

H₂ UH-OH OUT OF THE AND INTO THE



Joanne Bartkus
Director
Public Health Laboratory
MN Dept of Health



Minnesota is known for:



Minnesota's Temperature Extremes

- Highest Recorded Temperature
114° F
- Lowest Recorded Temperature
-60° F
- Largest Single Day Change
71° Drop

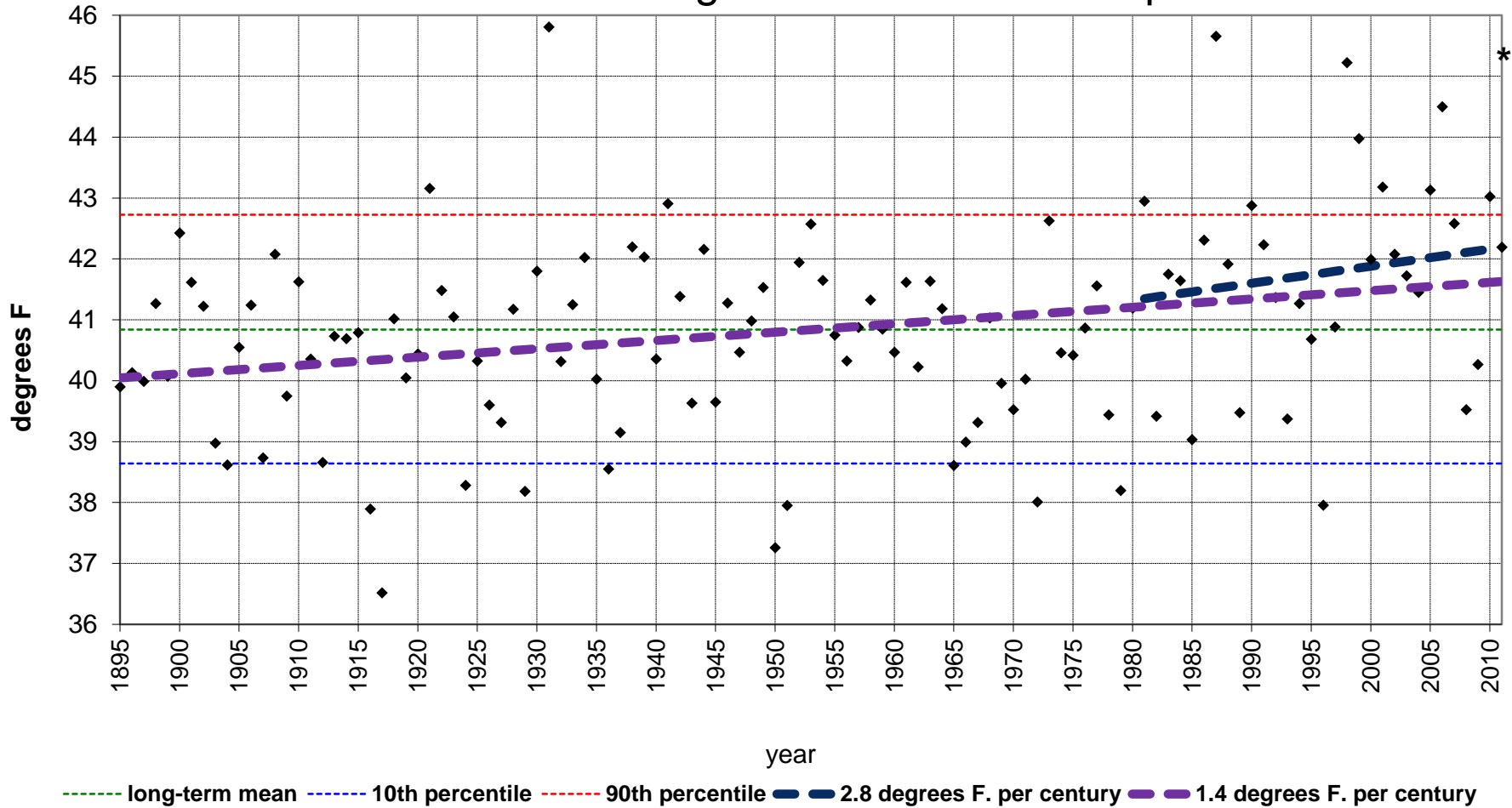


Observed Climate Changes

There have been three recent significant observed climate trends in Minnesota:

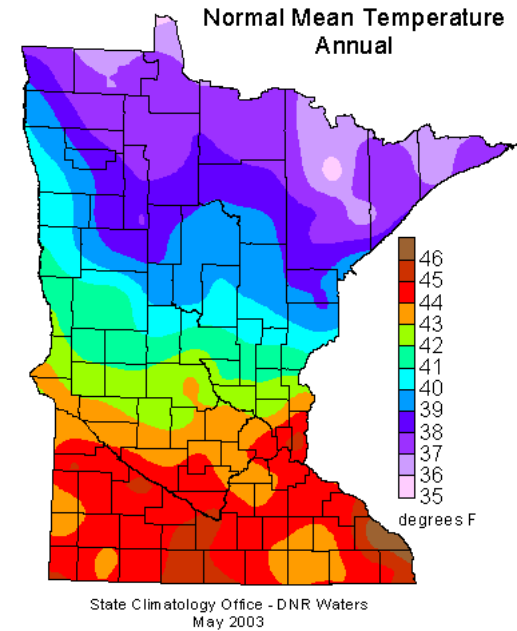
- **The average temperature is increasing**
- **The average number of days with a high dew point may be increasing**
- **The character of precipitation is changing**

