State Community Health Services Advisory Committee (SCHSAC)
Office of Performance Improvement
Minnesota Department of Health
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Assessment of Health and Climate Preparedness

Final Report of the SCHSAC Climate Change Adaptation Workgroup

May 2012

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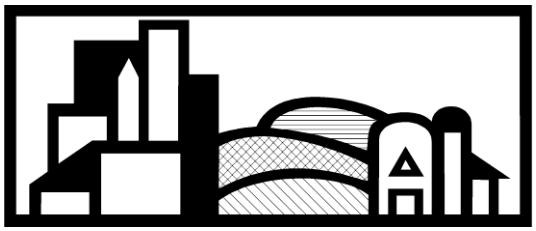

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MINNESOTA MDH DEPARTMENT OF HEALTH

Protecting, maintaining and improving the health of all Minnesotans

May 8, 2012

Karen Nordstrom
SCHSAC Chair
Council Member
City of Bloomington
1800 West Old Shakopee Road
Bloomington, MN 55431

Dear Chair Nordstrom:

Thank you for sending me the report and recommendations from the Climate Change Adaptation Workgroup for the State Community Health Services Advisory Committee (SCHSAC). This work will help prevent injuries, illnesses, and deaths related to extreme weather events and climate change in Minnesota. I accept this report and its recommendations.

I thank the workgroup for its dedicated work and its commitment to respecting all viewpoints as the members wrestled with the political nature and uncertainty of climate change predictions. Changes in climate that negatively impact public health, especially extreme weather events, seem to be occurring more regularly based on scientific evidence, and it is critical for public health to be prepared for these kinds of events despite uncertainties.

I support SCHSAC taking a leadership role in protecting the health of Minnesotans from the effects of climate change. I look forward to working with you and the SCSHAC as we jointly implement the recommendations in this report. Again, thank you for the excellent work.

Sincerely,

Edward P. Ehlinger, MD, MSPH
Commissioner
P.O. Box 64975
St. Paul, MN 55164-0975

CITY OF
BLOOMINGTON
MINNESOTA

May 7, 2012

Edward P. Ehlinger, MD, MSPH
Commissioner
Minnesota Department of Health
P.O. Box 64975
St. Paul, MN 55164-0975

Dear Commissioner Ehlinger:

I am pleased to present to you the final report and recommendations from the Climate Change Adaptation Workgroup of the State Community Health Services Advisory Committee (SCSHAC). The SCHSAC approved this report at its meeting on May 4, 2012.

In 2011, the SCHSAC charged the workgroup to help guide and recommend best practices in planning for the health impacts of extreme weather events and climate changes at the local level. Despite differing opinions and the controversial nature of the topic, the members of the workgroup agreed that SCHSAC needs to provide a leadership role in protecting the health of the public from the effects of climate change. Any messages and planning efforts should be based on the best scientific evidence available and should be presented in an unbiased manner.

The workgroup members recommend that planning for the effects of climate change be integrated within the planning processes that already exist and tied to the 10 Essential Services of Public Health. The recommendations adopted by SCHSAC address actions for local public health and for the Minnesota Department of Health.

We are committed to preventing injuries, illnesses and deaths related to extreme weather events and climate change. We will do this by advocating for partnerships and collaboration to plan for these changes, raising awareness of the negative impacts climate change may have on human health, and focusing on practical, local responses to events that have occurred and may continue to occur in Minnesota.

On behalf of SCHSAC, I request the adoption and approval of this report and its recommendations.

Sincerely,

Karen D Nordstrom

Karen Nordstrom
2012 SCHSAC Chair

Introduction

Background

Weather and climate have always had substantial direct and indirect impacts on the health of the public, including morbidity and mortality attributed to extreme weather events (e.g., floods, hurricanes), extreme heat events (e.g., heat waves), air pollution, and incidences of vector-borne diseases and infectious diseases. Changes in climate, including periods of warmer weather, colder weather, wetter weather and drier weather, have affected humans throughout history.

The purpose of this report is to address the effects of extreme weather events and climate changes on the health of the public and provide recommendations to prevent negative health impacts. This report is not a discussion of how or why climate changes, or whether current observed trends are natural fluctuations or a result of human-induced changes. This report simply acknowledges the recent observed trends in Minnesota's climate and addresses the potential repercussions of these changes on human health.

Weather vs. Climate

Weather consists of the short-term (minutes to months) changes in the atmosphere. Think of weather in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility and wind.

Climate is the description of the long-term pattern of weather in a particular area. Some scientists define climate as the average weather for a particular region and time period, usually taken over 30 years. It's an average pattern of weather for a particular region.

Source: National Oceanic and Atmospheric Administration, 2005. Available online: http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html

SCHSAC Climate Change Adaptation Workgroup

In 2010, the Minnesota Department of Health (MDH) received a grant from the Centers for Disease Control and Prevention (CDC) to facilitate the development of a strategic plan that focuses specifically on the capacity of the local public health system to address the effects on health from changes in weather and climate. MDH staff decided to request the formation of a State Community Health Services Advisory Committee (SCHSAC) workgroup to help guide and recommend best practices for planning for the health impacts of extreme weather events and climate changes at the local level.

In February 2011, SCHSAC voted to create the SCHSAC Climate Change Adaptation Workgroup. The workgroup was charged with the following tasks to assess the potential impacts of climate changes on the health of the public:

- Review available science and literature on climate change and public health,
- Develop and review results from a survey of local public health departments' abilities to address climate change, and
- Make recommendations on next steps for strategic planning for climate change.

The workgroup developed a vision statement and set of three goals to guide its work and recommendations. The vision and goals are as follows:

Vision: To prevent injuries, illnesses and deaths related to extreme weather events and climate change.

Goals:

1. Advocate for partnerships and collaboration (across jurisdictions, departments, levels of government, and between sectors) for planning and responding to extreme weather events and climate changes that affect the health of the public.
2. Raise awareness of the potential effects of extreme weather events and climate changes on the health of the public.
3. Focus on practical, local responses to events that have occurred and may continue to occur from extreme weather events and climate changes that impact the health of the public.

The Communication Challenges of "Climate Change"

There are varying views of climate change by SCHSAC members, local public health (LPH) and the public. The Climate Change Adaptation Workgroup agreed that being sensitive to these views is important for developing appropriate messages and promoting planning for the protection of the health of the public from the impacts of extreme weather and climate changes. Any messages and planning efforts should be based on the best scientific evidence available and should be presented in an unbiased manner.

Some workgroup members agreed that the real issue was the severe weather events that harmed the health of the public. Therefore, it would be more accurate to say "weather-related public health threats," "severe weather events and climate change," or "climate health preparedness," in place of "climate change." The other point of view shared by some workgroup members is that as a reputable lead state agency it is important for MDH to assertively use the words "climate change," if that best describes the issue. This is especially true when considering that changes in the climate include issues besides severe weather events, such as changes to the location and incidence of vector-borne diseases. Ultimately the workgroup decided that the report would use the words "climate change" because that is what has been observed: Minnesota's climate has changed and is changing.

This report summarizes the best available science on weather and climate changes in Minnesota, the potential human health impacts of extreme weather events and climate changes, SCHSAC members' perceptions of and capabilities dealing with climate change, and the workgroup's own internal discussions. All of this information led to the final recommendations located at the end of the narrative.

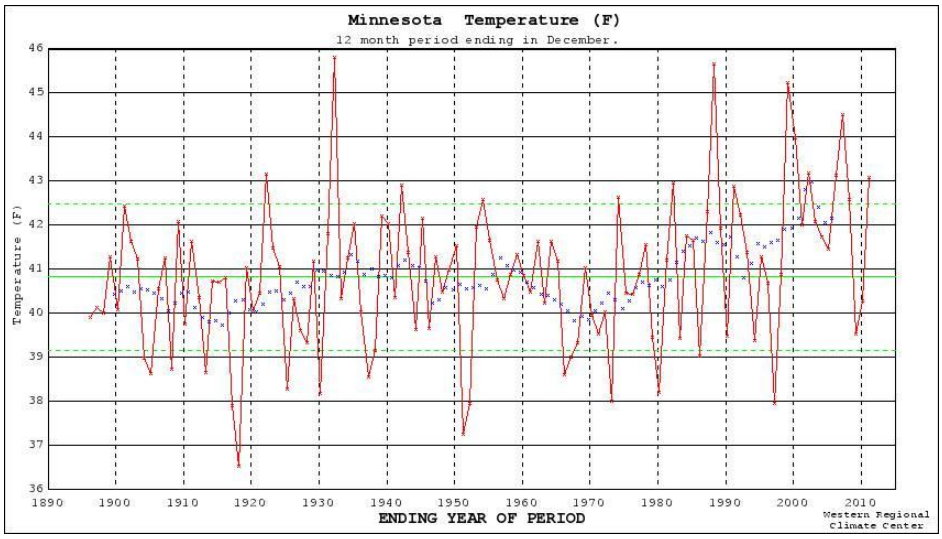
Changing Weather and Climate in Minnesota

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

1. The average temperature is increasing.
2. The average number of days with a high dew point may be increasing.
3. The character of precipitation is changing.[i] [ii]

The Average Temperature is Increasing

Temperature has been rising in Minnesota. Minnesota's average temperature changed very little from 1891 (the start of the National Weather Service records) to the early 1980s, but a clear upward trend has been observed starting in the 1980s.[iii] See the upward trend indicated by the blue dotted line (10-year running average temperature) in the chart below. The red line shows Minnesota's annual average temperature, which demonstrates the wide fluctuation in temperature from year to year, from the late 1890s to 2010.



There are three significant observed trends in this overall warming:

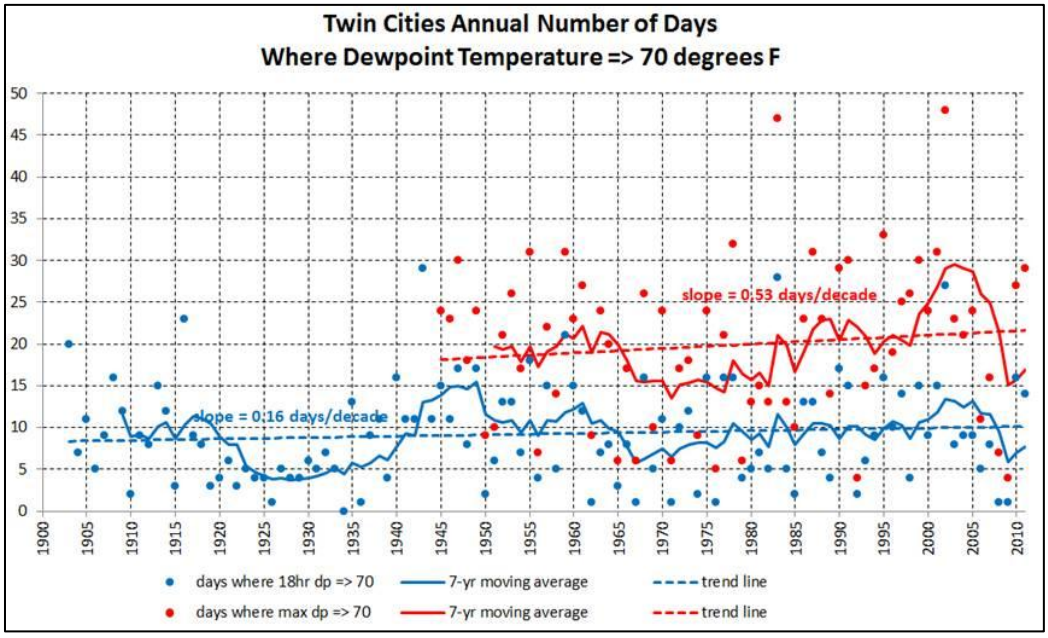
1. Winter temperatures have been rising about twice as fast as annual average temperatures.
2. Minimum or 'overnight low' temperatures have been rising faster than the maximum temperature, or ‘daytime high.’
3. Since the early 1980s, the temperature has risen slightly over 1°F in southern Minnesota to a little over 2°F in much of the northern part of the state.[iv]

The Average Number of Days with a High Dew Point May be Increasing

Minnesota has observed an increasing number of days with high dew point temperatures. "The dew point temperature is the temperature to which the air must be cooled at constant pressure for it to become saturated.”[v] Higher dew point temperatures mean that there is more moisture in the air. This directly impacts people’s health

by making it more difficult for people to cool themselves. Human bodies cool by perspiring and the perspiration evaporating into the air. When evaporation is inhibited by additional moisture in the air, perspiration doesn't evaporate easily off the skin, which reduces people's ability to cool. High dew point and air temperatures combine to create dangerous conditions for human health.

The chart below shows the trend line (dashed red line) of the number of days where the maximum dew point was greater than or equal to 70°F in the Twin Cities from 1945 to 2010. The slope of the trend line suggests that there has been an increase in .53 days with a dew point greater than or equal to 70°F per decade.



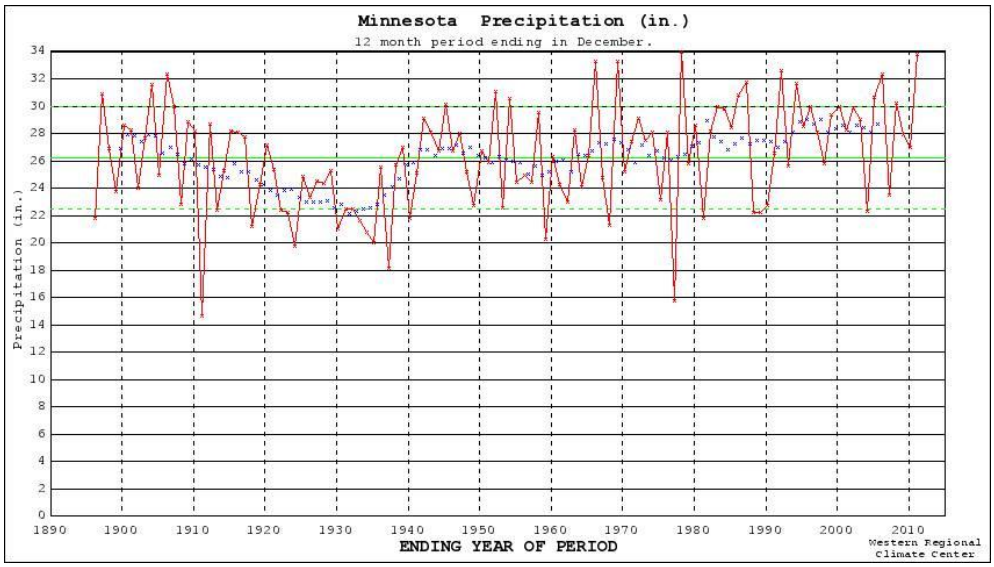
Source: Dr. Mark Seeley, 2012

Prior to 2011, the highest dew point temperature ever recorded in the Twin Cities was 81°F on July 30, 1999. On July 19, 2011 the dew point temperature reached 82°F in the Twin Cities, and a state record maximum dew point temperature of 88°F was reached in Moorhead, Minnesota.[vi] [vii]

High dew points combined with high air temperatures can create dangerous extreme heat events. Many counties and cities in Minnesota are not prepared to deal with extreme heat events. Lessening the impact of extreme heat events requires improving the awareness of public health officials and the general public about the health risks of extreme heat as well as continuing to develop and implement effective extreme heat notification and response plans.

