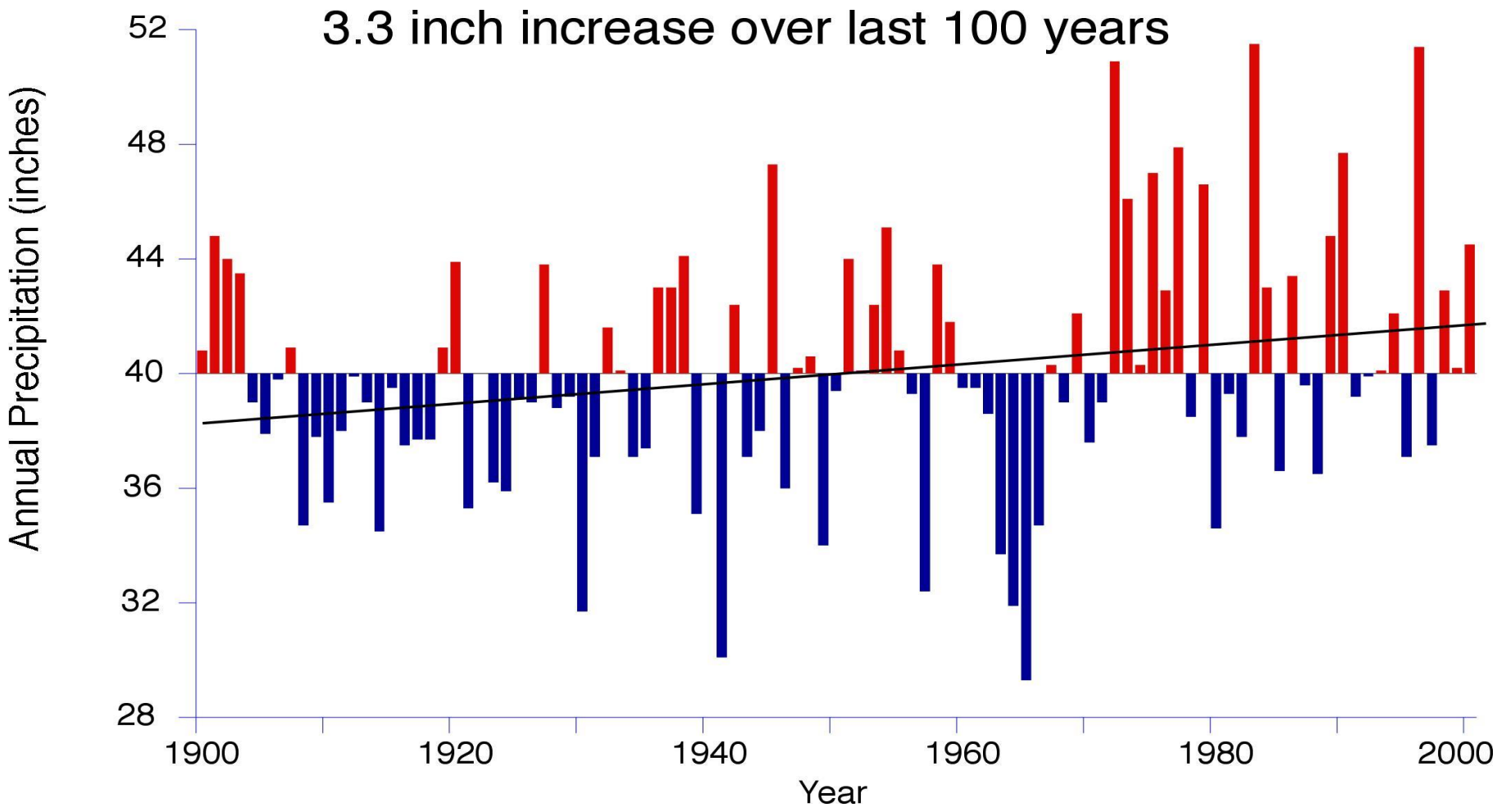
Source: Betts (2011), Climate Change in Vermont

Change in Lake Champlain temperature, 1964-2009



Source: Lake Champlain Basin Program, 2015 State of the Lake Report

Precipitation has been increasing



Time series represent average of 79 meteorological stations in the Northeast, 1899-2000. [From Wake 2005]

Future expectations for Vermont

- Warmer ambient and water temperatures
- During warm months:
  - Longer growing season
  - More frequent heat waves
  - Fewer total days with rain
    - But more frequent heavy rain
- During winter:
  - Shorter freeze season
  - More precipitation
    - But less as snow, more as freezing rain