Minnesota State-Averaged Mean Annual Temperature



Temp trend is upward and more frequently above the 90th percentile

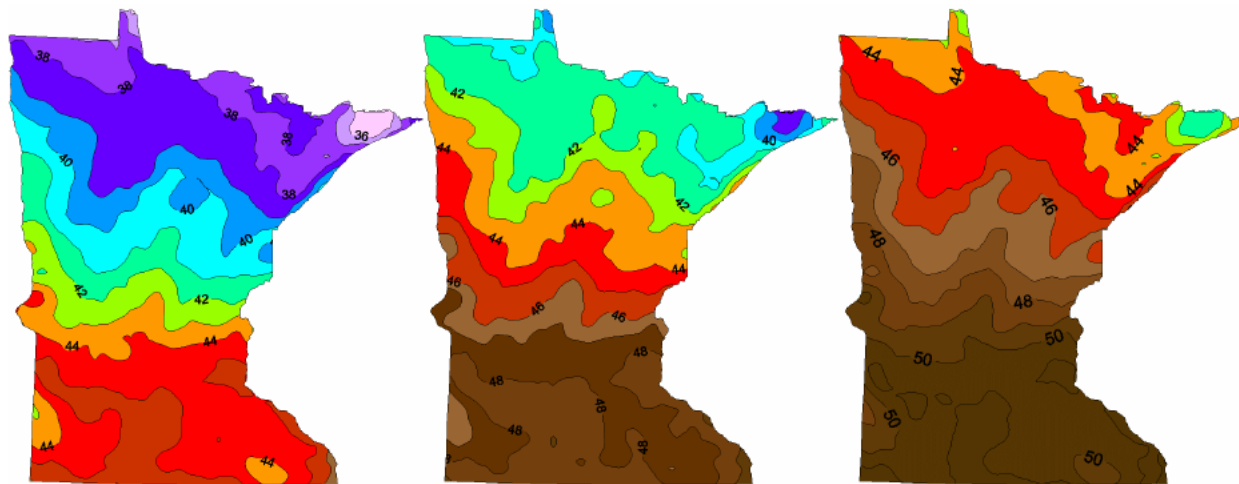
Annual Mean Annual Temperature Map (1971-2000)



Decadal average annual temperature from 16 GCM models runs showing 275 mile northern migration of the 44 degrees F isotherm
Source: CMIP-Lawrence-Livermore and MN State Climatology Office



The following maps are A1B decadal average from 16 GCM models (39 runs).
The color scheme is the same one used in our most recent (1971-2000) annual 'normal' map at http://www.climate.umn.edu/doc/historical/temp_norm_adj.htm



1981-2010

2031-2040

2061-2070

Changes in Precipitation

Precipitation in Minnesota is changing:

- Increased precipitation
- More localized, heavy precipitations events
- Potential to cause both increased flooding and drought



Change in Annual Precipitation "Normals" for Minneapolis/St Paul, MN

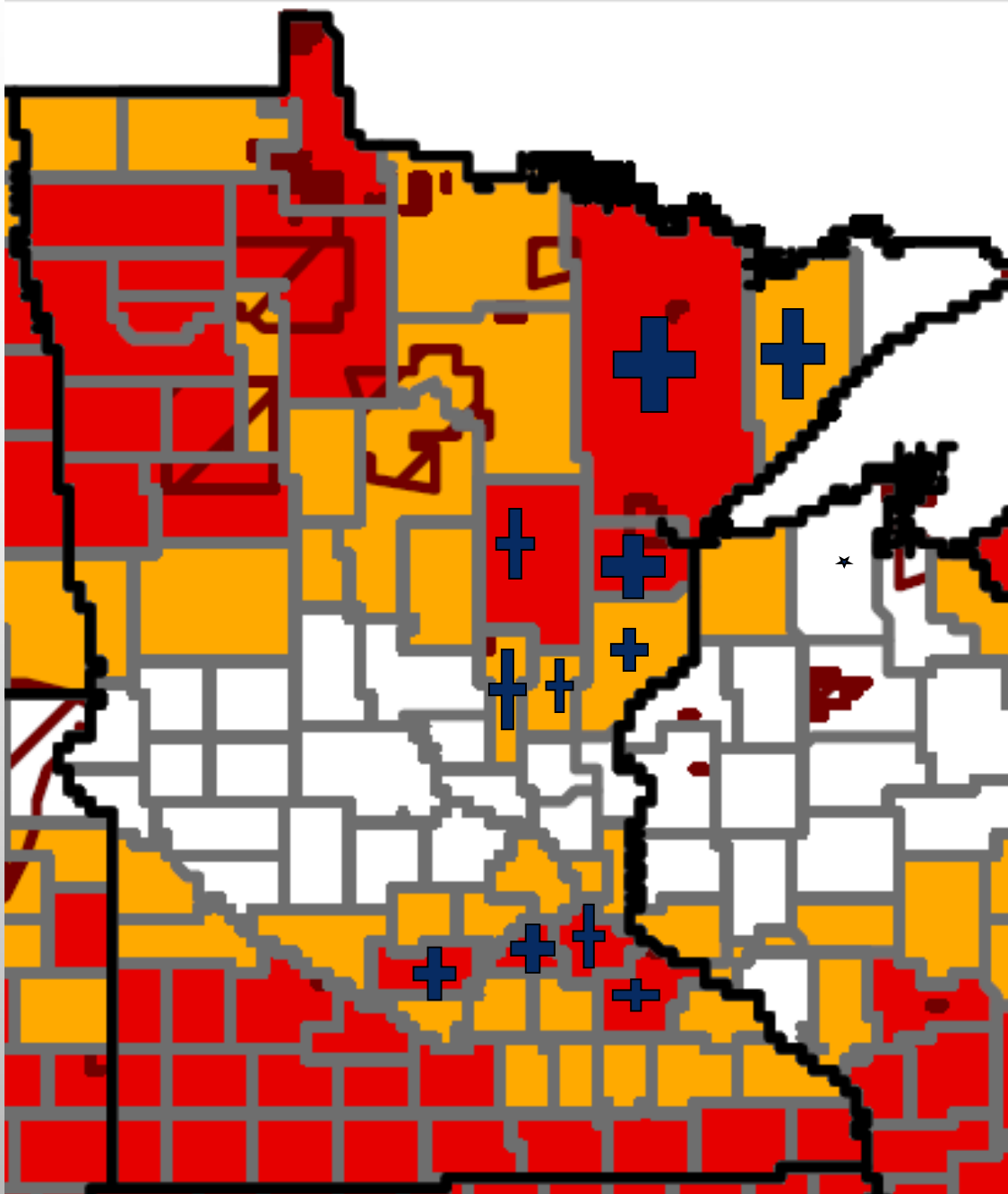
<u>PERIOD</u>	<u>AMOUNT (IN.)</u>
1941-1970	25.93"
1951-1980	26.36"
1961-1990	28.36"
1971-2000	29.40"
1981-2010	31.16"

20 percent increase since
1941-1970 period

Observed 2 inch rainfalls* for the period 1991 – 2012 and maximum single day

Location	No.	Max Inches (date)
• Rosemount	42	5.80 (7/23/1987)
• Albert Lea	39	7.50 (6/15/1978)
• Waseca	43	5.63 (9/23/2010)
• Winona	35	4.95 (8/19/2007)
• Zumbrota	43	6.46 (6/27/1998)
• Winnebago	41	8.64 (9/25/2005)
• Bricelyn	39	9.22 (9/14/2004)
• Amboy	36	9.48 (9/23/2010)
• Hokah	33	15.10 (8/19/2007)