The Character of Precipitation is Changing

The character of precipitation in Minnesota is changing. On average, the total precipitation in the state has increased since the Dust Bowl era of the 1930s. The following chart shows Minnesota's average annual precipitation (in red), which demonstrates the wide fluctuation in precipitation from year to year, and the 10-year running average precipitation (in blue) from the late 1890s to 2010. The 10-year running average precipitation (in blue) shows an upward trend in precipitation from the 1930s.



Minnesota is starting to experience increases in localized, heavy precipitation events. The observed precipitation trends have the potential to cause both increased flooding and drought, based on the localized nature of storms and their intensity, leaving some areas of the state drenched and other areas without any precipitation. For example, in August 2007, 24 counties throughout Minnesota were included in a US Department of Agriculture (USDA) drought disaster declaration; at the same time, seven southeastern counties were declared a federal flood disaster by the Federal Emergency Management Agency (FEMA).[viii] Changes to Minnesota's natural landscape, such as increased development and impervious surfaces, also have affected the ability of the land to absorb and infiltrate heavy rainfall, leading to flash flooding, increased runoff and erosion.

Potential Human Health Impacts of Extreme Weather Events and Climate Change

Health impacts of climate changes include direct and immediate impacts of extreme weather events as well as other longer-term impacts related to changes in the environment and ecosystems (e.g., vector-borne and water-borne diseases). Extreme weather events include extreme heat, heavy rainfall, floods and tornadoes.

Extreme Heat and Extreme Weather Events

Extreme heat events have well-documented health impacts, including breathing difficulties, heat rash, heat cramps, dizziness, fainting, heat stroke, and even death. Heat can exacerbate existing conditions such as cardiovascular diseases, chronic obstructive pulmonary disease, diabetes and renal failure. Additionally, heat can affect persons taking certain medications that interfere with the body's thermoregulatory system, such as diuretics, anticholinergics, beta blockers, and antipsychotic medications.[ix]

Extreme weather events, such as heavy rainfall events, floods, tornadoes, and severe erosion, can cause event-related morbidity and mortality from injuries, drowning, and infectious diseases, as well as impact people's mental health. People who are displaced from their homes and/or have property destroyed from an extreme weather event can suffer from significant financial loss and long-term mental health issues. Extreme weather events also can disrupt public health and medical services, including emergency responses, by flooding and destruction of roads and infrastructure.

Extreme heat and weather events can have serious financial repercussions and can affect an individual's and a communities' economic well-being. Economic impacts from extreme weather events can be caused by loss of livestock, property, jobs, and infrastructure. For example, Steve Olson, executive director of the Minnesota Turkey Growers Association, noted significant losses to the turkey industry during the hot weather of July 2011.[x] He reported that one turkey barn site in southwest Minnesota lost 45,000 birds, worth $450,000.

Certain populations are more vulnerable to extreme heat and extreme weather events. In the case of extreme heat events, age and health conditions may affect the ability of an individual to maintain normal body temperature and remain hydrated. Social and geographic characteristics may affect an individual's ability to seek air conditioning or other cool places. More vulnerable populations include people with low socioeconomic status, children, the elderly, and the socially isolated. Occupational status also may be a contributor; for example, persons who work outdoors and athletes are at a higher risk for adverse health effects during extreme heat events.

Health Impacts Related to Changes in the Environment and Ecosystems

Higher temperatures will likely worsen air pollution episodes.[xi] The primary air pollution concern is increases in ambient concentrations of ground-level ozone, which is caused by higher temperatures that hastening the chemical reactions that lead to ozone formation.[xii] Additionally, air emissions from power plants are likely to increase with heat waves, when air conditioning use peaks.

Another air quality issue, allergens, also is expected to worsen due to projected climate changes, specifically increased temperatures during the winter and spring months. Warmer seasonal temperatures may increase the growing season which can increase the amount of pollen produced and duration of production.[xiii] Climate changes also may affect the amount of fungal allergens in the air. As a result, climate changes will likely increase respiratory allergies for approximately 25 million Americans, and could mean more asthma attacks for the approximately 10 million Americans with allergic asthma.[xiv]

Climate change is likely to alter the geographical distribution and incidence of vector-borne diseases (e.g., diseases transmitted by mosquitoes and ticks) and other zoonotic diseases (i.e., diseases transmitted by animals, such as rabies).[xv] In Minnesota, higher temperatures combined with favorable rainfall patterns could enhance vector development and transmission of pathogens, such as West Nile Virus, and increase the number of ticks that transmit Lyme disease, anaplasmosis, and babesiosis. In other locations, climate change may inhibit vector development or reduce survival.[xvi] Climate change also is likely to facilitate the emergence and establishment of vector-borne diseases that are currently endemic to the tropics or subtropics (e.g., malaria, dengue fever, yellow fever).

Changes in precipitation, especially increases in heavy precipitation events, may result in increased water-borne disease outbreaks. Heavy precipitation events have been shown to lead to storm water discharges of sewage and contaminants into surface water bodies and groundwater resources.[xvii] In addition, intensification of heavy rainfall events (as suggested by some scenarios) could lead to more rapid leaching from hazardous-waste landfills, as well as contamination from agricultural activities and septic tanks. This leaching or contamination represents a potential health hazard-particularly at times of extensive flooding, which can lead to toxic contamination of groundwater or surface drinking water.[xviii] Also, mold in buildings and in the environment may increase as a result from higher moisture levels. Additionally, increased temperatures may be conducive to development of warm-water pathogens, such as cyanobacteria (blue-green algae) blooms.[xix] Some of these impacts may be worsened by changes in land cover (e.g., increased development and therefore runoff during storm events).

Changes in precipitation may impact water supply. While average annual precipitation is projected to increase, summer precipitation may not increase. If temperatures increase and summer precipitation does not increase, available soil moisture and water levels will decrease, reducing the supply of water for drinking, recreation, and agricultural uses. Frequency of extreme precipitation events is expected to increase, with longer intervening dry periods and increased risk of drought.[xx] Higher temperatures, decreased soil moisture, and extended periods of drought are likely to increase the risk of wildfires.[xxi] Wildfires are associated with increased risks of morbidity and mortality from physical injuries/trauma and smoke inhalation.

SCHSAC Members' Perceptions and Capabilities Dealing with Climate Change

The second task established for the Climate Change Adaptation Workgroup was to develop and review results from a survey of local public health departments' ability to address climate change. At the August 15, 2011 meeting of the SCHSAC Climate Change Adaptation Workgroup, members suggested administering a climate change survey at the SCHSAC meeting during the 2011 Community Health Conference on September 14, 2011. See Appendix A for full report on the survey, including survey methodology.

Out of 52 Community Health Boards (CHBs), representatives and local public health staff from 43 CHBs responded, for a response rate of 83 percent of CHBs. The vast majority (85 percent) of respondents agreed with the statement: "Minnesota is currently experiencing climate change." The same percentage of respondents agreed that Minnesota will experience climate change in the next 20 years. More than eighty percent (81.8 percent) of respondents agreed that climate change will potentially adversely impact public health in Minnesota in the next 20 years. When given a list of 14 potential negative health impacts, the top five health impacts that respondents felt likely to be made worse by climate change in Minnesota in the next 20 years were the following: extreme weather events (e.g., tornadoes, floods, droughts) (79.7 percent); heat waves and heat-related illnesses/deaths (70.9 percent); respiratory conditions (e.g., asthma) (67.1 percent); vector-borne diseases (e.g., West Nile disease, Lyme disease, etc.) (64.6 percent); and water supply and quality (63.3 percent).

When asked if the respondent's CHB had the expertise to assess the potential public health impacts associated with climate change in their jurisdiction, only 20 respondents (25.3 percent) agreed. Even fewer respondents (13.9 percent) agreed that their CHB currently has the expertise to create an effective climate change adaptation plan, and only eight respondents (10.1 percent) agreed that their CHB is currently planning for the potential public health impacts of climate change. The overwhelming message is that CHBs do not have the expertise and are not preparing for the potential health impacts of climate change in their regions.

The final question of the survey asked what information or resources would be useful to help respondents' CHBs prepare for climate change. The top five responses were the following:

- Scientific data, climate models, and predictions of potential impacts
- Technical assistance and planning
- Presentations created by MDH
- Funding
- Data for planning purposes, such as data on changing demographics, vulnerable populations, etc.

The responses from this survey provided information useful to the workgroup to plan for the health impacts of climate change at the local level.

Workgroup Discussions

The Climate Change Adaptation Workgroup met four times in 2011 and 2012: August 15, 2011, October 7, 2011, January 30, 2012, and March 26, 2012. Notes and slides from meetings are included in the appendices located at the end of this report. In addition to lengthy discussions on how to communicate climate change health impacts, two critical discussions occurred during the meetings:

- Coordinating climate change planning into existing local public health planning processes
- Potential partners for climate change work

Coordinating Climate Change Planning into Existing Local Public Health Planning Processes

LPH currently has a large amount of planning work to undertake for accreditation and grant requirements. At the same time, many of the public health responses to climate changes are not new, such as preparing for flooding. For example, the Office of Emergency Preparedness (OEP) jurisdictional risk assessment includes a number of issues related to the effects of climate changes, such as floods, tornadoes, severe storms, extreme heat, and water supply contamination.

However, the potential magnitude and frequency of flooding and other climate change-related events will require additional considerations and planning. To promote efficiency and efficacy, the workgroup suggested MDH and local public health departments consider ways of incorporating climate change planning into existing public health planning processes, such as the OEP planning process as well as the local public health planning and assessment process.

MDH's Public Health Response to Climate Change Program has been working with OEP and the MDH Office of Performance Improvement, which provides support and technical assistance to local public health departments with the local assessment and planning process, to determine the best ways of incorporating climate change into those planning processes. Some of the discussions have included adding climate change resources and examples within the local public health planning and assessment process and providing data maps and tables for certain climate change vulnerabilities within the Minnesota Guide to Data Indicators for County Health Assessments from the MDH Center for Health Statistics.

Potential Partners for Climate Change Work

Workgroup members suggested developing relationships with leaders in agriculture, such as the Department of Agriculture and the University of Minnesota Extension, around climate change. Health is intricately linked with an available supply of healthy food, as well as, the strength of Minnesota's economy, which includes a large agricultural sector. Changes in precipitation and weather due to climate change will threaten the agriculture industry and was raised as a major concern of the workgroup. MDH has initiated conversation with the Department of Agriculture on climate change activities.

Additionally, MDH is leading an effort to assess the climate change resources and activities of all state agencies and University of Minnesota departments. New partnerships will continue to be pursued. Other partnerships the workgroup suggested developing included environmental health, Department of Natural Resources, Minnesota Pollution Control Agency, the State Climatology Office, and local partners, such as emergency management, health care system, and planning and zoning departments.

Recommendations

In developing the recommendations, the workgroup wrestled with several issues related to climate change and public health. In addition to climate change being a politicized issue, there is a large degree of uncertainty in climate change predictions, and this uncertainty makes it difficult to plan for protecting the health of the public. Additionally, not all climate changes are bad for public health. For example, increasing minimum temperatures in the winter may reduce the number of extremely cold days in the winter, reducing cases of frost bite and other cold-related health conditions. Nonetheless, changes in climate that negatively impact public health, especially extreme weather events, seem to be occurring more regularly, and it is critical for public health to be prepared for these kinds of events despite uncertainties.

The workgroup members felt that SCHSAC needs to provide a leadership role in protecting the health of the public from the effects of climate change. Elected officials and public health practitioners need to be aware of ways in which climate change affects the health of the public and be prepared for changes that are likely to occur in Minnesota. To that end, the workgroup recognizes that climate change will affect the health of Minnesotans and developed a vision and three goals that guide its recommendations.

Vision: To prevent injuries, illnesses and deaths related to extreme weather events and climate change.

Goals:

1. Advocate for partnerships and collaboration (across jurisdictions, departments, levels of government, and between sectors) for planning and responding to extreme weather events and climate changes that affect the health of the public.
2. Raise awareness of the potential effects of extreme weather events and climate changes on the health of the public.
3. Focus on practical, local responses to events that have occurred and may continue to occur from extreme weather and climate changes that impact the health of the public.

Recommendations for Local Public Health and the Minnesota Department of Health

The workgroup members recommend that planning for the effects of climate change be integrated within the planning processes that already exist and tied to the 10 Essential Services of Public Health (see box on page 17). Below are the specific recommendations separated for implementation by LPH and by MDH.

Recommendations for Local Public Health

1. LPH should begin or continue to assess and plan for the potential effects of extreme weather events and climate change on the health of the public and health infrastructure (e.g., health care services, behavioral and mental health services, etc.) within existing processes (e.g., local public health assessment and planning process).
[Essential Service #2: Diagnose and investigate health problems and health hazards in the community.]

2. LPH should encourage staff to get trained on health issues associated with climate changes, and share MDH climate change adaptation products with the community and policy makers when available. LPH should provide feedback to MDH on improving climate change adaptation products. LPH should monitor and use as appropriate National Association of County and City Health Officials' (NACCHO) information on climate change.
   [Essential Service #3: Inform, educate and empower people about health issues.]

3. LPH should begin or continue to work with community partners (e.g., emergency management, social services, law enforcement, health care community, extension services) to prepare for the effects of extreme weather events and climate change on local resources that may have impacts on the health of the public.
   [Essential Service #4: Mobilize community partnerships and action to identify and solve health problems.]

Recommendations for the Minnesota Department of Health

1. MDH should continue to facilitate the SCHSAC Public Health Emergency Preparedness Oversight Workgroup and include connections between planning for emergencies and climate change impacts. For example, the workgroup should expand to include members of the Climate Change Adaptation Workgroup. Additionally, MDH could review the results of the Office of Emergency Preparedness (OEP) jurisdictional risk assessment and use that to facilitate planning for the health impacts of climate change.
   [Essential Service #2: Diagnose and investigate health problems and health hazards in the community, and Essential Service #5: Develop policies and plans that support individual and community health efforts.]