Source: Vermont State Climate Office; Betts (2011), Climate Change in Vermont

Priority health concerns

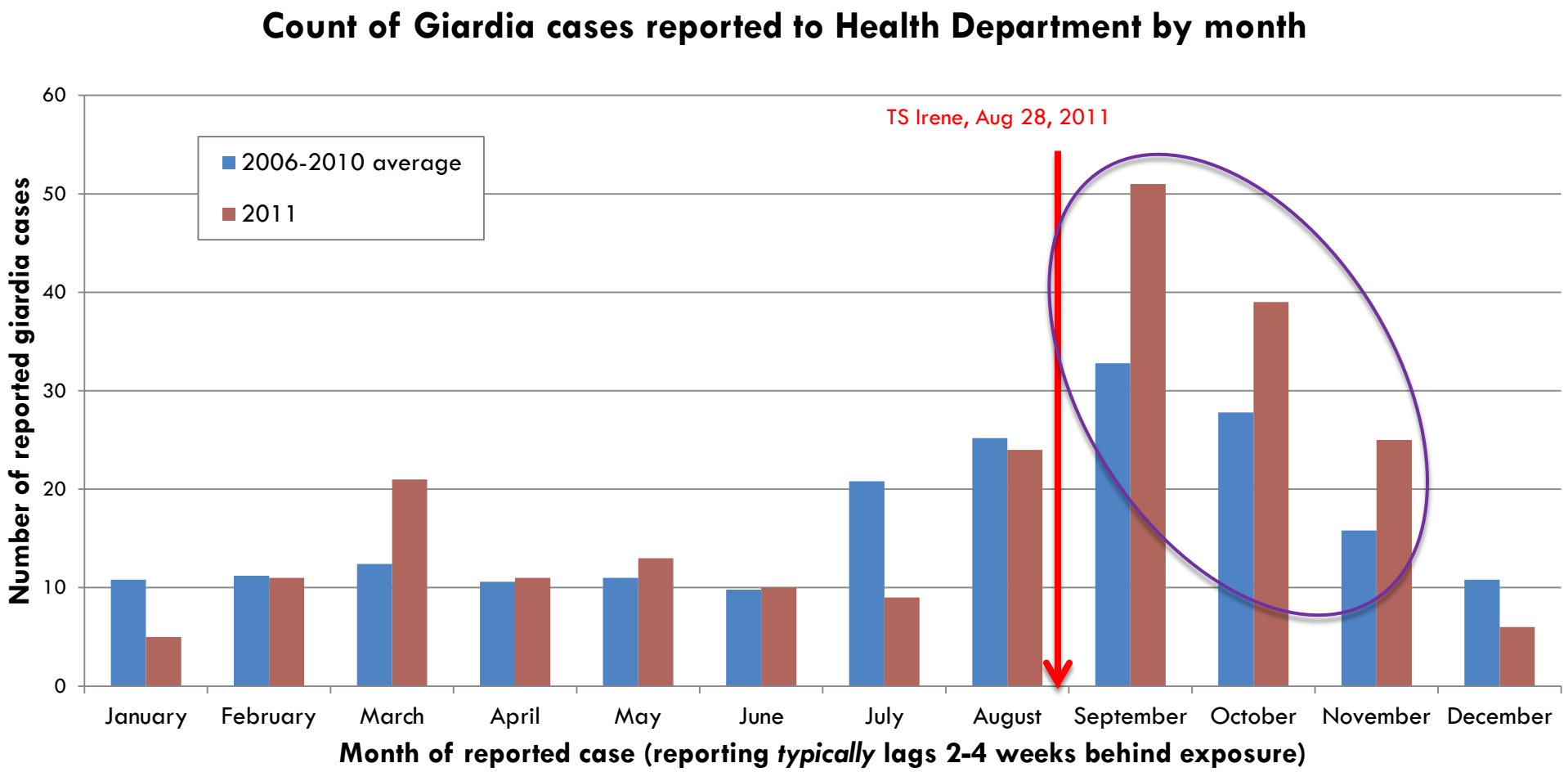
Extreme weather events

- Health impacts from Tropical Storm Irene (2011)
  - 6 deaths
  - Extensive property/infrastructure damage, power outages, and other service disruptions
  - Wellheads submerged by floodwaters
  - 30 public water systems issued Boil Water Notices
  - 17 wastewater treatment facilities reported compromised operations
  - Septic system failures, fuel spills, other hazardous contamination
  - Over $10 million estimated damage to crops and farmlands

Source: Vermont Agency of Natural Resources; Vermont Emergency Management

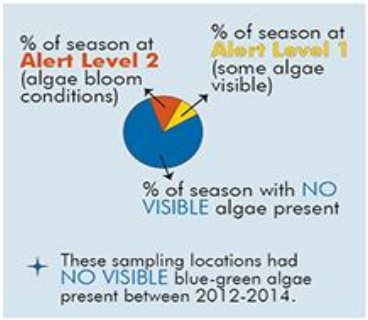
Sources: Wikimedia Commons; Burlington Free Press