***Historical average is one 2-in rainfall per year**



MN Counties designated for federal disaster assistance in 2012

All are associated with drought except those with

+ designates for flood or severe storm

A STORM FOR ALL SEASONS

Experts Say Extreme Weather To Become The New Norm



The Celestial Convergence Blogspot

EXTREME WEATHER IMPACTS

Stories from MDH-PHL

2012 Duluth Flood: A 500 Year Storm Event

- Total rainfall in excess of 10 inches
- \$108 million in damage in infrastructure alone
- Damage to 1,700 homes and 100 businesses
- Estimated damages for these homes and businesses exceed \$12 million



Photo credits: Rachel Agurkis (top),
 Derek Montgomery for MPR (bottom)



MDH Laboratory Response

- **Potential for impact on private drinking water wells**
- **Environmental Laboratory worked with MDH Well Management and local responders**
 - **shipped 2,500 sampling kits to the affected counties for distribution**
- **1,145 samples were tested**
 - **approximately half were contaminated with bacteria**
- **Allowed for efficient allocation of remediation resources to ensure a safe environment for impacted residents**

PAM, Minnesota, 2010 and 2012

ADVERTISE

Brain-Eating Amoeba Eyed in Death of Minnesota Child

Aug. 8, 2012

By KATIE MOISSE via GOOD MORNING AMERICA



A flyer stating that the beach is closed is posted by Lily Lake in Stillwater, Minn.

KSTP/ABC News

AUTO START: ON

Minnesota State Department of Health officials have been eyeing a rare parasitic amoeba in the death of child.

StarTribune

startribune.com



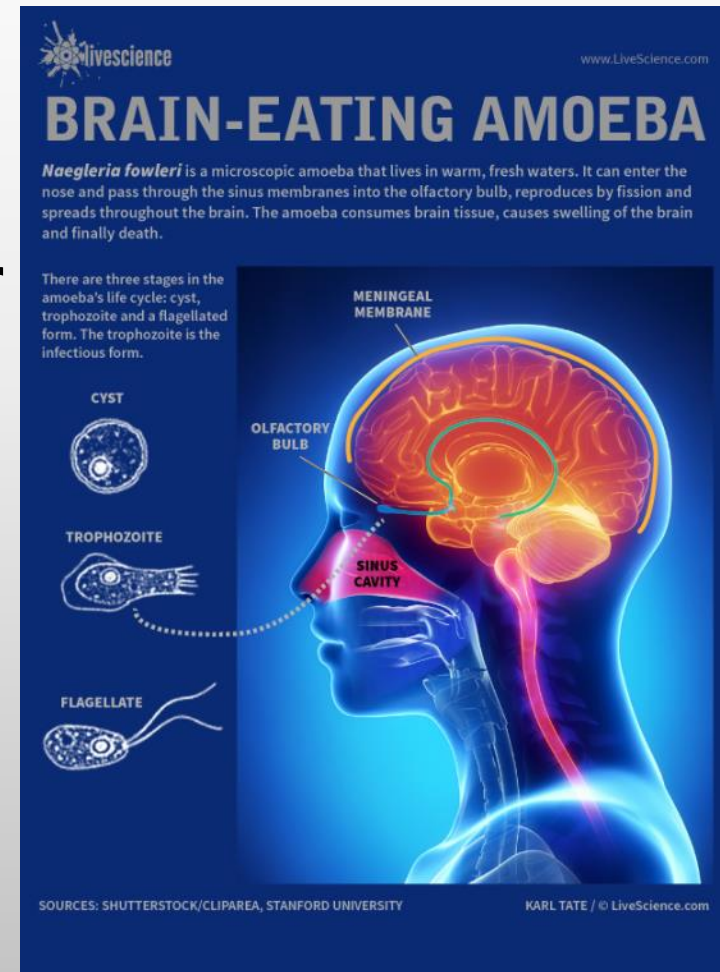
JERRY HOLT • jholt@startribune.com

The beach at Lily Lake in Stillwater was taped off Wednesday, one day after a boy died from a brain infection linked to an amoeba in the water.

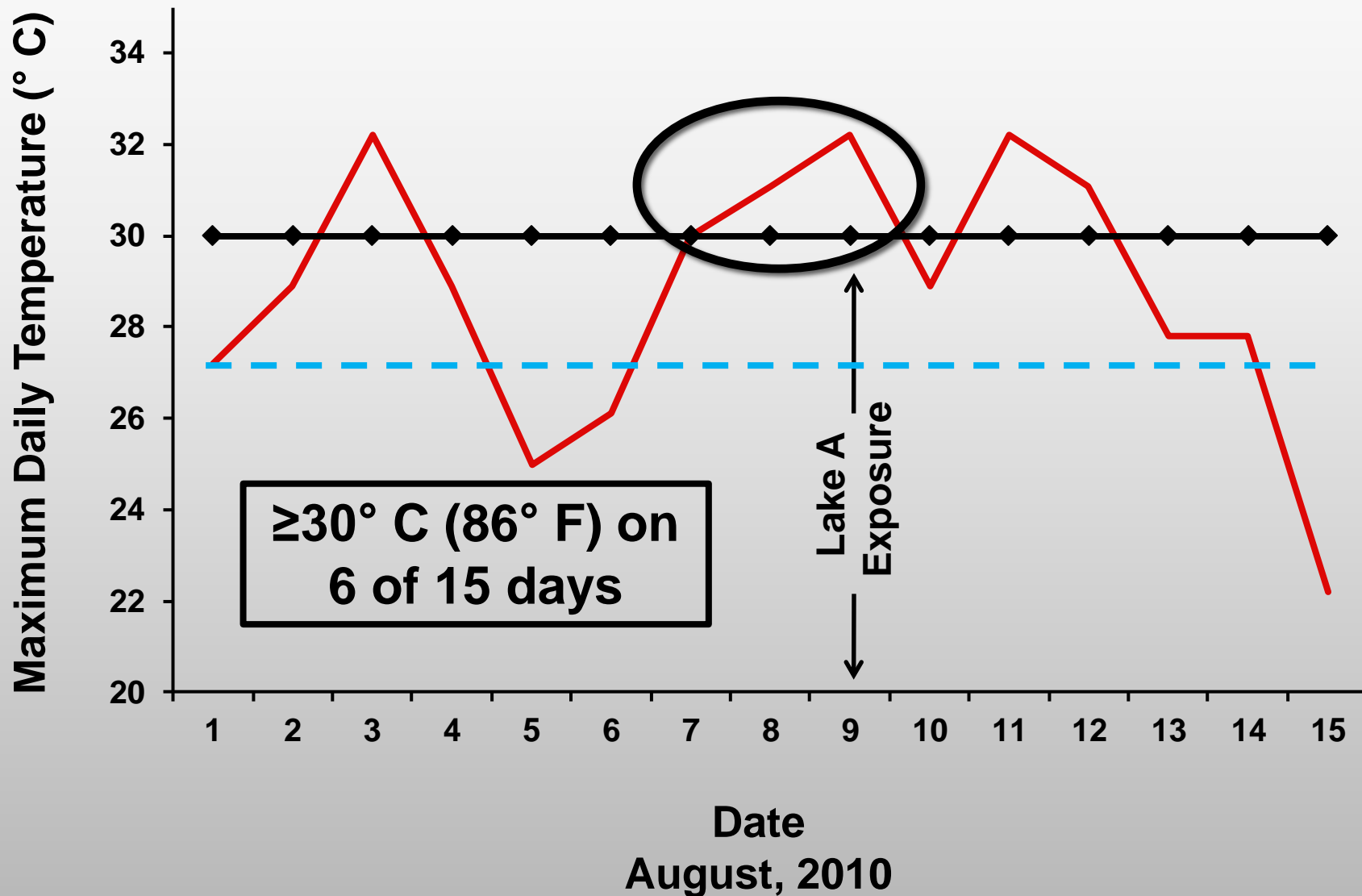
Two deaths from infection via one lake incredibly rare