2. MDH should develop a communications plan to organize its recommendations on health and climate change, and share its climate change work and products with LPH through its website, the CHS Mailbag and other communication vehicles.
   [Essential Service #3: Inform, educate and empower people about health issues.]

3. MDH should partner with other agencies and institutions (e.g., the Department of Agriculture, the University of Minnesota (U of MN), U of MN Extension, the State Climatology Office, Minnesota Pollution Control Agency, Department of Natural Resources, etc.) on climate change-related efforts.
   [Essential Service #4: Mobilize community partnerships and action to identify and solve health problems, and Essential Service #10: Research for new insights and innovative solutions to health problems.]

4. In partnership with local public health, MDH should support local public health in their discussions about planning with hospitals, healthcare facilities, the health care community, and behavioral and mental health related to the health effects of climate change.
   [Essential Service #4: Mobilize community partnerships and action to identify and solve health problems, and Essential Service #5: Develop policies and plans that support individual and community health efforts.]

5. MDH should identify and maintain a compendium of best practices and strategies for dealing with the impacts of climate change on the health of the public that considers limited time and funding for implementation. As part of the compendium, and with the help of local public health, MDH should identify appropriate strategies for immediate public health impacts, such as from severe weather events, and long-term impacts, such as changes in vector-borne diseases. MDH should provide examples of

successful climate change plans and annexes (e.g., extreme heat) that are relevant to Minnesota.
[Essential Service #5: Develop policies and plans that support individual and community health efforts.]

6. MDH should integrate planning for the health effects of climate change into existing planning processes, such as the Minnesota LPH Assessment and Planning process, and provide practical tools and resources for planning.
[Essential Service #5: Develop policies and plans that support individual and community health efforts.]

Ten Essential Services of Public Health

The ten essential public health services provide the framework for the National Public Health Performance Standards Program. These national performance standards for state and local public health systems identify the optimal level of performance for state and local public health systems and governing bodies and seek to ensure that strong effective public health systems are in place to deliver essential public health services.

1. **Monitor** health status to identify community health problems.
2. **Diagnose and investigate** health problems and health hazards in the community.
3. **Inform, educate, and empower** people about health issues.
4. **Mobilize** community partnerships to identify and solve health problems.
5. **Develop policies and plans** that support individual and community health efforts.
6. **Enforce** laws and regulations that protect health and ensure safety.
7. **Link** people to needed personal health services and assure the provision of health care when otherwise unavailable.
8. **Assure** a competent public health and personal healthcare workforce.
9. **Evaluate** effectiveness, accessibility, and quality of personal and population-based health services.
10. **Research** for new insights and innovative solutions to health problems.

Appendix A

2011 SCHSAC Climate Change Survey Results

Introduction

The 2011 SCHSAC Climate Change Survey assessed local public health's (LPH) knowledge and attitudes towards climate change and its related public health impacts. The survey was developed as part of a grant from the Centers for Disease Control and Prevention (CDC) to build MDH and LPH capacity to address the public health impacts of climate change.

The survey assessed local elected officials', Community Health Board (CHB) Administrators', and LPH leadership and staffs' knowledge and attitudes toward climate change. The survey also gauged LPH's attitudes towards climate change-related impacts, and LPH's capacity to plan for and adapt to climate change. The survey asked respondents to also provide suggestions for resources necessary to adapt to climate change. The results of the survey will be used to inform LPH training needs and topics, to learn about LPH priorities related to climate change, and to assess developing climate change resources for LPH.

Process

At the August 15, 2011 meeting of the SCHSAC Climate Change Adaptation Workgroup, members suggested administering a climate change survey at the SCHSAC meeting during the 2011 Community Health Services (CHS) conference on September 14, 2011. The SCHSAC Climate Change Adaptation Workgroup agreed that the SCHSAC Climate Change Survey would be developed from a simplified version of the 2010 MDH Climate Change Survey. Specific questions from the 2010 survey were included in the 2011 survey to enable comparison of results.

For the 2010 MDH Climate Change Survey, MDH reviewed surveys developed by the Association of State and Territorial Health Officials (ASTHO) and the National Association of County and City Health Officials (with the Environmental Defense Fund) on climate change and public health. The 2010 MDH Climate Change Survey was developed with the assistance of two survey experts and was pilot tested prior to implementation. The survey was implemented using Vovici, Web-survey technology.

The SCHSAC Climate Change Survey consisted of two sheets of paper: one that asked respondents to check their CHB and one that contained the survey questions. The survey was administered to all attendees at the SCHSAC meeting at the CHS conference on September 14, 2011. The chair of the SCHSAC Climate Change Adaptation Workgroup asked SCHSAC members and LPH management staff to complete the survey at the end of the meeting and hand in their responses as they left the meeting room. MDH staff collected all the surveys. Results were tabulated from responders who checked one of the following categories: Local elected official; CHB Administrator/Local Public Health Director; Local Public Health Manager or Supervisor; or Other. Surveys received from MDH staff, LPHA, and public health nurses (who could not be places as a local public health nurse) were removed from survey responses prior to tabulation. The two pages of the survey were separated to ensure respondents' anonymity.

Basic frequencies were performed on all the questions. Open responses to question number nine was categorized and grouped according to similar responses/intent. One coder did the categorizing, so it is possible that if another coder had reviewed the data the results may be slightly different.

Summary of Results

Out of 52 CHBs, 43 responded to the survey. A total of 82 surveys were received. Three surveys were removed from the final results because the respondent was not a local elected official, CHB Administrator/Local Public Health Director, or local public health staff. The majority of respondents (57 percent) classified themselves as CHB Administrator/Local Public Health Director. Local elected officials were the second largest group with 27.8 percent of responses. There were eight "Local Public Health Managers or Supervisors" and four respondents who categorized themselves as "Other".

The vast majority (85 percent) of respondents agreed with the statement: "Minnesota is currently experiencing climate change." The survey found that 85.7 percent of respondents agreed that Minnesota will experience climate change in the next 20 years. Less than 10 percent (7.8 percent) of respondents disagreed with the statement. More than eighty percent (81.8 percent) of respondents agreed that climate change will potentially adversely impact public health in Minnesota in the next 20 years. More respondents said that they did not know if climate change will potentially adversely impact public health in Minnesota in the next 20 years (eight respondents) than those who did not know if Minnesota will experience climate change in the next 20 years (five respondents).

The top five events/conditions that respondents reported as likely to be made worse by climate change in Minnesota in the next 20 years were extreme weather events (e.g., tornadoes, floods, droughts) (79.7 percent); heat waves and heat-related illnesses/deaths (70.9 percent); respiratory conditions (e.g., asthma) (67.1 percent); vector-borne diseases (e.g., West Nile disease, Lyme disease, etc.) (64.6 percent); and water supply and quality (63.3 percent). Only 30 percent of the respondents thought foodborne diseases would be made worse by climate change; the lowest response for the 14 impacts listed.

When asked if the respondent's CHB had the expertise to assess the potential public health impacts associated with climate change in their jurisdiction, only 20 respondents (25.3 percent) agreed. Even fewer respondents (13.9 percent) agreed that their CHB currently has the expertise to create an effective climate change adaptation plan, and only eight respondents (10.1 percent) agreed that their CHB is currently planning for the potential public health impacts of climate change. The overwhelming message is that CHBs do not have the expertise and are not preparing for the potential impacts of climate change in their region.

The open-ended final question asked what information or resources would be useful to help respondents' CHBs prepare for climate change. The top five responses are below:

- Scientific data, climate models, and predictions of potential impacts
- Technical assistance and planning
- Presentations created by MDH
- Funding
- Data

The next section presents the detailed results of the survey.

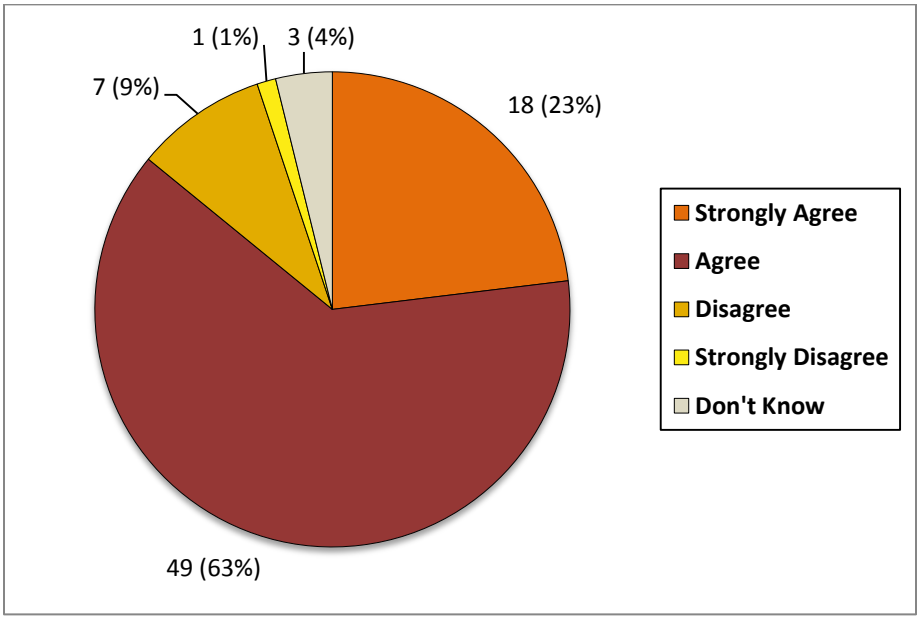
Survey Questions and Results

The survey questions and responses are provided. Highlighted rows represent the largest percentage of respondents. Percentages were rounded, so due to rounding, the total percent for each question may not add up to 100 percent.

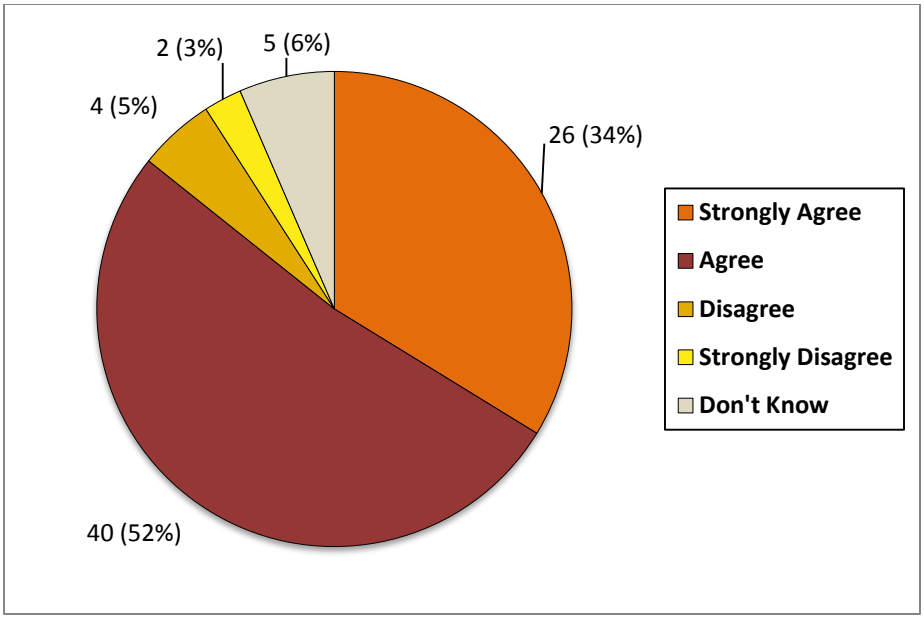
1. Please check ONE title that most accurately reflects your position (if you perform more than one role, please check the highest level position): N = 79

N	Percentage	Response
22	28%	Local Elected Official
45	57%	CHB Administrator / Local Public Health Director
8	10%	Local Public Health Manager or Supervisor
4	5%	Other

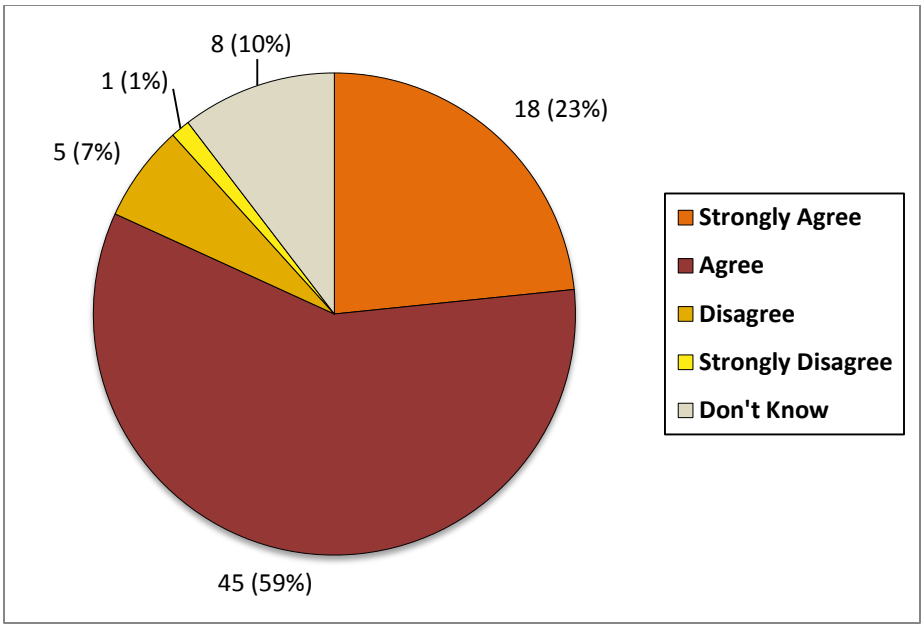
2. Minnesota is currently experiencing climate change. N = 78