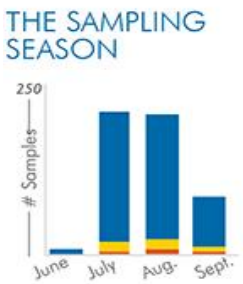
Waterborne & foodborne diseases

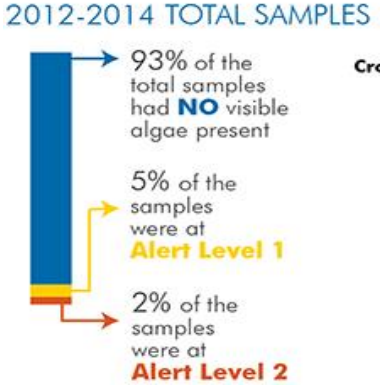


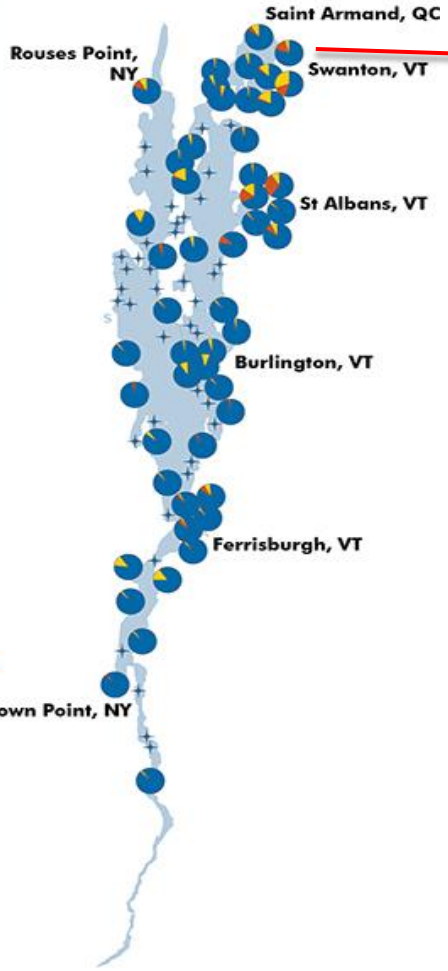
Source: Vermont Department of Health

Blue-green algae









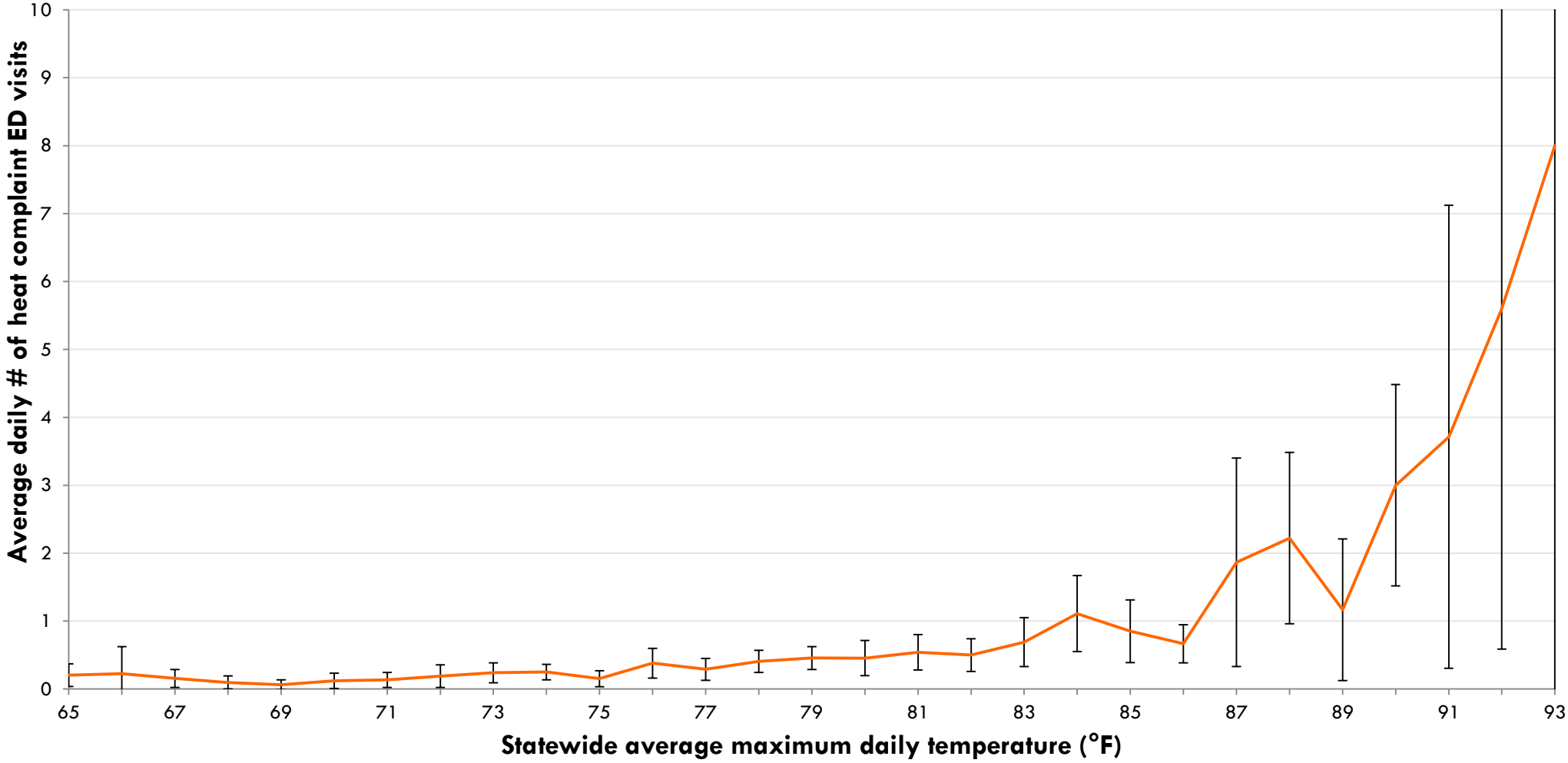
Missisquoi Bay:

Source: Lake Champlain Basin Program, 2015 State of the Lake Report

Source: Burlington Free Press (Aug 29, 2015)