Naegleria fowleri

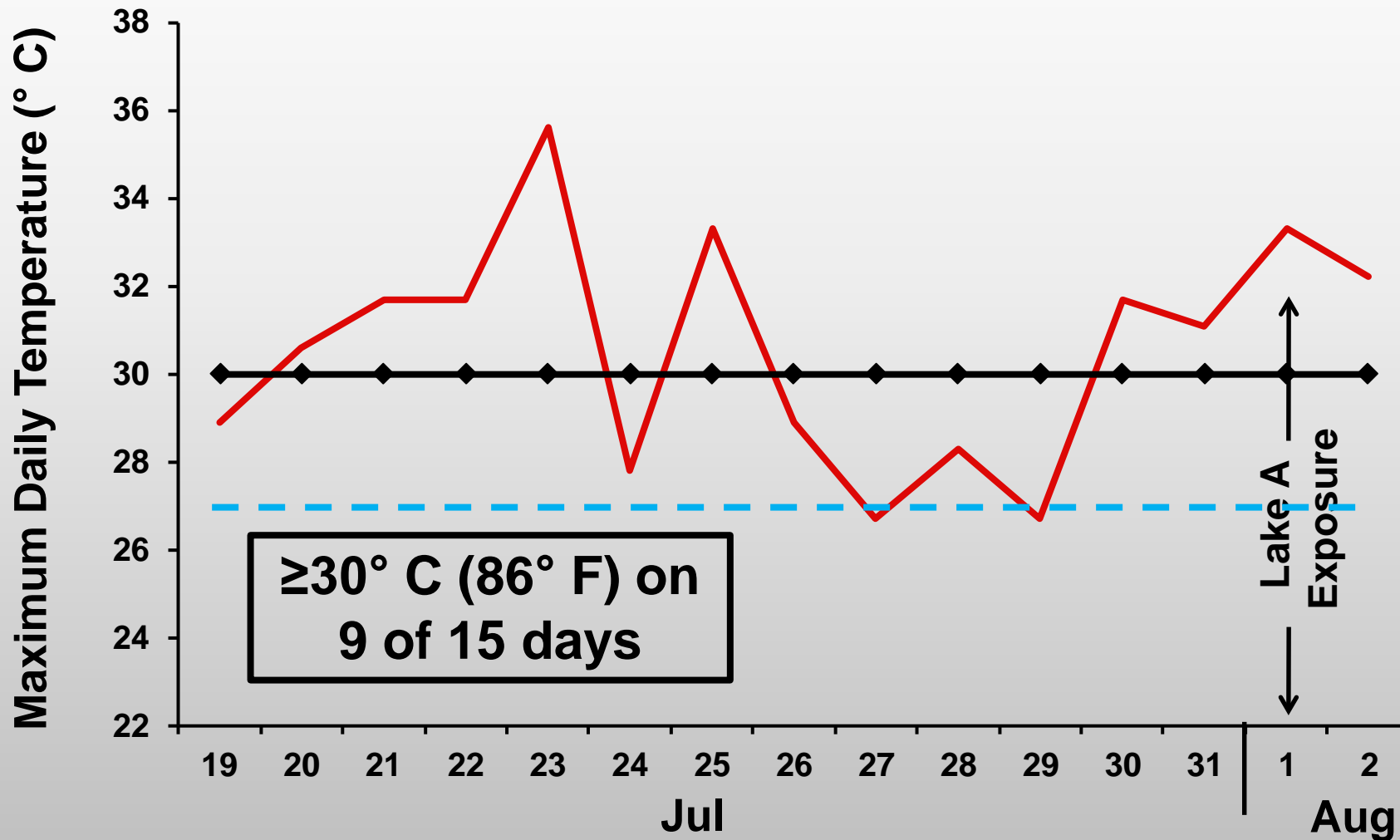
- Free-living amoeba found in fresh water
- Introduced into nose during activities in water
- Can migrate up olfactory nerve to brain
- Primary amebic meningoencephalitis (PAM)
- 123 cases in southern U.S., 1962-2011
- **Proliferates at temperatures above 30° C, or 86° F**



Daily Maximum Air Temperature near Lake A Prior to Illness Onset, August 1-15, 2010



Daily Maximum Air Temperature near Lake A Prior to Illness Onset, July 19-August 2, 2012



MDH Response

- Swimming advisory posted
- Testing of lake sediments for *Naegleria fowleri* (CDC)
- MDH-PHL implemented PCR for *N. fowleri*

SWIMMING ADVISORY

Naegleria fowleri is an amoeba commonly found in warm freshwater. It enters the body through the nose and causes a rare but fatal brain infection.