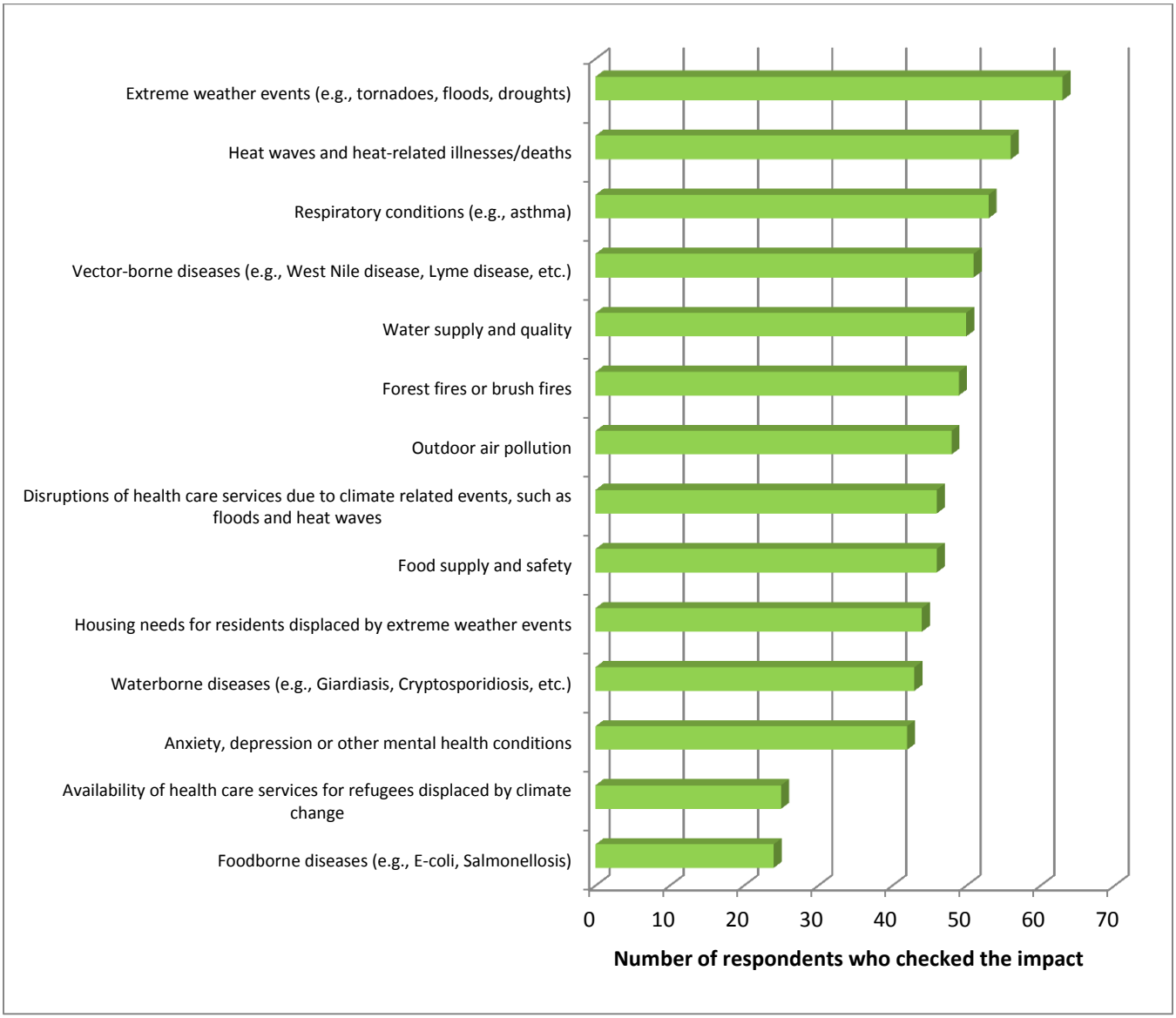
3. Minnesota will experience climate change in the next 20 years. N = 77



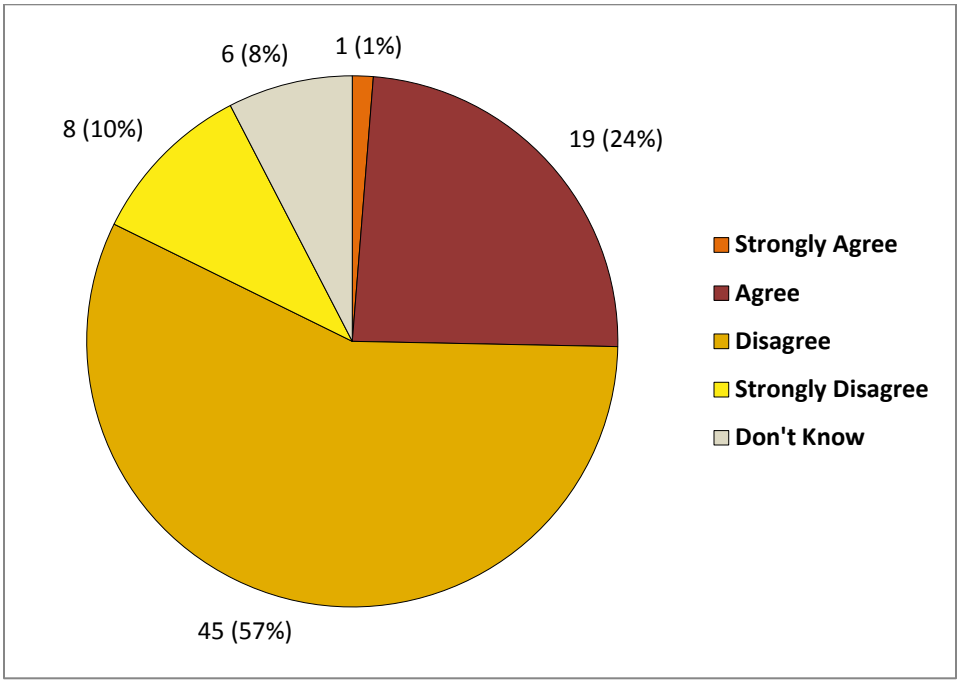
4. Climate change will potentially adversely impact public health in Minnesota in the next 20 years. N = 77



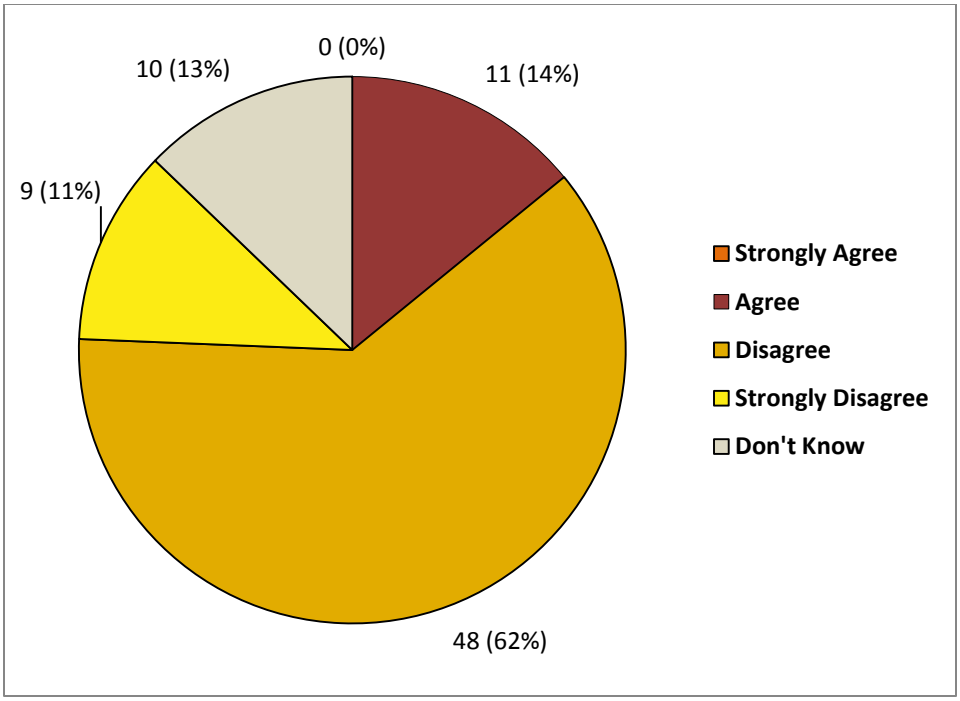
5. Climate change may have positive as well as negative impacts. Please check all the following conditions that are likely to be made worse by climate change in Minnesota in the next 20 years.



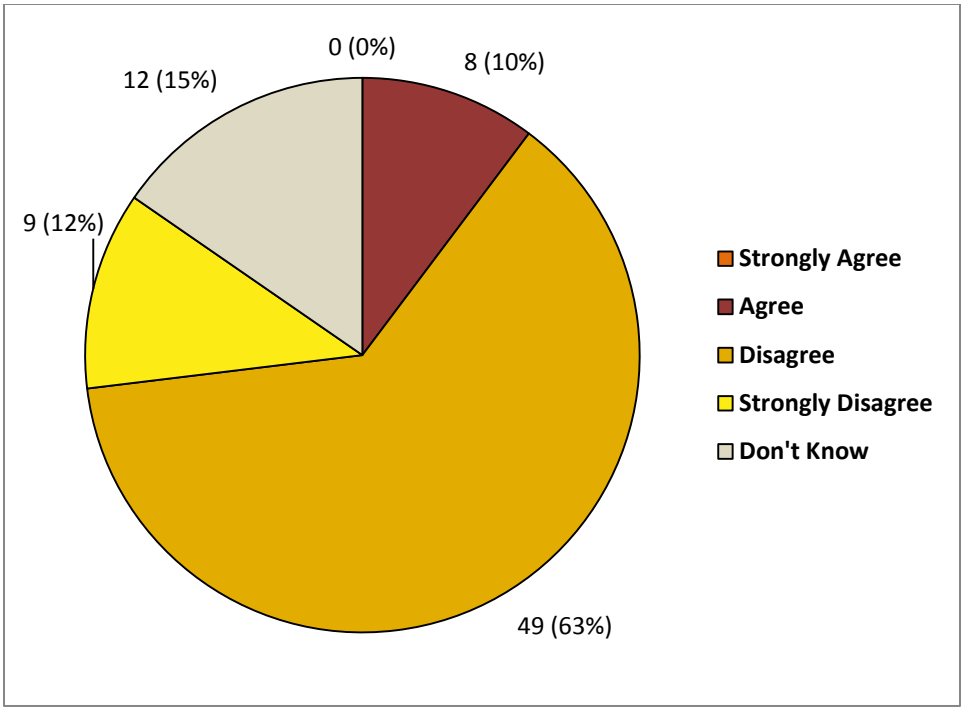
6. My CHB currently has expertise to assess the potential public health impacts associated with climate change that could occur in my jurisdiction. N = 79



7. My CHB currently has expertise to create an effective climate change adaptation plan. N = 78



8. My CHB is currently planning for the potential public health impacts of climate change. N = 78



9. What information/resources would be useful to help your CHB prepare for climate change? N = 39

(This question was open-ended. Respondents may have listed more than one resource in the list below.)

N	Response
17	Technical or planning assistance
15	Latest data/science on climate predictions and potential impacts
9	MDH power point or presentation
5	Other
3	Data
2	Funding

A number of respondents mentioned collaborating with local elected officials, MDH staff, emergency preparedness staff and other community partners for planning and assessment. Additionally, respondents expressed interest in MDH preparing templates and planning assistance tools with detailed instructions.

Regarding responses of "data" and "technical assistance," the respondents showed interest in unbiased, scientific information, possibly from a climate change expert. CHBs were not interested in an influential presentation by partisan groups, but data that clearly told the climate change story in an unbiased manner. The responses suggested that more education is needed to demonstrate the need for planning for the public health impacts of climate change and how to plan before the planning can commence.

Conclusion

Overall, the majority of respondents agreed climate change was happening or was going to happen in Minnesota in the next 20 years. The responses from questions five (assessing the potential public health impacts of climate change) and nine (assessing the resources needed by LPH) provide useful information to help MDH and the SCHSAC Climate Change Adaptation Workgroup prepare planning tools for local public health to adapt to and mitigate the impacts of climate change on public health. MDH will use the results to explore additional resources useful to LPH, such as technical assistance and funding.

Appendix B

Meeting Notes and Presentations: August 15, 2011

SCHSAC Climate Change Adaption Workgroup
Meeting Notes
August 15, 2011 | 10:00 a.m. to 2:30 p.m.

Attendees

SCHSAC Workgroup Members: David Benson, Renee Frauendienst, Bill Groskreutz, Harlan Madsen, RaeAnn Mayer, Todd Monson, Susan Morris, Ewald Petersen, Jim Skoog, and Karen Swenson

MDH Staff: Chaina Bapikee, Becky Buhler, Gail Gentling, Kelly Muellman, and Kristin Raab

Meeting Notes

I. Welcome and introductions

Chair, Bill Groskreutz, welcomed attendees, and all workgroup members and MDH staff introduced themselves.

II. Ground rules

Chair, Bill Groskreutz, read the ground rules. No changes were made.

III. Review charge of workgroup

Chair, Bill Groskreutz, reviewed the charge of the work group. All agreed; no changes were made.

IV. Presentation on climate change by Dr. Mark Seeley, University of Minnesota

Dr. Mark Seeley gave a presentation on climate science and climate change. See a copy of his presentation for details. A "Q&A" followed. SCHSAC members asked Dr. Seeley about how they can assure they are receiving and communicating the correct information to begin discourse about climate change with constituents. Dr. Seeley recommended telling stories, focusing on shared experiences and values.

V. Discussion: Review literature on public health and climate change

Kristin Raab, MDH – Environmental Health, presented on the impacts of climate change on public health. See her presentation for details.

VI. Review surveys on climate change

Kristin Raab presented a review of three recent climate change surveys – a national survey of a representative sample of U.S. adults (18+) on awareness and concern of climate change; an MDH survey on employee awareness of climate change impacts on public health and the appropriateness of MDH to work on those public health impacts; and the NACCHO survey of members on climate change awareness and capabilities to address climate change impacts. See a copy of her presentation for details.

Following the climate change and public health presentation, SCHSAC workgroup members discussed recent climate/weather-related emergency public health planning. Todd Monson reported that an unexpected response from Hennepin County following the North Minneapolis tornado in May 2011 was replacement of food stamps (Hennepin County also provided assistance with psychological aid and other food/goods). Karen Swenson informed the group that Nicollet County opened cooling centers in Mankato and St. Peter during the July 2011 heat wave. St. Peter also donated bus service to provide transportation to the cooling center. The planning took place in a matter of hours. Only 15 people used the cooling center in St. Peter, probably because of no advance notice and lack of awareness. Swenson noted that it would have been beneficial to have a plan for cooling centers in advance of these extreme heat events. Todd Monson brought up an example of climate change preparedness in another region of the U.S. in which some Northeast states now have requirements for central air conditioning as a standard for public housing. Additionally, the idea was raised that it would be informative to track library, public pool and movie theater visits during extreme heat events to see if people used them as unofficial cooling centers. Harlan Madsen suggested that MDH engage with the Department of Agriculture on climate change issues; possibly through the interagency adaption workgroup or another avenue.