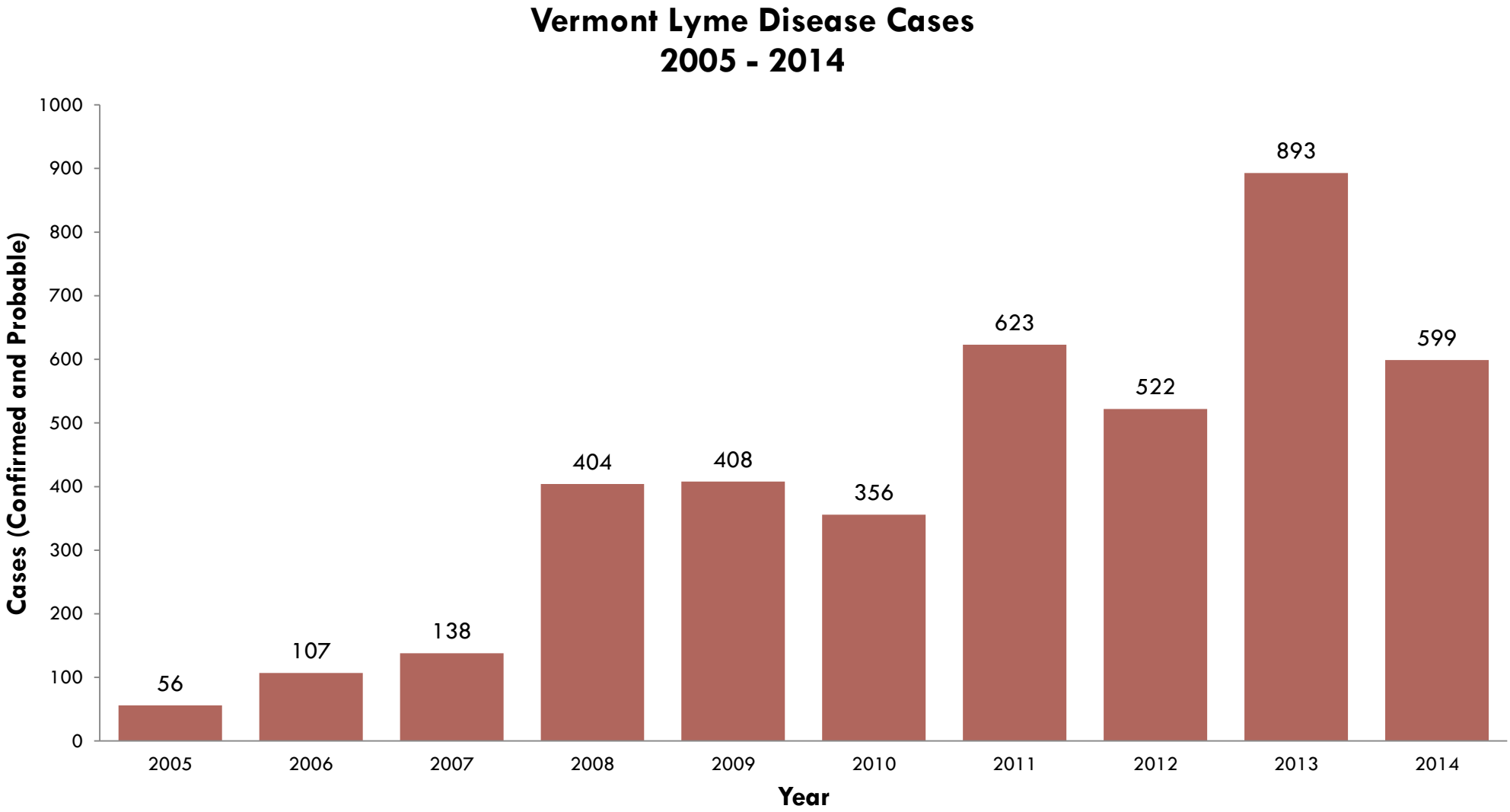
Heat-related illness and mortality

Average daily emergency department visits for heat complaints in Vermont, by maximum daily temperature, 2004 - 2013