There is a low level of *Naegleria fowleri* risk when entering any warm freshwater.

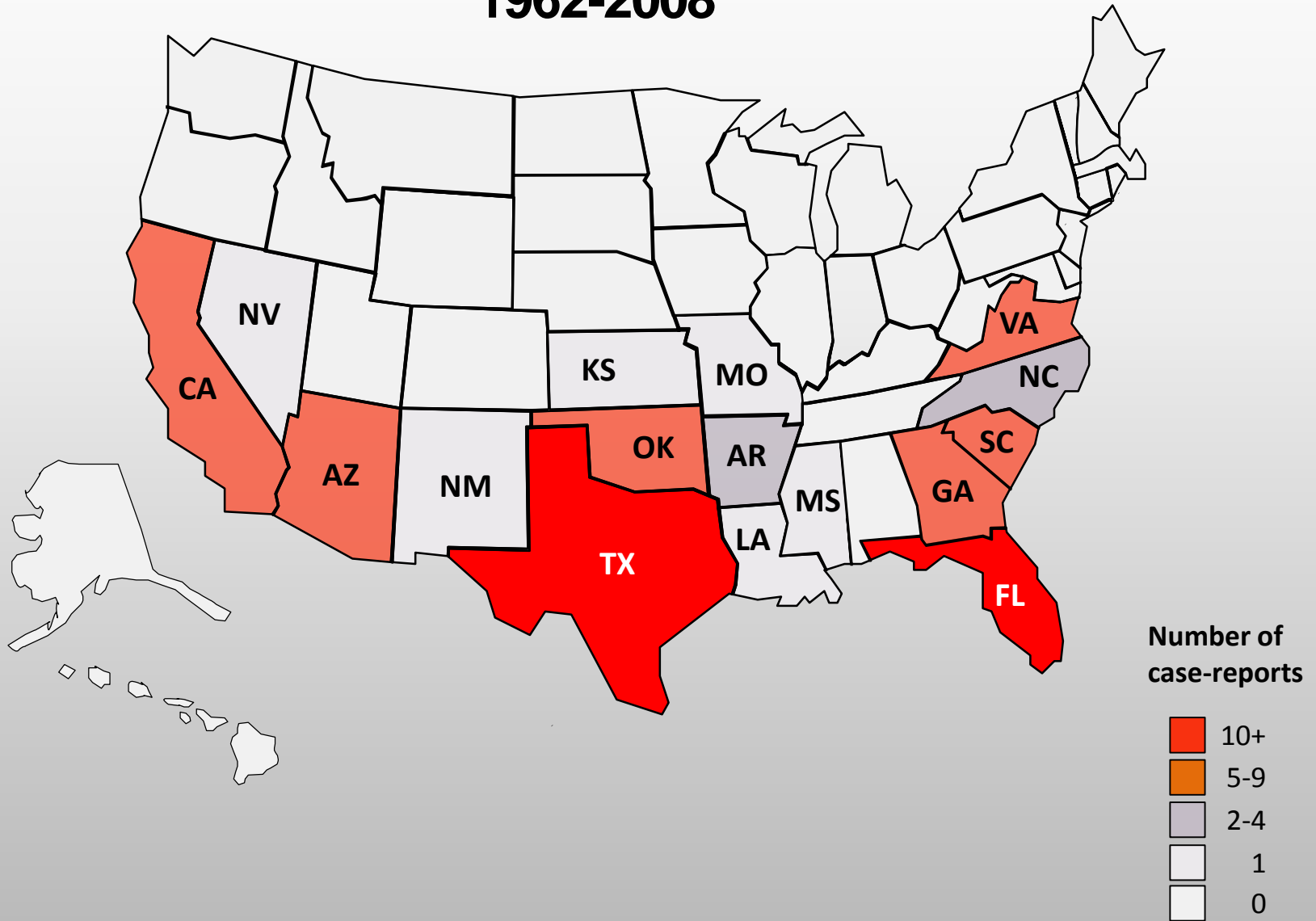
Infections are more likely to occur when water temperatures are high and water levels are low.



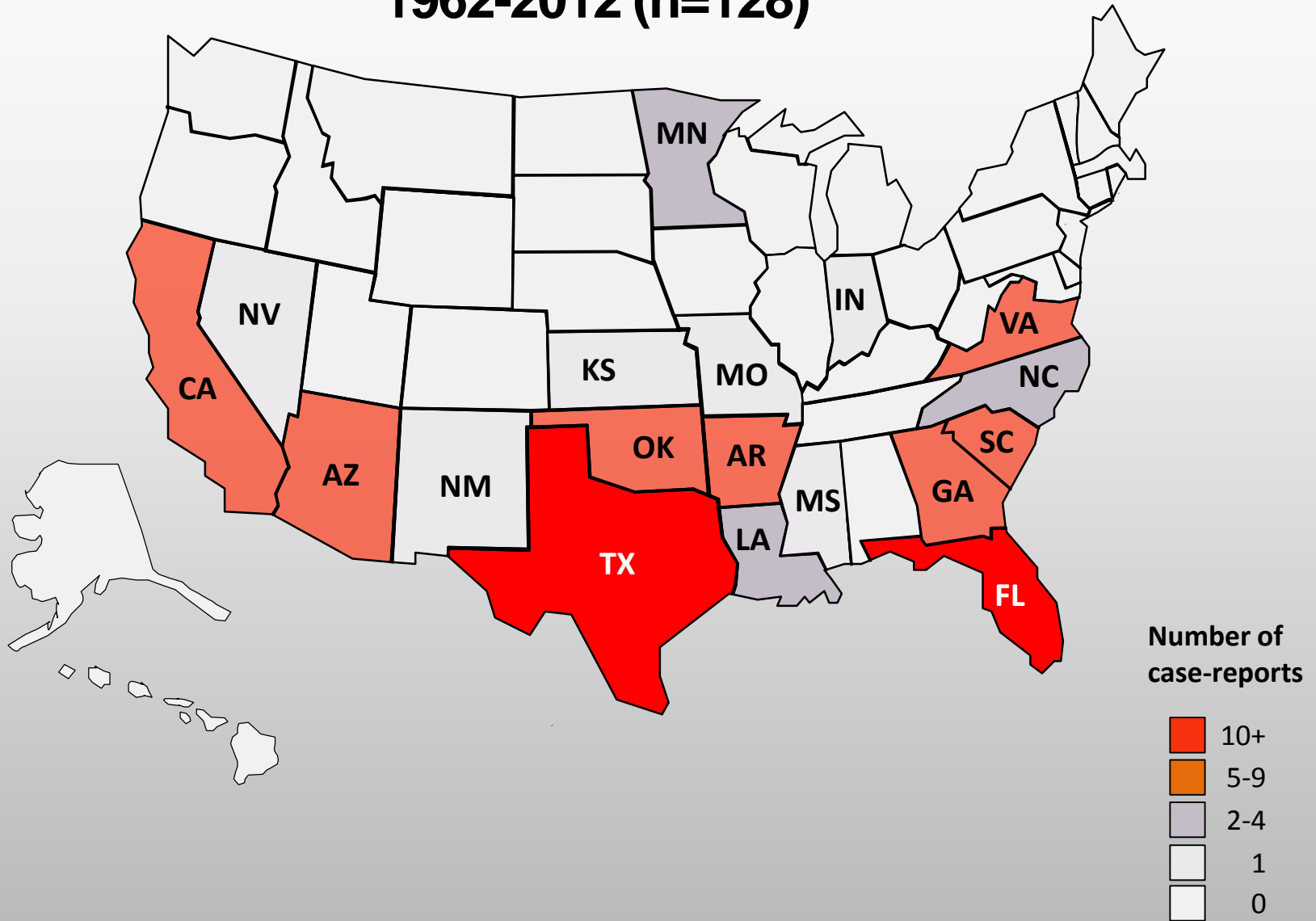
Reduce the risk of *Naegleria fowleri* infection while swimming, limit the chance of contaminated water going up the nose:

- **Avoid water-related activities when temperatures are high and water levels are low**
- **Hold your nose shut, use nose clips, or keep your head above water**
- **Avoid digging in, or stirring up, the sediment**

Number of Case-reports of Primary Amebic Meningoencephalitis by State of Exposure: United States, 1962-2008



Number of Case-reports of Primary Amebic Meningoencephalitis by State of Exposure: United States, 1962-2012 (n=128)



Chris Turney

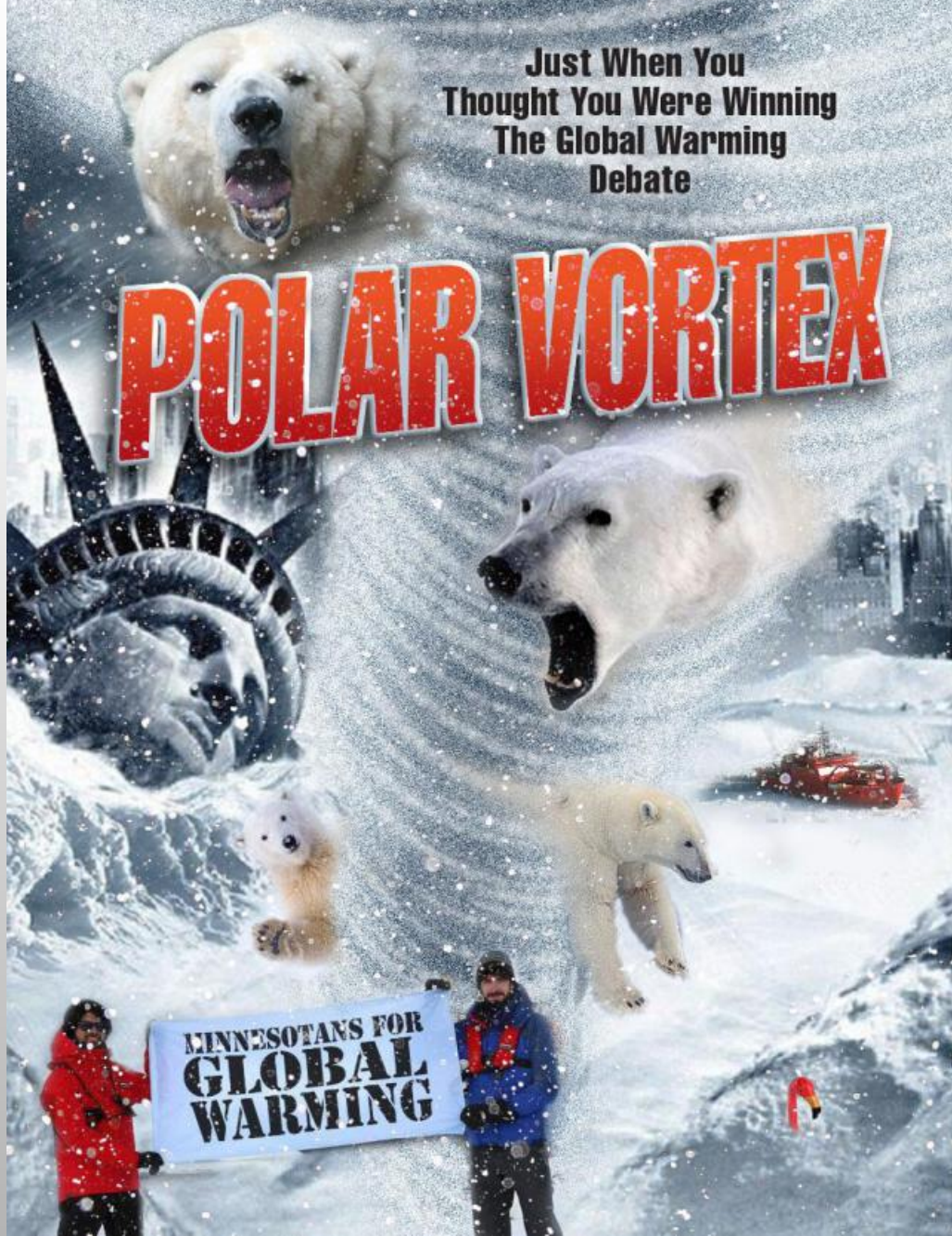
Al Sharpton

Michael Mann

Al Gore

Just When You
Thought You Were Winning
The Global Warming
Debate

POLAR VORTEX

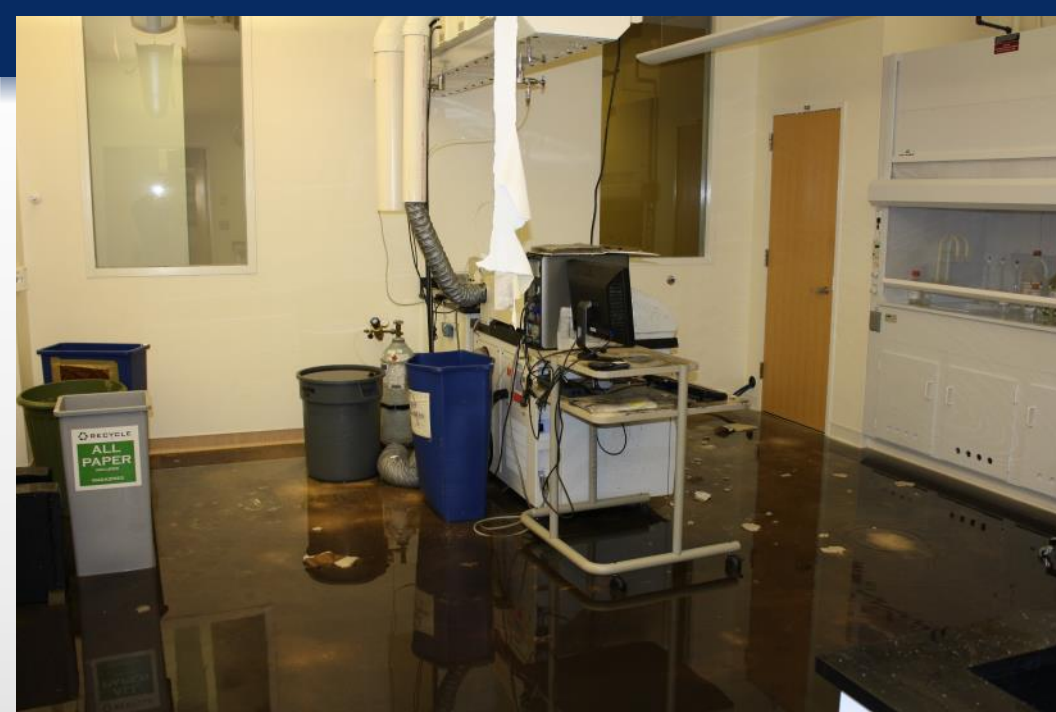


MINNESOTANS FOR
GLOBAL
WARMING



The Incident, January 6, 2014

- **Overnight temperature drops to -24° F**
- **Laboratory air handlers and heat wheels go down allowing cold air into the system**
- **Air handlers restarted in a.m. and building warms up**
- **Frozen heating system coils thaw and burst**
 - **Multiple (20) additional heating coil leaks throughout the day**
 - **Fire sprinkler in clean metals lab**





Day 1: Response

- **Laboratory staff scramble to move or cover equipment**
- **Plant Management personnel work to assess situation and shut off water to damaged coils**
- **MMB gives approval to send staff home**
- **Testing suspended and partners contacted**
- **Newborn Screening ships samples to contract lab**

Day 1: Response (cont'd)

- **ICS established**
 - **2x daily briefings**
- **Emergency contract and procurement documents**
- **PIO issues press release, media express interest**
- **Leaks contained at 7 pm, clean-up begins**



Day 2: Recovery, Plant Management

- **Substantial progress on clean-up**
- **No additional water leaks**