VII. Planning processes for local public health

Becky Buhler, MDH – Office of Performance Improvement, presented the Minnesota Local Public Health Assessment and Planning Process. She was followed by Gail Gentling, MDH – Office of Performance Improvement, who presented the Public Health Emergency Preparedness Assessment and Planning Community Health Board Grantee Duties for August 2011 – December 2012.

Following the MDH presentations, SCHSAC members discussed the possibilities of rolling a climate change survey into existing preparedness planning work that local health departments are already required to do. It was requested that MDH find the confluence between planning on climate change and strategic planning for the MN Local Public Health Assessment and Planning Process. Currently there is no climate change language in the strategic planning process or preparedness assessment and planning. This language should be added sooner rather than later because plans are good for 5 years. Renee Frauendienst mentioned that the Stearns County Hazard Assessment includes consideration of extreme heat and extreme weather but there is nothing connecting these issues to climate change or long-term planning. Karen Swenson agreed that in Nicollet County the work on climate change issues is there but the terminology or long-term consideration may be lacking. In Nicollet County, they use the terminology "climate health preparedness".

Some SCHSAC members agreed that now is the opportunity to connect the dots between emergency preparedness and climate change. However, Harlan Madsen questioned whether making the connection to climate change was too political and potentially harmful for the work of local public health agencies. He made the suggestion that if the working is being done under a different guise that it does not matter if it connected to climate change explicitly.

VIII. Discussion of survey development

Assuming that climate change work does progress, SCHSAC members asked if it was possible to use state emergency preparedness (OEP) requirements to assess climate change response capacity at the local public health level. Myrlah Olson was suggested as a natural connection in OEP for this work, but she is retiring in September and has no replacement yet. Gail Gentling and Becky Buhler agreed to look into incorporating additional language/directive into existing planning requirements so that local health departments did not have to complete

more planning and paperwork. If the work was dovetailed with existing requirements, there would be fewer complaints and be more efficient. One member said that since climate change affects everything in public health this work could potentially break down existing silos within public health. SCHSAC members said that they would like assistance from MDH in the form of technical support and consulting expertise.

Then returning to the specifics of a climate change survey, work group members questioned what the purpose of the survey would be. Suggestions included gauging local public health capacity, knowledge and experience to do climate change or climate change impact work. Also suggested was the potential framing of questions as "we know there will be more frequent/extreme . . . , is your agency prepared?" In the final thoughts and objectives moving forward, Kristin Raab agreed to help administer MDH's 'climate change perceptions/awareness' survey at the September community health conference with local staff and commissioners. The results will be compared with MDH staff survey responses. The conference survey will be provided either as a paper survey included in the conference packet or electronically at a resource table (via laptop/survey monkey).

IX. Next steps

Bill Groskreutz adjourned the meeting and reminded SCHSAC work group members that the next meeting will be held at the same time and location on October 7, 2011. If necessary, a brief workgroup meeting may be convened during the September conference.

Climate Science and Climate Change: A Review

Dr. Mark Seeley

Dept of Soil, Water, and Climate University of Minnesota

SCHSAC Climate Change Adaptation Working Group

(MN Dept of Health)

August 15, 2011

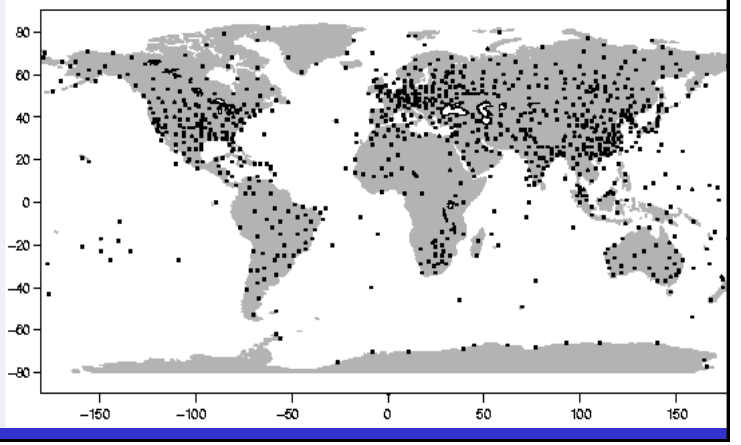
CLIMATE

- QUANTITATIVE DESCRIPTION OF HISTORICAL WEATHER FOR A GIVEN PLACE OVER A GIVEN INTERVAL OF TIME
- INCLUDES THE PHYSICAL AND BIOLOGICAL FEATURES OF EARTH'S SURFACE, THEIR INTERACTIONS AND ATMOSPHERIC FEEDBACKS

WEATHER

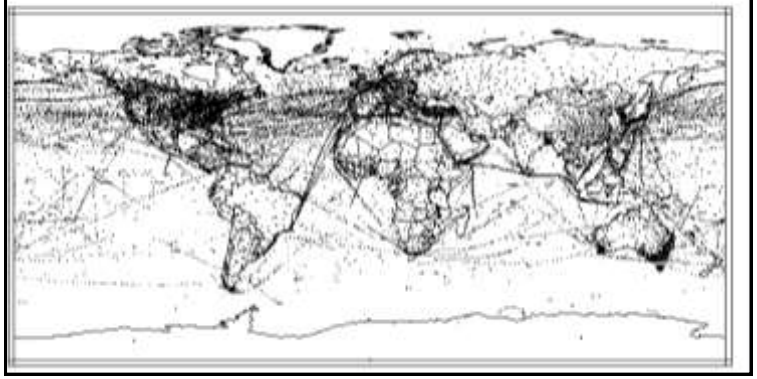
- RECENT, CURRENT, AND NEAR-FUTURE STATE OF THE ATMOSPHERE
- MOST COMMON ELEMENTS: TEMP, HUMIDITY, PRECIPITATION, CLOUDINESS, VISIBILITY, WIND
- SIGNIFICANT FEATURES (FOG, HAIL, TORNADO, HURRICANE, LIGHTNING)

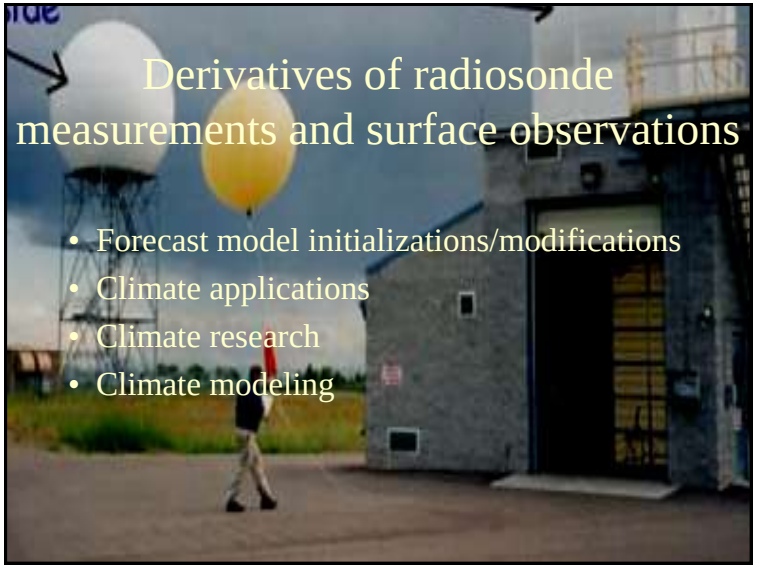
Over 1200 radiosonde locations used by the meteorological and climatological community (12-hr intervals)



Includes land, ocean (buoys) and ships

Surface Observation Locations



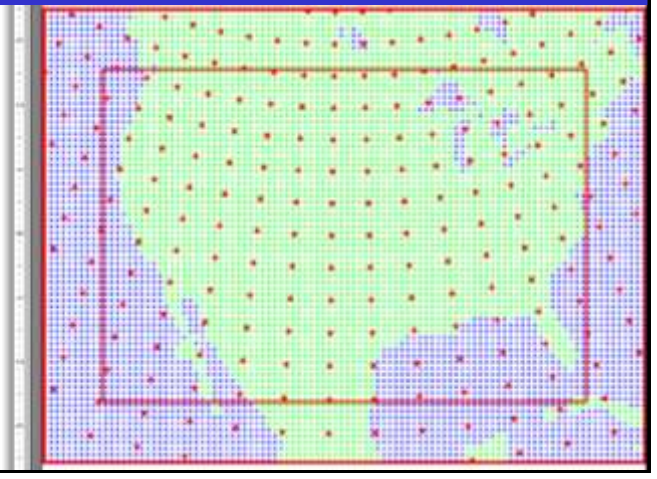


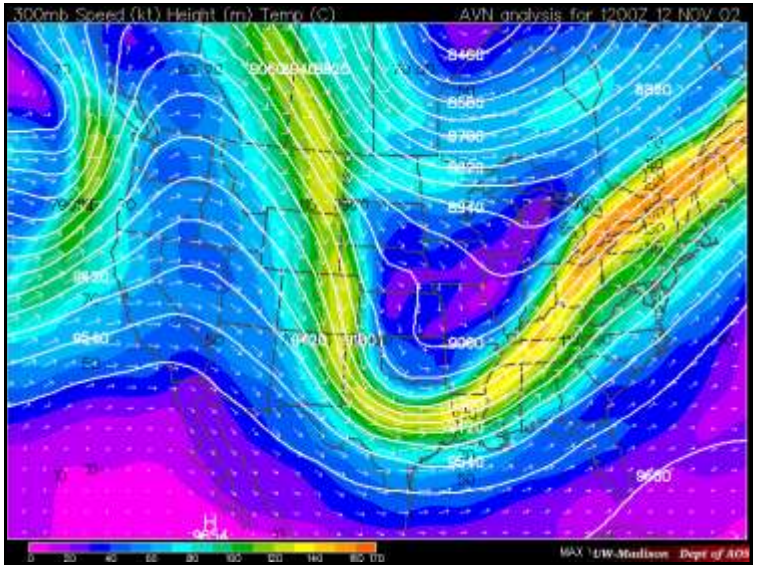
Derivatives of radiosonde measurements and surface observations

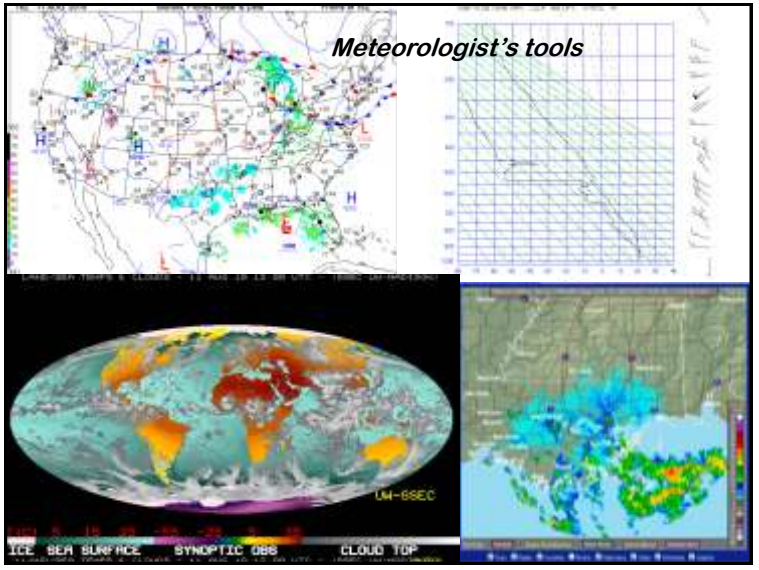
- Forecast model initializations/modifications
- Climate applications
- Climate research
- Climate modeling

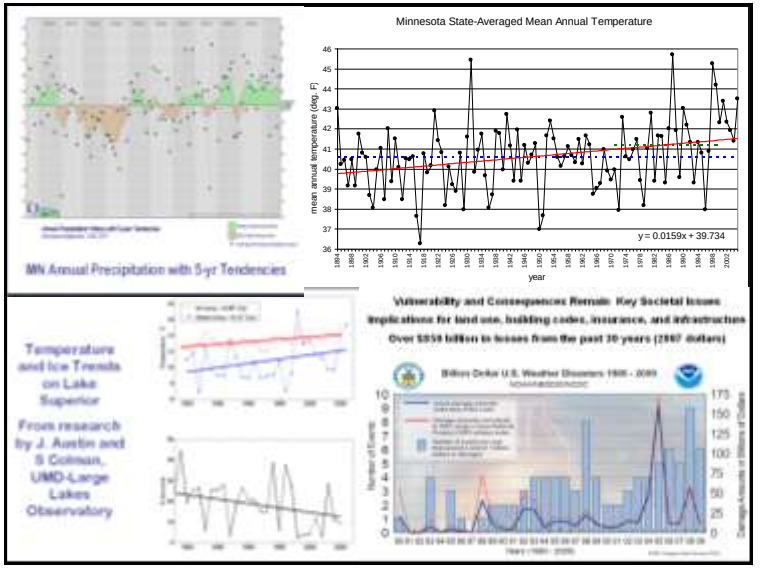
Regional model grids

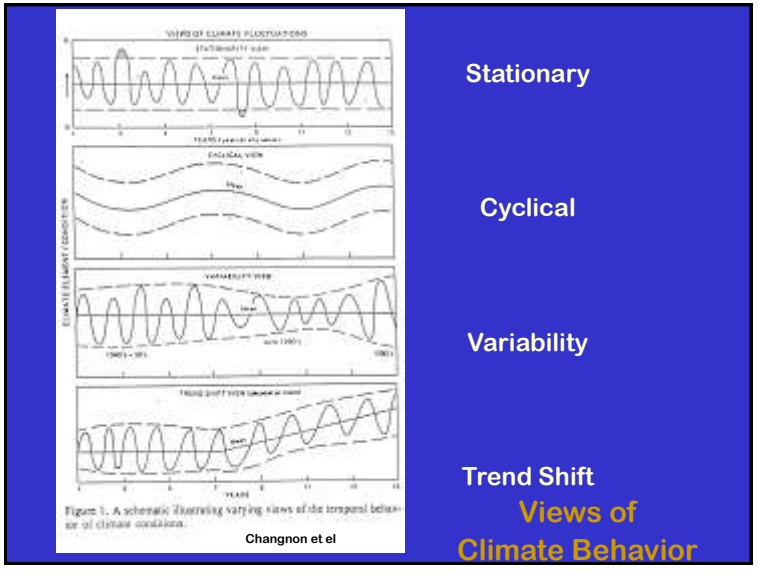
Climate

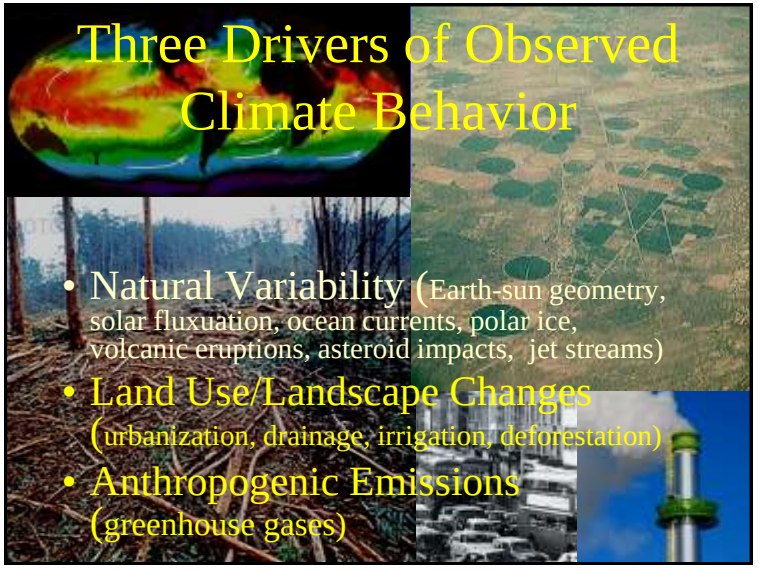





Meteorologist's tools
ICE
SEA SURFACE
SYNOPTIC OBS
CLOUD TOP


Minnesota State-Averaged Mean Annual Temperature
mean annual temperature (deg. F)
year
y = 0.0159x + 39.734
MN Annual Precipitation with 5-yr Tendencies
Temperature and Ice Trends on Lake Superior
From research by J. Austin and S Colman, UMD-Large Lakes Observatory
Vulnerability and Consequences Remain Key Societal Issues
Implications for land use, building codes, insurance, and infrastructure
Over $850 billion in losses from the past 30 years (2007 dollars)