Source: Vermont Department of Health

Vectorborne disease



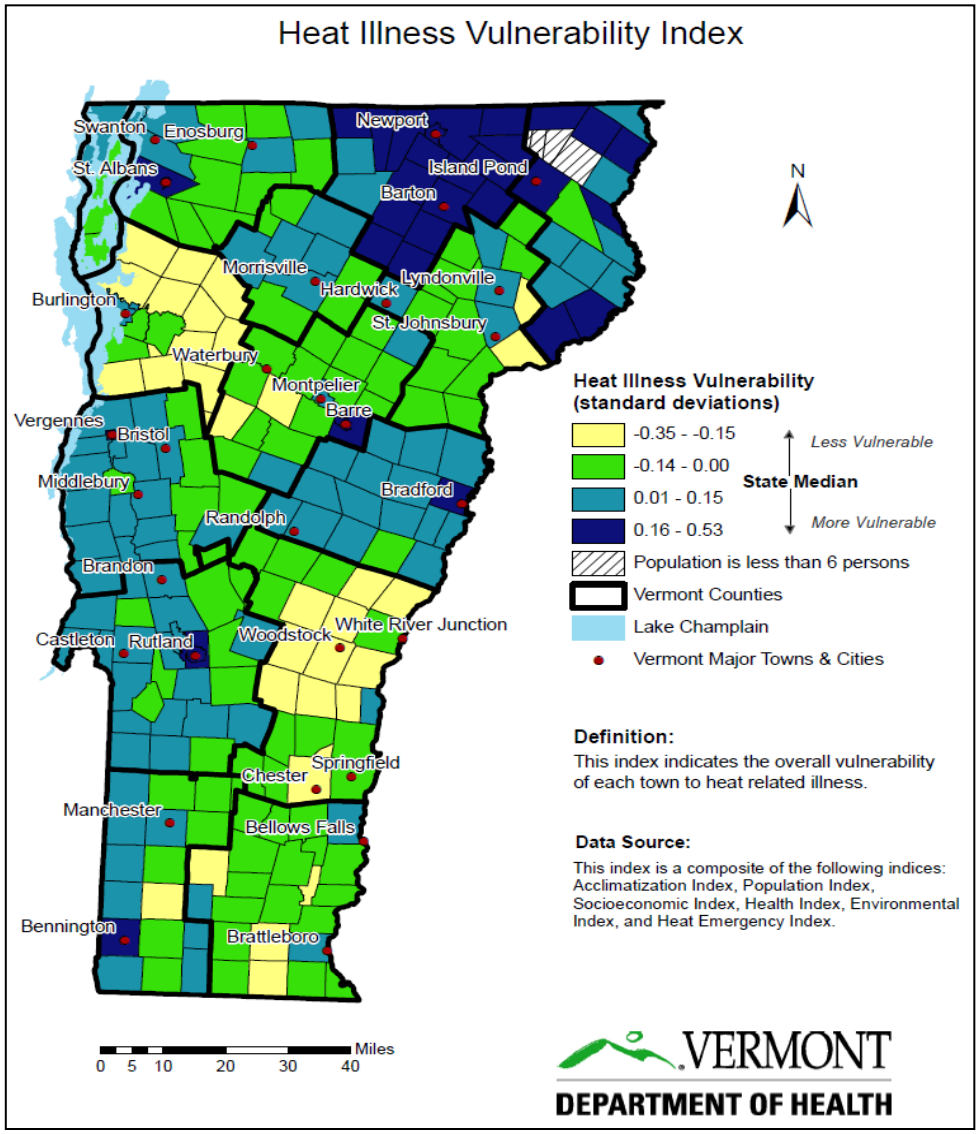
Other potential impacts

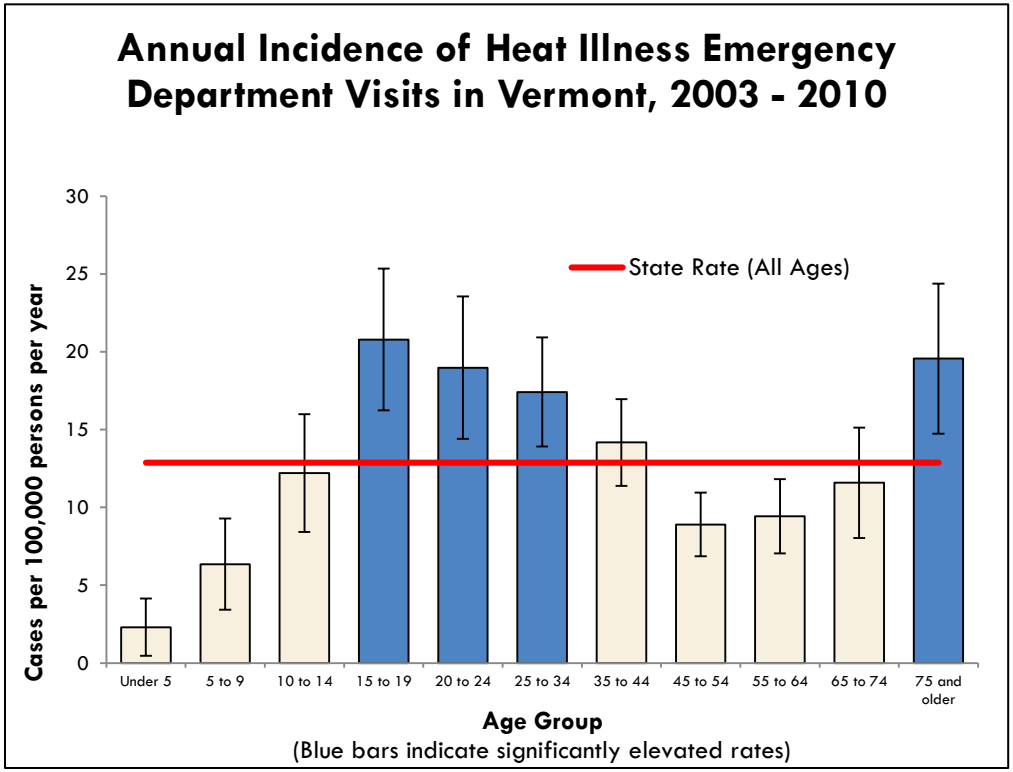
- Allergens
  - Pollen
  - Mold
- Skin irritants
  - Poison ivy
  - Poison parsnip
- Air pollution
  - Ozone & fine particulate matter
- Mental health