- **Coil repairs under way**
 - 1st floor labs completed
- **Five of six air handlers restarted**
- **Exhaust fans still off**
 - building positively pressured
- **Additional building security personnel**

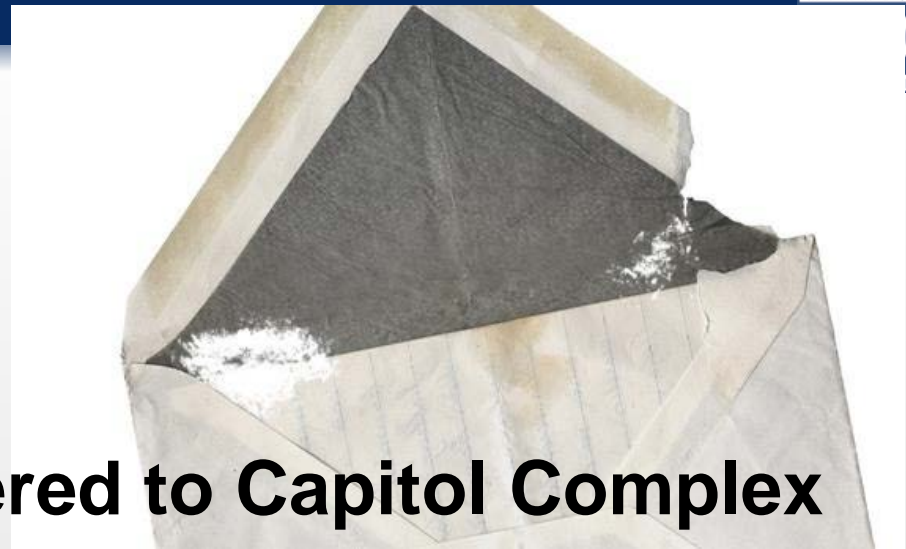


Day 2: Lab Operations

- Labs in WI and IA contacted and agree to provide assistance if necessary
- Rabies testing relocated to University of Minnesota VDL
- Newborn Screening continues, all environmental testing and most infectious disease testing suspended
 - no loss of power, so sample integrity maintained
- Operations holds tactical meeting

And then...

The FBI Calls



- **Powder letter delivered to Capitol Complex building**
- **FBI wants to know if we can test letter or if it needs to go elsewhere**
- **Facilities Branch determines exhaust fans can be turned back on for BSL-3 labs and glove box room**
- **Powder from letter is tested, mercifully negative**

Day 3: Recovery

- All lab staff back at work
- Continuing to clean lab spaces and equipment
- Complete damage assessment list
- Exhaust fans turned on
- Resumed newborn screening in-house
- Preparations to resume ID testing



Day 4: Recovery

- Coil repair complete
- Clean-up nearly complete
- ID testing resumes
- Environmental testing
 - Drinking water testing back online
 - Some environmental testing subcontracted out
- Staff with damaged cubes relocated



Current Status

- **Laboratory spaces fully functional end of March, 2014**
- **Office space repairs completed end of April**
- **Estimated cost of damage to building**
 - **~\$300,000**
- **Estimated cost of damage to lab equipment, personnel time**
 - **Still being calculated**
 - **Much of the cost covered by insurance**