Stationary
Cyclical
Variability
Trend Shift
Views of Climate Behavior
Changnon et el


Three Drivers of Observed Climate Behavior
• Natural Variability (Earth-sun geometry, solar fluxuation, ocean currents, polar ice, volcanic eruptions, asteroid impacts, jet streams)
• Land Use/Landscape Changes (urbanization, drainage, irrigation, deforestation)
• Anthropogenic Emissions (greenhouse gases)

Three Reasons to Accept That Climate Change is Real

- (1) Measured attributes of the Earth climate system are changing (temp, precip, cloud) according to NASA, NOAA, and Hadley Centre Data Sets.
- (2) Models mimic measured climate changes more accurately with parameterized human disturbance (land use, emissions) included.
- (3) Observed and measured physical and biological consequences fit with the measured climatic changes.

NOAA Climate Literacy Principles

(available online at http://www.globalchange.gov/resources/educators/climate-literacy)

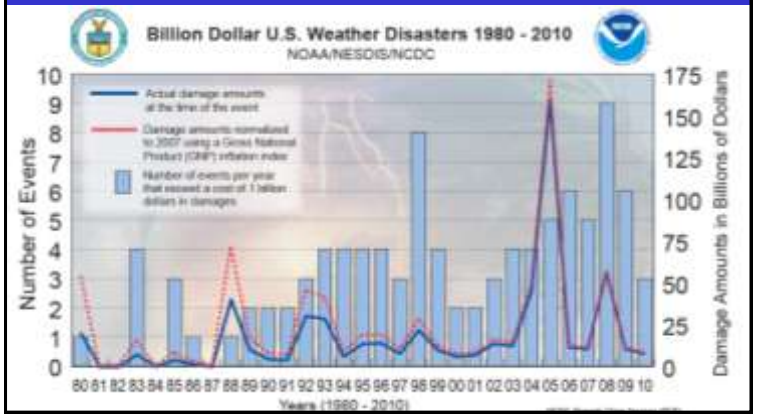
Frank Niepold
Climate Education Coordinator
Climate Program Office (UCAR),
Washington, D.C., USA
frank.niepold@noaa.gov

http://www.climate.gov/

Vulnerability and Consequences Remain Key Societal Issues

Implications for land use, building codes, insurance, and infrastructure

Over $850 billion in losses from the past 30 years (2007 dollars)



"citizens do not use the news media as scientists assume……faced with a….torrent of daily news, citizens use their value predispositions….as perceptual screens"

(Nisbet and Mooney)

Science, 316. pg 56, Apr 6, 2007)

To engage the public on climate change we must give attention to the 5 Cs: common experience, core values, community, citizenship, and civility

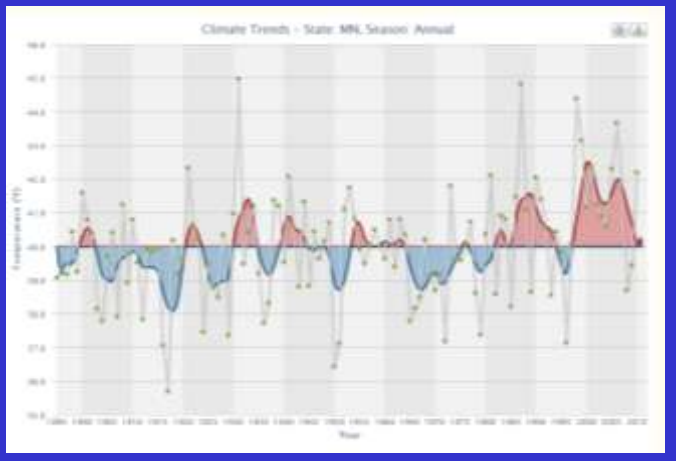
Examples of good climate science overviews

Scientist/citizen perspectives

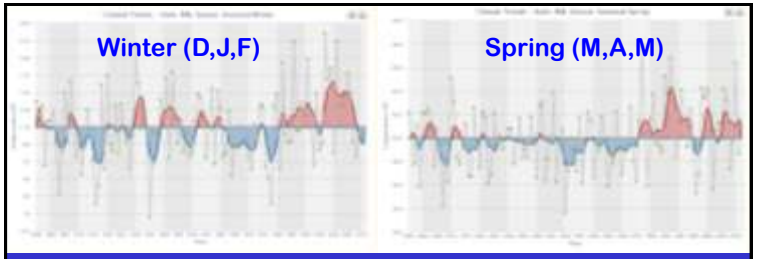
www.ipcc.ch (4th Assessment)

RECENT SIGNIFICANT CLIMATE TRENDS IN MINNESOTA AND THE WESTERN GREAT LAKES

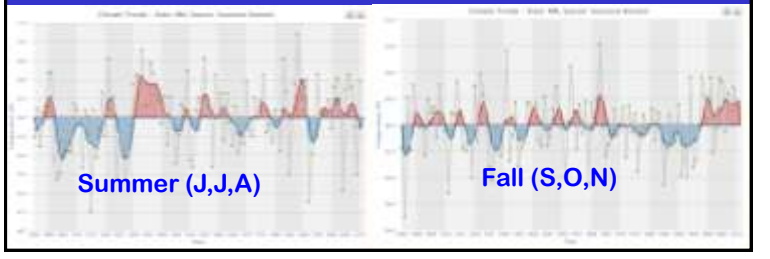
- *TEMPERATURE*: WARM WINTERS AND HIGHER MINIMUM TEMPERATURES
- *DEWPOINTS*: GREATER FREQUENCY OF TROPICAL-LIKE ATMOSPHERIC WATER VAPOR
- *MOISTURE*: AMPLIFIED PRECIPITATION SIGNAL, THUNDERSTORM CONTRIBUTION



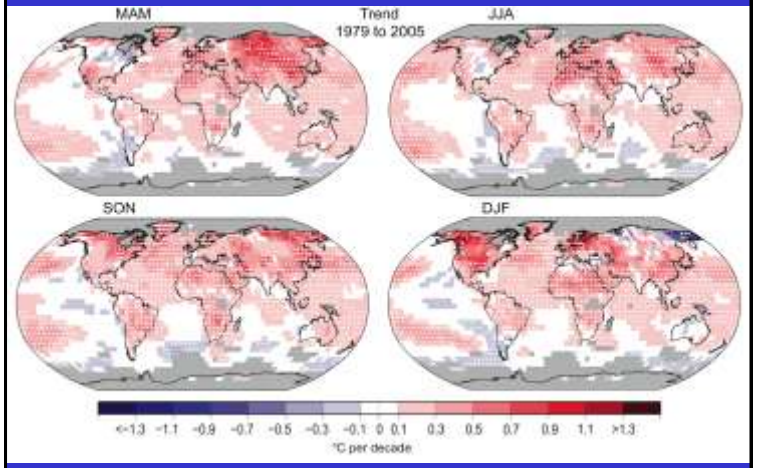
Statewide Annual Temperature History



Seasonal Temperature Trends in MN

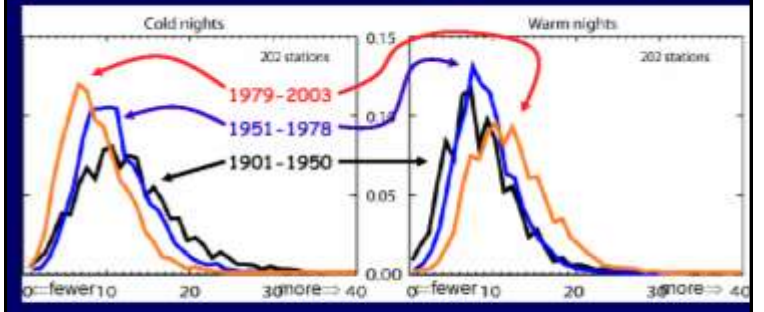


Seasonality in temperature change



IPCC-2007

Warm nights are increasing; cold nights decreasing



IPCC-2007

Frequency of occurrence of cold or warm temperatures for 202 global stations for 3 time periods:
1901 to 1950 (black), 1951 to 1978 (blue) and 1979 to 2003 (red)

Warming is weighted towards minimum temperature change

Trends in mean monthly temperatures at Waseca, MN
1971-2000 normals vs 1981-2010 normals

Month	Change in value (deg F)
January	+2.3
February	+0.5
March	+0.8
April	+0.6
May	0.0
June	+0.3
July	+0.4
August	+0.5
September	+0.8
October	+1.1
November	+1.2
December	+1.1

Trends in average winter minimum temperatures Rochester, MN

Period of Record	Ave Min Temp in Deg. F
1951 - 1980	Jan 1.9
1961 - 1990	Jan 2.7
1971 - 2000	Jan 3.7
1981 - 2010	Jan 7.7
1951 - 1980	Feb 7.6
1961 - 1990	Feb 8.1
1971 - 2000	Feb 10.6
1981 - 2010	Feb 12.4
1951 - 1980	Mar 19.2
1961 - 1990	Mar 21.3
1971 - 2000	Mar 22.6
1981 - 2010	Mar 24.3

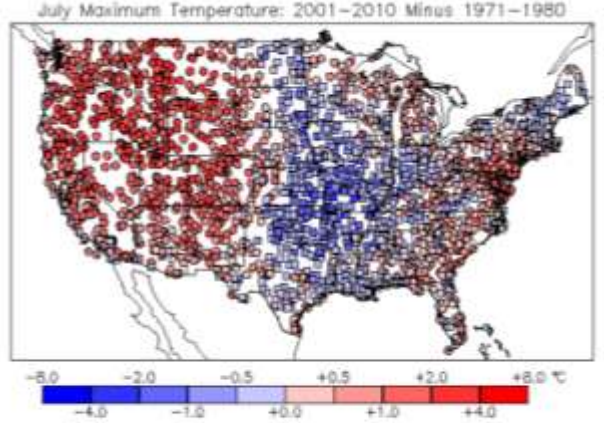


Figure 1. The difference between the decade-averaged maximum temperatures in July for the 2001-2010 period and the 1971-1980 period. Red circles (blue squares) indicate positive (negative) anomalies, i.e., warmer (cooler) conditions in the most recent decade versus the decade cycling off of the normals computation.

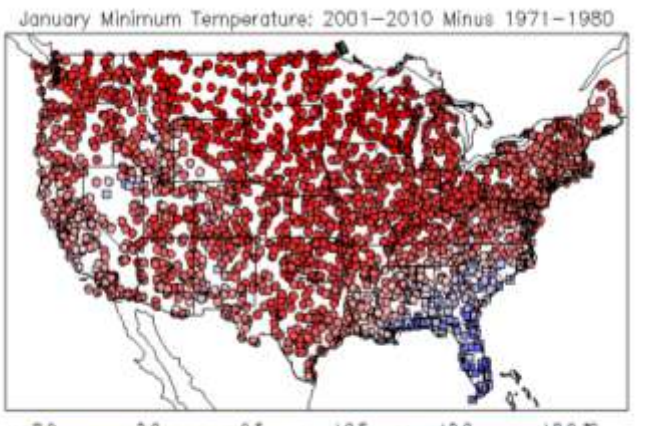
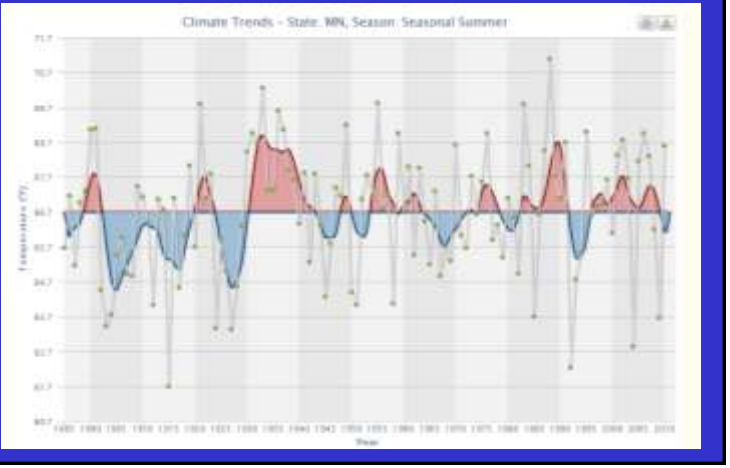


Figure 2. Same as Figure 1, but for January minimum temperatures.