Disease burden analysis

DRAFT, preliminary findings – please do not cite or circulate

Vulnerability assessment





DRAFT, preliminary findings – please do not cite or circulate

Projecting disease burden

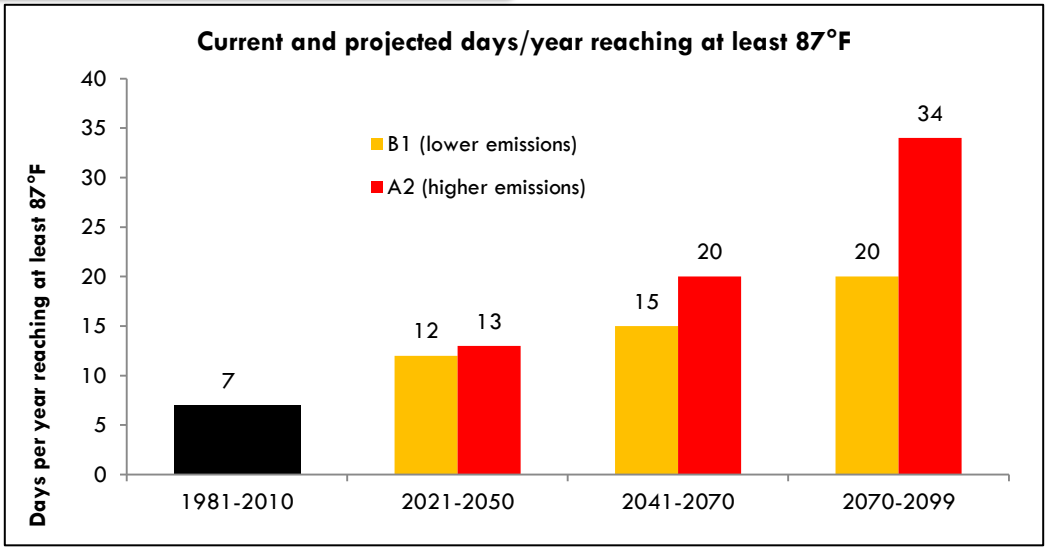
Current health burden

- Average of 80 emergency department visits per year for heat complaints
  - 26 occurred on days 87°F and warmer
- For those aged 65+, estimated 6 excess deaths per year on days 87°F and warmer

Exposure – outcome associations

- Emergency department visits were **8x more likely** on days when temperature reaches 87°F
- For those aged 65+, about **one additional death** on days 87°F and warmer

Expected change in exposure



Source: Vermont Department of Health

Future health burden

Time period	Excess emergency department visits/year for heat complaints	Excess deaths/year attributable to heat
Baseline (2012)	26	6
2021-2050	44-48	10-11
2041-2070	55-73	12-17
2070-2099	73-125	17-28

Climate change adaptation

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How Hot is too Hot?

VERMONT DEPARTMENT OF HEALTH

For Immediate Release: July 28, 2015

Media Contact:
Communication Office
802-863-7281

Vermonters Experience Serious Health Effects When Temperatures Reach Mid to Upper-80s

BURLINGTON—A Vermont Department of Health analysis shows that Vermonters are at greater risk for serious illnesses, even death, when the statewide average temperature reaches or exceeds 87°F. Adults age 75 and older and 15 to 34 experience the highest rates of heat-related illnesses. Adults 65 and older are at higher risk for death on such hot days.

"Vermonters may be especially vulnerable because our bodies are not accustomed to hot temperatures and because many older homes and businesses are not well designed to deal with summer heat," said David Grass, environmental health surveillance chief at the Health Department. "This explains why we see some of the highest rates of heat-related illnesses in the cooler counties. In general, Vermonters should take the necessary precautions when temperatures are forecast for the mid-80s or higher."

The statewide average temperature of 87°F corresponds to a range from about 85°F in cooler counties like Bennington and Essex to almost 89°F in warmer counties like Chittenden and Windham. Those who work or exercise outdoors, infants and children, people who are obese or have a chronic medical condition, and people living in more urbanized areas also tend to be at greater risk. Some people will suffer heat-related illnesses at temperatures lower than this range.

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Vermont Drinking Water Systems Now Sampling for Blue-Green Algae Toxins

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DEPARTMENT OF HEALTH

For Immediate Release: July 7, 2015

Media Contacts:

Vermont Department of Health
Communication Office
802-863-7281

Vermont Department of Environmental Conservation
Drinking Water and Groundwater Protection Division
802-236-1483

BURLINGTON –All 22 of the drinking water systems on Lake Champlain began sampling this week as part of a new program to monitor public drinking water supplies for blue-green algae toxins.

Some blue-green algae blooms produce toxins that are harmful to humans and animals. Testing is the only way to know if an algae toxin is present in drinking water. This new 12-week monitoring program will bolster the state's current efforts to visually monitor for blue-green algae blooms and protect the public from potential toxins in drinking water.

Lake Champlain is the drinking water source for about 150,000 Vermonters. Since the U.S. Environmental Protection Agency does not require testing for blue-green algae toxins, participation in collecting samples is voluntary.

Thirty public drinking water system operators were trained this spring on visual bloom identification and toxin detection response. Water system operators are submitting samples to the Vermont Department of Health Laboratory for toxin analyses.