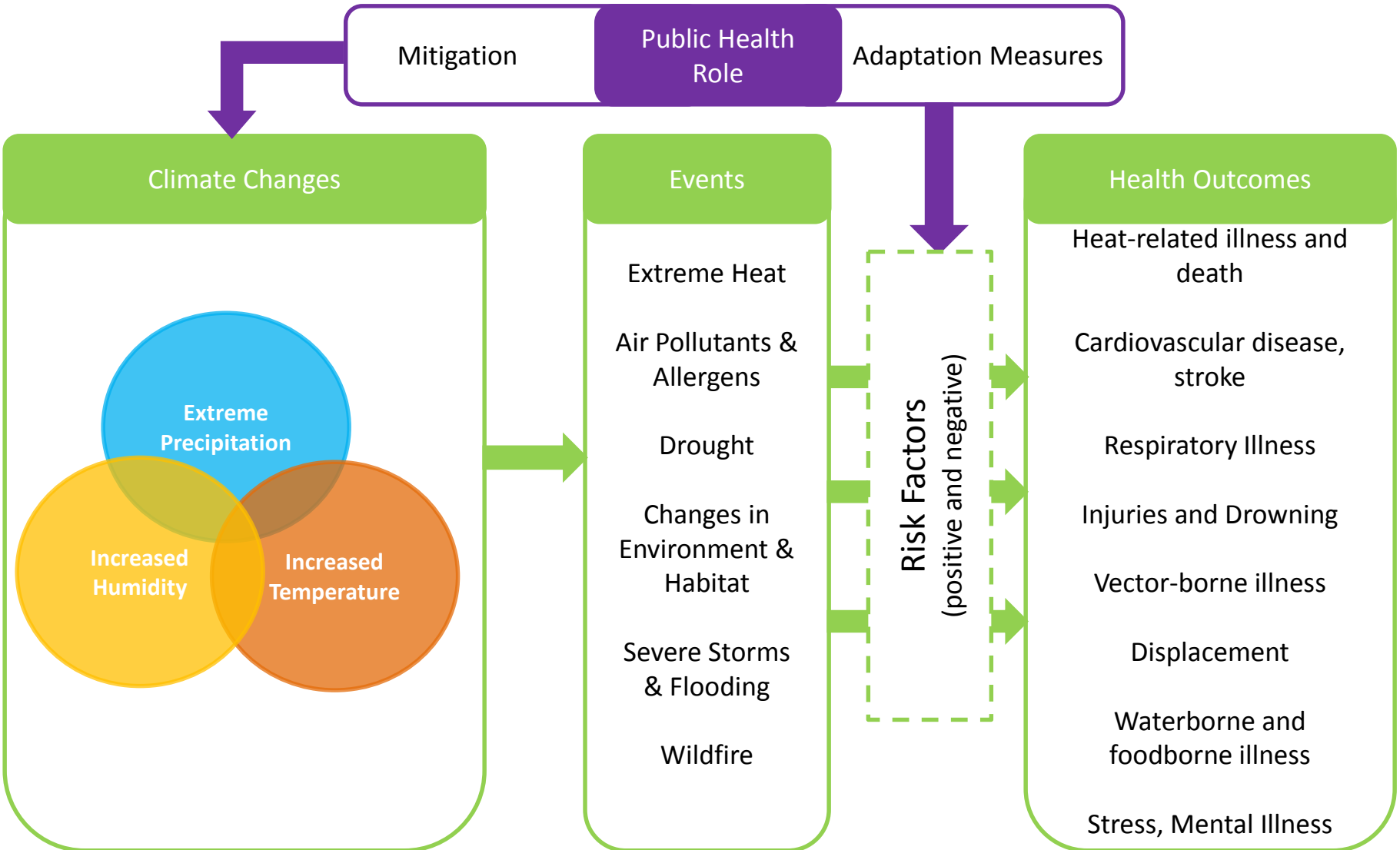
Follow-up Activities

- **After Action Report**
 - Hotwash Conducted 01/13/2014
 - Follow-up scheduled
- **Root Cause Analysis and Preventive Action**
 - 3rd party review undertaken
 - Results will be presented to MDH on June 10, 2014

A Few Takeaway Messages

- **Safety first!!!**
- **Deal with immediate crisis first**
 - **Continually assess and communicate situation**
- **ICS was critical**
 - **Assign and train staff in relevant ICS roles**
- **COOP**
 - **Maintain a prioritized list of laboratory services**
 - **Maintain a list of alternate providers for critical services and contact information**
 - **Have a list of key questions to assess situation**

Climate Change and Public Health





Climate and Health

Home

Climate Change 101

Extreme Heat Events

Water Quality & Quantity

Air Quality

Vector-Borne Diseases

Agriculture & Food Security

Mental Health

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External Resources

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Emergency Preparedness

Comprehensive Plans

Environmental Review

Environmental Health Division

EH Division Home

Climate and Health

Changes occurring in Minnesota's climate are affecting our health and wellbeing and will have even greater impacts in the future. The MN Climate and Health Program is helping to understand these impacts and prepare local public health and the public for the health risks.

Topic Areas:

<p>Climate Change 101 How climate change is impacting MN.</p>	<p>Extreme Heat Events Extreme Heat Toolkit, maps, and more.</p>
<p>Water Quality and Quantity Effects of changes in precipitation.</p>	<p>Air Quality Climate change impacts on air pollutants.</p>
<p>Vector-Borne Diseases Climate change impacts on vector-borne diseases.</p>	<p>Agriculture and Food Security Climate change impacts on food production and security.</p>
<p>Mental Health Climate change impacts on sense of place, disasters, and loss.</p>	<p>Planning Tools & Data Public health data on climate change impacts.</p>
<p>Health and Climate Video Watch the video and find resources for teachers.</p>	<p>Sign up for email updates</p>

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Spotlight

MPCA Announces Grants for "Communities Adaptation to Climate Change and Extreme Weather"

The Minnesota Pollution Control Agency (MPCA) has approximately \$1 million available for grant awards in 9 focus areas. Applications are due July 16, 2014. Go to the MPCA Environmental Assistance Grants Program website for more information.

2014 National Climate Assessment Released
The 2014 National Climate Assessment summarizes the impacts of climate change on the United States, now and in the future.

Questions?

Contact us at health.climatechange@state.mn.us or 651-201-4899.

Acknowledgements

- Climatalogic Information
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- *Naegleria fowleri*
 - Trisha Robinson, MDH, IDEPC
 - Richard Danila, MDH, IDEPC
- MDH-PHL Staff