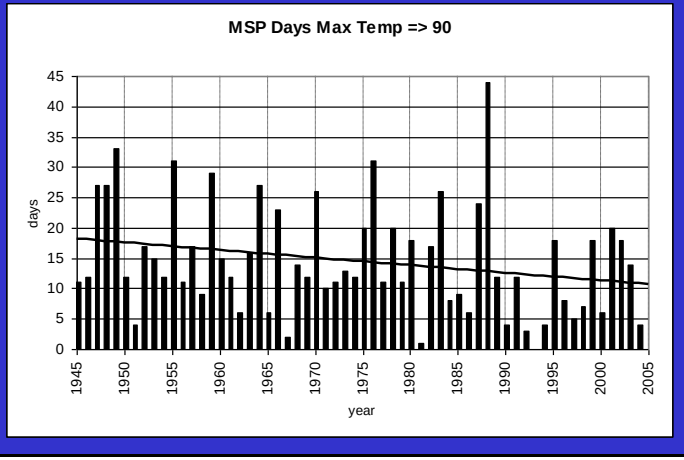
Possible Implications of Warm Winters and Higher Minimum Temperatures

- Change in depth and duration of soil and lake freezing
- More rapid breakdown of crop residues
- Later fall nitrogen applications
- Longer outdoor construction season, fewer adverse weather days
- Change in over winter survival rates of insect pests and plant diseases, and soil microbes
- Reduced energy use for heating
- Increased number of freeze/thaw cycles
- Change in animal migration, hibernation, and foraging
- Longer exposure times to mold and allergens

Summer (J,J,A) Trend is Warmer



Trend in number of days with max temp of 90 F or higher is negative for Twin Cities

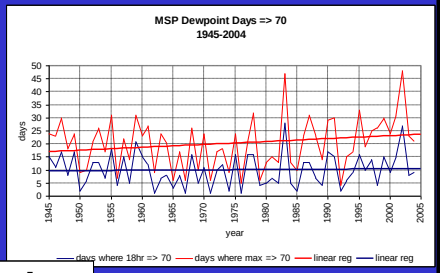


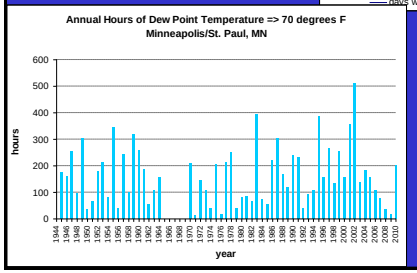
Minnesota Statewide May Through September Mean Temperature Ranking of the past 17 Growing Seasons (1994-2010)

Year	Percentile Rank for 1895-2006	(mean temp)
1994	66	(62.8 F)
1995 *	79	(63.3 F)
1996 *	40	(61.9 F)
1997	48	(62.1 F)
1998	108	(64.8 F)
1999 *	78	(63.3 F)
2000	53	(62.3 F)
2001 *	93	(63.8 F)
2002 *	80	(63.3 F)
2003 *	73	(63.1 F)
2004	12	(60.3 F)
2005 *	85	(63.6 F)
2006 *	96	(63.9 F)
2007 *	104	(64.6 F)
2008	35	(61.7 F)
2009	27	(61.3 F)
2010 *	71	(63.5 F)

* Denotes summer dewpoint of 80 F or higher

Trend in dewpoints of 70 F or higher in the Twin Cities



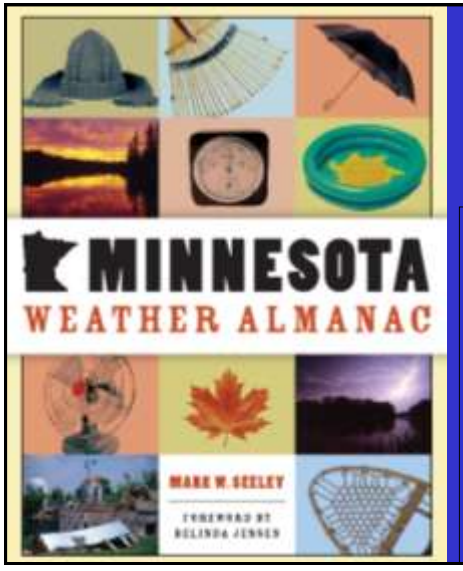


Trends in average summer minimum temperatures St Peter, MN

Period of Record	Ave Min Temp in Deg. F
1951 - 1980	Jun 56.7
1961 - 1990	Jun 56.6
1971 - 2000	Jun 56.7
1981 – 2010	Jun 58.1
1951 - 1980	Jul 61.1
1961 - 1990	Jul 61.2
1971 - 2000	Jul 61.3
1981 - 2010	Jul 62.8
1951 - 1980	Aug 58.5
1961 - 1990	Aug 58.9
1971 - 2000	Aug 59.0
1981 - 2010	Aug 60.7

Frequencies of July tropical dew points (70 F or higher) and associated Heat Index values for the Twin Cities since 1945.

Year	Hours with DP of 70 F or greater	Range of Heat Index Values (F)
1949	223	98 - 112
1987	223	98 - 104
1955	206	98 - 113
1999	192	98 - 115 (116*)
1957	192	99 - 114
2001	182	98 - 110
1977	160	100 - 108
1983	157	102 - 110
1995	110	98 - 116
2002	305	98 - 109
2004	108	98 - 105
2011	243	98 - 118



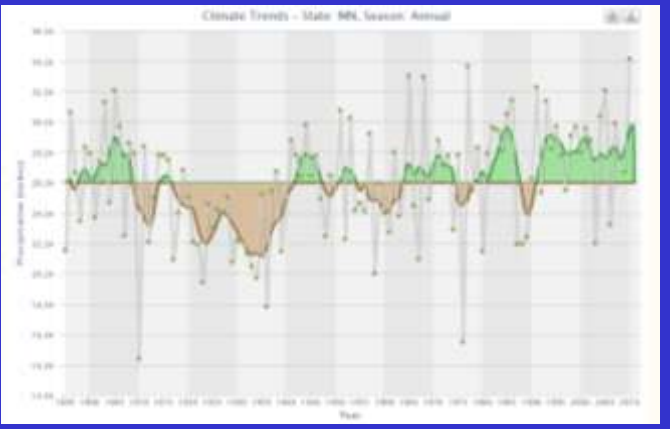
Historical Minnesota Heat Waves:

Red denotes dewpoint driven

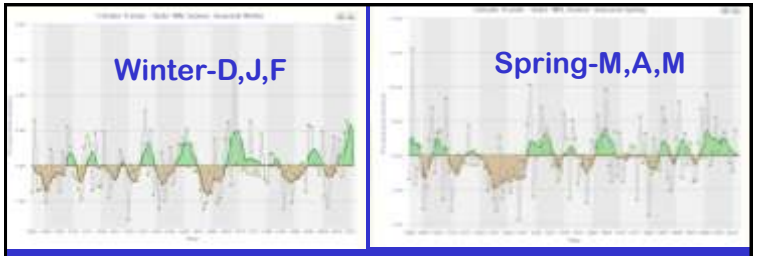
1883, 1894, 1901, 1910, 1917, 1921, 1931, 1933, 1934, 1936, 1937, 1947, 1948, 1949, 1955, 1957, 1959, 1964, 1976, 1977, 1983, 1988, 1995,1999, 2001, 2005, 2006, 2007, 2010, 2011

Possible Implications of Increased Frequency in Tropical Dew Points?

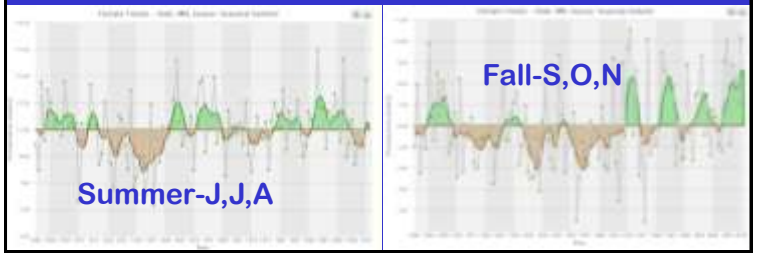
- Dynamics of pathogen, insect, and microorganism populations
- Efficacy and persistence of herbicides (volatility)
- Elevated water temperatures, algae blooms
- Increased workload in heat related health care (exposure differentials, MS, COPD, Obesity)
- Increased stress on livestock (change in ration, water, reduced milk production and reproduction problems)
- Increased demand for air conditioning



MN Annual Precipitation with 5-yr Tendencies



Seasonality in MN Precipitation Trends



Change in Annual Precipitation Normals at Willmar, MN

PERIOD	AMOUNT (IN.)
1921-1950	23.01”
1931-1960	24.47”
1941-1970	27.63”
1951-1980	27.71”
1961-1990	28.21”
1971-2000	28.23”
1981-2010	29.46”

28 percent increase since 1921-1950 period

Change in Annual Precipitation "Normals" at Brainerd, MN

PERIOD	AMOUNT (IN.)
1921-1950	23.03″
1931-1960	24.68″
1941-1970	25.59″
1951-1980	26.02″
1961-1990	26.40″
1971-2000	27.55″
1981-2010	28.38″

23 percent increase since 1921-1950 period

"…..water vapor and clouds are far and away the most important greenhouse substances in the atmosphere [quantity, type, and distribution are important]" K. Emanuel

FORUM

THE CHANGING CHARACTER OF PRECIPITATION

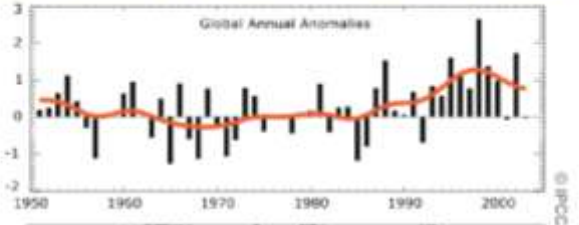
BY KEVIN E. TRENBERTH, AIGUO DAI, ROY M. RASMUSSEN, AND DAVID B. PARSONS

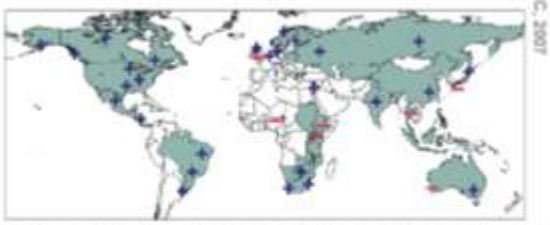
As climate changes, the main changes in precipitation will likely be in the intensity, frequency, and duration of events, but these characteristics are seldom analyzed in observations or models.

Why does it rain? If a parcel of air rises, it expands … pushing underneath warmer air (advancing cold

Quantity is but one character of precipitation

Heavy Precipitation Trend (% from very wet days)





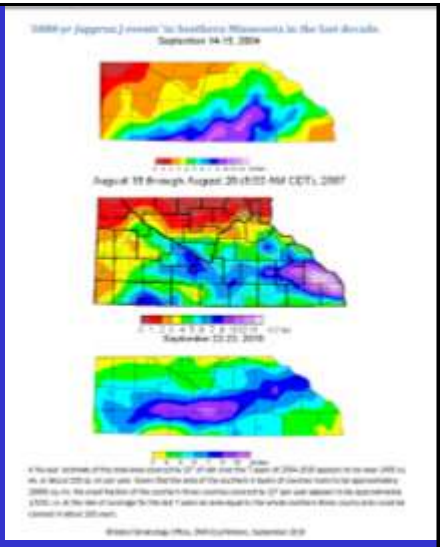
Regions where disproportionate changes in heavy and very heavy precipitation during the past decades were documented as either an ***increase (+) or decrease (–)*** *compared to the change in the annual and/or seasonal precipitation*

Historical recurrence interval of 2 inch rains in MN is once per year.

Observed 2 inch rainfalls for the period 1991 – 2010 and maximum single day value for various communities:

Location	No. 2 in. rains	Maximum Value (date)
Fairmont	33	6.20 (9/15/2002)
Albert Lea	33	7.50 (6/15/78)
Preston	32	6.60 (7/21/51)
Blue Earth	38	7.10 (9/15/2004)
Lake City	42	5.60 (5/28/70)
Waseca	38	5.40 (8/31/62)
Winnebago	40	8.64 (9/25/2005)
Bricelyn	38	9.22 (9/14/2004)
Amboy	36	9.48 (9/23/2010)
Hokah	32	15.10 (8/19/2007)

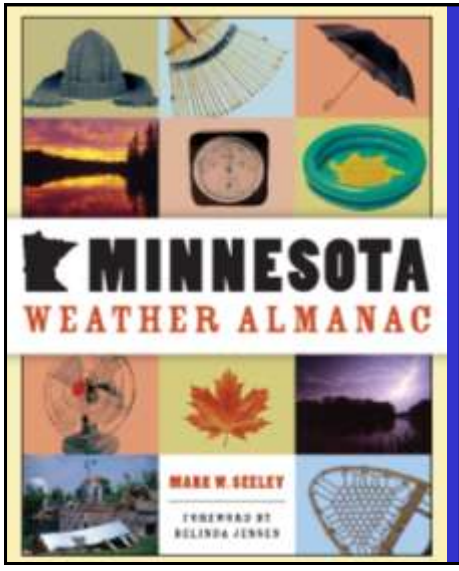
Shift in Precipitation Recurrence Intervals



Minnesota Statewide May Through September Precipitation Ranking of the past 17 Growing Seasons (1994-2010)

Year	Percentile Rank for 1895 to 2010	(amount)
1994	72	(18.04")
1995	80	(18.54")
1996	29	(15.55")
1997 *	59	(17.17")
1998 *	61	(17.28")
1999 *	110	(22.33")
2000 *	67	(17.58")
2001 *	46	(16.74")
2002 *	102	(21.05")
2003	31	(15.69")
2004 *	104	(21.62")
2005 *	96	(20.64")
2006 *	19	(14.63")
2007 *	37	(16.15")
2008 *	42	(16.51")
2009	6	(12.61")
2010*	115	(24.73")

* Denotes thunderstorm produced flashfloods



Historic Droughts

(Associated fires)

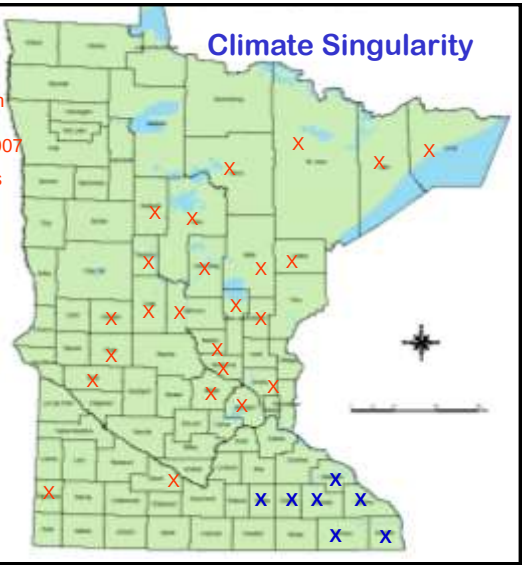
1829, 1852, 1856
1863-1864, 1871-1872
1894, 1896, 1900,
1910, 1918, 1921-1923
1926, 1929-1934,
1936-1939, 1948,
1954-1956, 1961,
1976, 1980, 1984,
1987, 1988, 1997,
2005-2007 2008
2009

Climate Singularity

X = 24 counties included in USDA drought disaster declaration of August 7, 2007

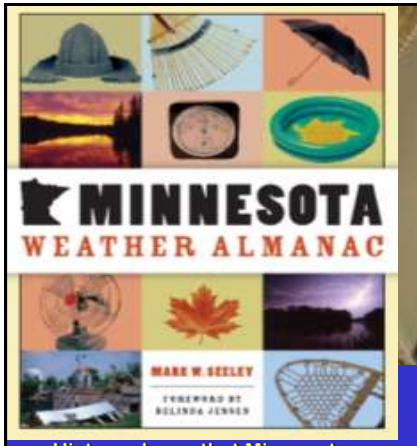
Note: adjacent 32 counties were also eligible for assistance

X= Counties included in federal flood disaster declaration of August 20, 2007 and eligible for FEMA assistance

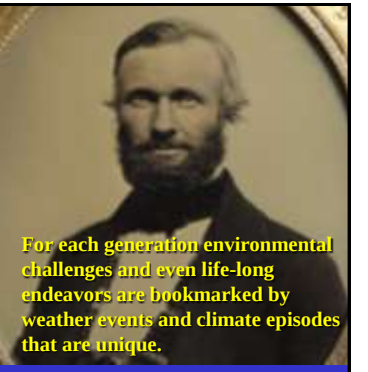


Possible Implications of Changes in Precipitation Quantity and Character

- Altered irrigation, drainage, runoff, sediment, and shoreline management
- Change in storm sewer runoff design
- Modified fisheries management
- Mitigation of soil erosion
- Mitigation of flooding potential
- Better management of blowing snow and spring snowmelt runoff



History shows that Minnesota citizens come together to take community action more frequently around shared values and than on scientific knowledge alone.