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ALL » PAGE PATH LEVEL 1: /prevent/ » PAGE PATH LEVEL 2: /lyme/ » PAGE: /prevent/lyme/lyme_disease.aspx

All Sessions
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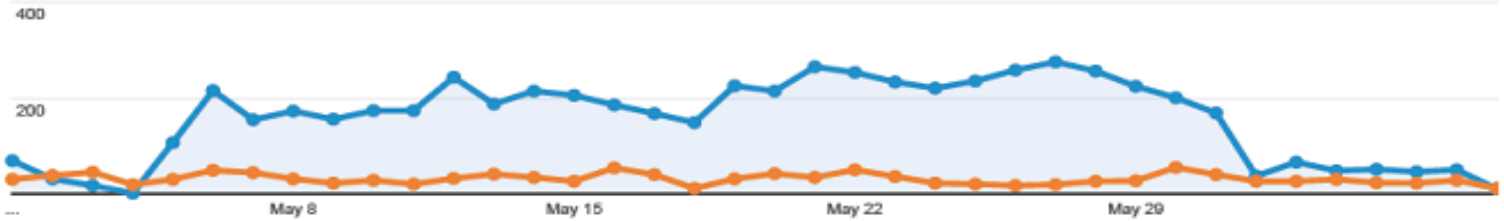
May 1, 2014 - Jun 7, 2014: Pageviews
May 1, 2013 - Jun 7, 2013: Pageviews



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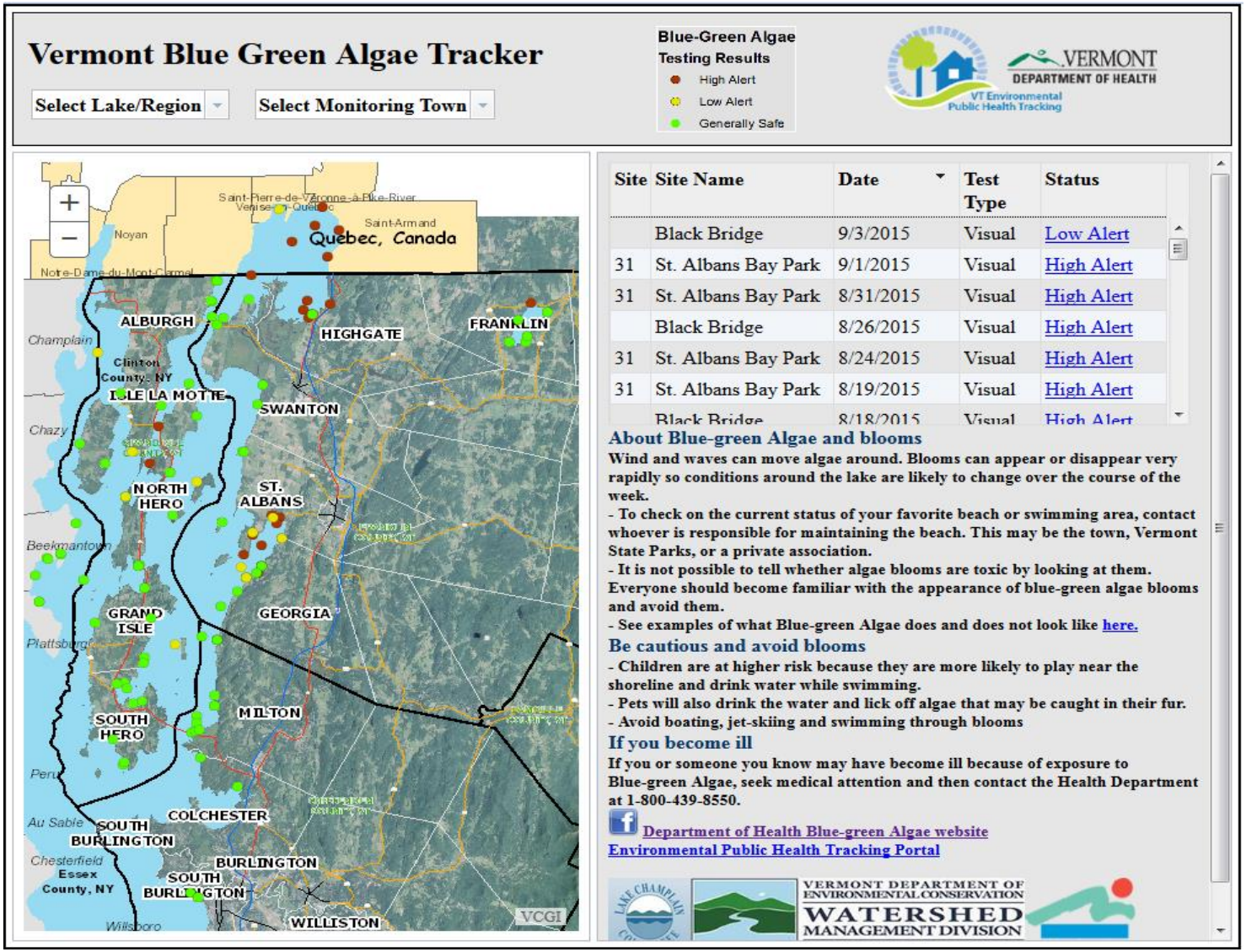
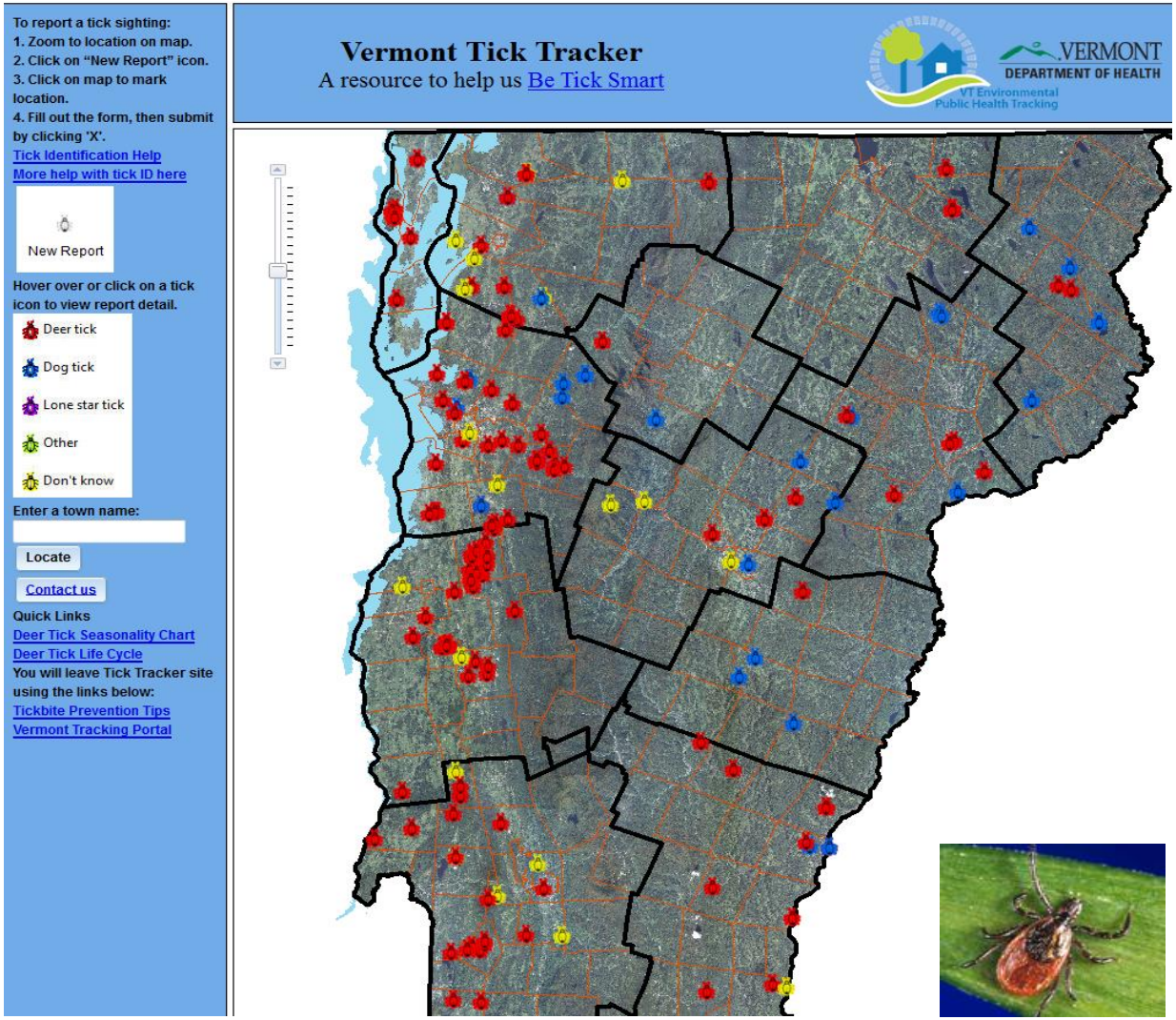
1. /prevent/lyme/lyme_disease.aspx					
May 1, 2014 - Jun 7, 2014	**5,938** (100.00%)	5,156 (100.00%)	00:01:15	62.88%	56.42%
May 1, 2013 - Jun 7, 2013	**1,141** (100.00%)	914 (100.00%)	00:01:34	50.89%	45.57%
% Change	**420.42%**	**464.11%**	**-19.88%**	**23.55%**	**23.79%**

Surveillance and reporting



Surveillance and reporting



Partnerships

Partnerships

- Extreme heat
  - National Weather Service
- Blue-green algae
  - Lake and drinking water monitoring
  - Drinking water system response plans
- Tick & mosquito monitoring
- ECO AmeriCorps
- State agency plans
  - Comprehensive Energy Plan
  - Hazard Mitigation Plan
- Non-governmental organizations
  - Community Resilience Organizations
  - Resilient Vermont

Next steps

Next steps

- Additional analyses and disease projections
- Identify potential interventions
- Develop & implement **Adaptation Plan**
  - Enhanced surveillance
  - Heat Response Plan
  - Local vulnerability assessment guidance
  - Green infrastructure initiatives
- Evaluation

Acknowledgments

- Centers for Disease Control and Prevention, Climate and Health Program
- Vermont Department of Health
  - Nate Schafrick, Climate Change Adaptation Program Epidemiologist
  - David Grass, Environmental Health Surveillance Chief
  - Heidi Hales, Vermont Agency of Natural Resources (former Climate Change Adaptation Program Coordinator)
  - Martin Fogl, McGill Medical School (former Climate Change Adaptation Program Epidemiologist)
  - Many others…
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  - Lesley-Ann Dupigny-Giroux, Vermont State Climatologist
  - Evan Oswald, PACE Post-doctoral Fellow, University of Vermont

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