For each generation environmental challenges and even life-long endeavors are bookmarked by weather events and climate episodes that are unique.

Web site resources for 2008 updates and summaries

www.extension.umn.edu/Climate/

www.climate.umn.edu

Information providers:

U of MN (CFANS,ROCs)

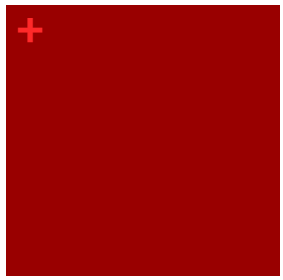
Extension

State Agencies

Federal Agencies

"I'll accept the notion of climate change when pigs and rabbits fly"

www.cloudappreciationsociety.org




Climate Change & Public Health in Minnesota

SCHSAC Climate Change Adaptation Workgroup
August 15, 2011
Kristin Raab, MPH, MLA

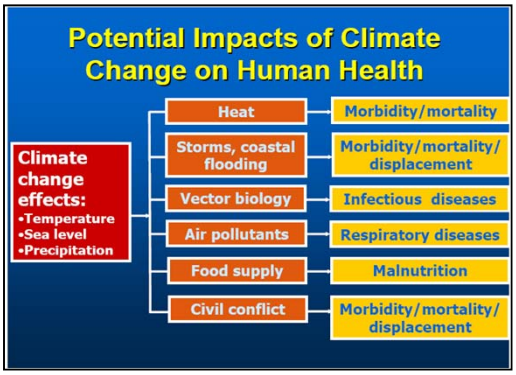
Overview

- Definitions
- Climate/weather changes in MN, current and future predictions
- Public health impacts of climate change
- MDH activities to prepare for climate change

Taking the Pulse Of A Changing Nation: *Findings from a Survey on Climate Change and State/Territorial Health Agencies*

Definitions

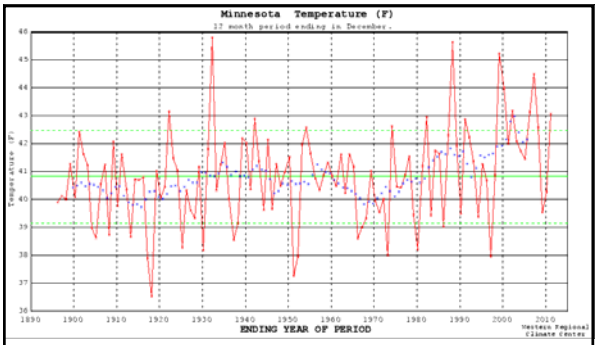
- **Adaptation** - efforts to anticipate and prepare for the effects of climate change, and thereby to reduce the associated health burden.
- **Mitigation** - efforts to slow, stabilize, or reverse climate change by reducing greenhouse gas emissions.



Source: McGeehin, M. 2007. CDC *Presentation to the First Annual State Environmental Health Directors Meeting.* Available at http://www.astho.org/pubs/McGeehinClimateChange.pdf.

Key Points

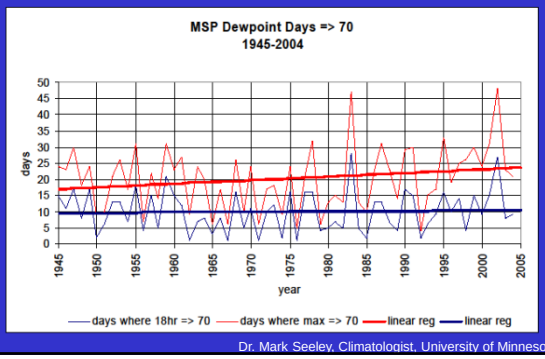
- Large degree of uncertainty, but
  - temperatures are rising in MN
  - dew points are rising in MN
  - quality/quantity of rainfall is changing MN
  - more severe storms
- Climate changes are expected to vary by region & season
- Direct public health effects & indirect effects



AVERAGE 40.826 SIGMA (RMS) 1.652 MEDIAN 40.871
MAX VALUE 45.808 MIN VALUE 36.517 NUM OBS 116

red - 12 month period
blue - 10 yr running mean
green - average (solid)
± sigma (dashed)

Trend in dewpoints of 70 F or higher in the Twin Cities



Dr. Mark Seeley, Climatologist, University of Minnesota

NOAA's National Weather Service

Heat Index

Temperature (°F)

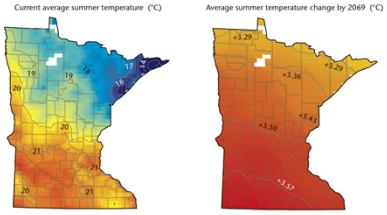
Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	118	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | Extreme Danger

+ Predicted temperature changes in summer by 2069

Figure 1. Projected Changes in Summer (June–August) Temperatures (°C) and Precipitation (millimeters/day) from Recent Conditions (1970 to 1999) to 2060 to 2069 Based on an Ensemble of 16 Models



Source: S. Galatowitsch, L. Frelich, and L. Phillips-Mao, "Regional Climate Change Adaptation Strategies for Biodiversity Conservation in a Midcontinental Region of North America," *Biological Conservation* 142 (2009): 2012–2022.

+ Public Health Impacts

- **Extreme heat events**
  - **Most common cause of weather-related human mortality in the United States**
  - **Include heat cramps, dehydration, heat exhaustion, heat syncope (fainting), heat stroke and death**
  - **Highest impact in the Northeast and Midwest**
  - **Some populations disproportionately affected**

+ 'Heat Waves'

- The 1995 Chicago heat wave caused more than 600 heat-related deaths over 5 days.
- France, summer of 2003: 14,802 excess deaths
  - Hurricane Katrina: 1,836 confirmed deaths
  - World Trade Center: 2,752 deaths

+ France and public health

- Life expectancy
  - France: 81.9 years
  - United States: 78.24
- Infant mortality
  - France: 3.31 deaths/1,000 live births
  - United States: 6.14 deaths/1,000 live births
- HIV prevalence rate
  - France: 0.4
  - United States: 0.6

https://www.cia.gov/library/publications/the-world-factbook/

Extreme Heat Events (EHE) and Air Pollution

- EHE increases air pollution by increasing ground-level ozone production. Ozone and high temperature work together to increase mortality.
- Mortality is greatest during a heat wave on days with high particulate matter in the air.

George Luber and Michael McGeehin. *Climate Change and Extreme Heat Events.* American Journal of Preventative Medicine 2008;35(5)

Atlanta: It really **is** hotter in the city!

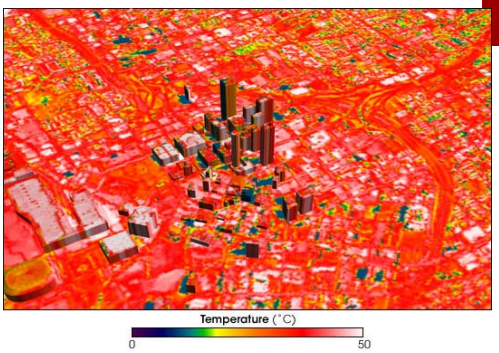


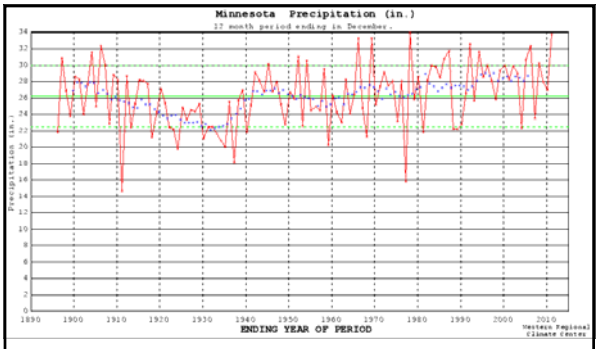
Image from NASA http://earthobservatory.nasa.gov/Features/GreenRoof/images/atlanta_thermal.jpg

Urban Heat Island Effect

- Hard surfaces, e.g., buildings with dark roofs and dark paving materials absorb heat in the day.
- Urban areas lack significant amount of vegetation that provides shade.
- Less trees, vegetation and exposed soil, limits evaporation of water from leaves and soil so cooling is lost.
- Urban heat islands have higher daytime maximum temperatures and less nighttime cooling than rural areas.

Public Health Impacts

- **Air pollution and allergens**
  - **World Health Organization (WHO) estimates two million premature deaths are caused worldwide by air pollution per year**
  - **Exacerbate chronic respiratory and cardiovascular diseases, including asthma, COPD, and cardiac dysrhythmias**
  - **Allergic diseases are the sixth leading chronic disease in the U.S.**



AVERAGE 26.236 SIGMA (RMS) 3.762

MEDIAN 26.600

MAX VALUE 33.920 MIN VALUE 14.650 NUM OBS 116

red - 12 month period
blue - 10 yr running mean
green - average (solid)
± sigma (dashed)

Public Health Impacts

- **Extreme weather events**
  - **Storms – injuries, displacement, power loss**
  - **Flooding –drowning, injuries, displacement, impaired water quality**
  - **Drought – wildfires, drinking water quality, water shortages, food shortages**
  - **Mental health impacts**
  - **Disruption in healthcare services**
  - **Vulnerable populations disproportionately affected**

Moorhead, MN, March 30, 2009 -- Resident wades through water to check on his flooded home on the Red River in Moorhead. Photo by Andrea Booher/FEMA

Oslo, MN, May 14, 2009 -- 35 days after the Red River flooded, the damage is still dramatic. Photo by Ed Edahl/FEMA

Public Health Impacts

- **Water quality and quantity**
  - Exacerbate the frequency and intensity of storms and droughts
  - Extreme water flows cause more erosion, resulting in turbidity* and concentrated pulses of pollutants
  - Increase growth of toxic algal blooms
  - In urban watersheds, 60% of annual loads of all contaminants are transported during storm events (Patz, 2008)

Public Health Impacts

- **Waterborne diseases**
  - may affect the quality of both surface water and groundwater
  - Many pathogens also can be acquired through recreational or drinking water
  - 1993 outbreak of *Cryptosporidium* in Milwaukee occurred after the heaviest rainfall in 50 years

August 23, 2007 Stockton. Photo by Patsy Lynch/FEMA

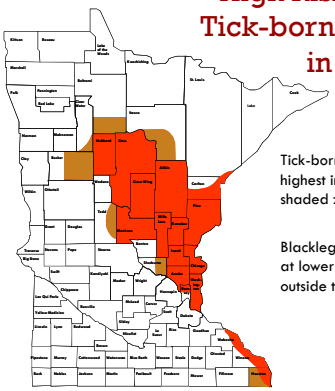
Public Health Impacts

- **Vectorborne diseases**
  - Change in the distribution and incidence of endemic vector-borne diseases
  - Tick-borne diseases include Lyme disease, human anaplasmosis, and babesiosis
  - Mosquito-borne diseases includ West Nile virus, La Crosse encephalitis virus, and western equine encephalitis virus

Ixodes scapularis (blacklegged tick or deer tick)

CDC/ Michael L. Levin, Ph. D. (Public Health Image Library)

High Risk Areas for Tick-borne Diseases in Minnesota



Tick-borne disease risk in Minnesota is highest in forested areas within the shaded zones.

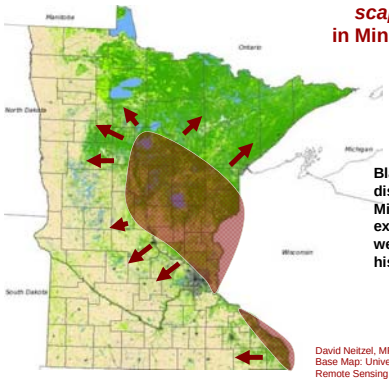
Blacklegged ticks may also be found at lower levels in some forested areas outside this zone.

David Neitzel, MPH, MDH

Known high risk areas for tick-borne diseases, before 2004

Known high risk areas for tick-borne diseases, added in 2004

Recent Expansion of Disease Risk from *Ixodes scapularis* in Minnesota



Blacklegged (Deer) tick distribution in Minnesota has expanded north and west of its known historical range

David Neitzel, MPH, MDH
Base Map: University of Minnesota, Remote Sensing & Geospatial Analysis Laboratory

Climate Change and Tick-borne Disease Risk

Increased temperature	- Longer tick growing/feeding season - Lower mortality in winter - New tick species - New disease agents
Increased precipitation/humidity	- Increased blacklegged tick survival in warm season - Increased time available for tick feeding each day

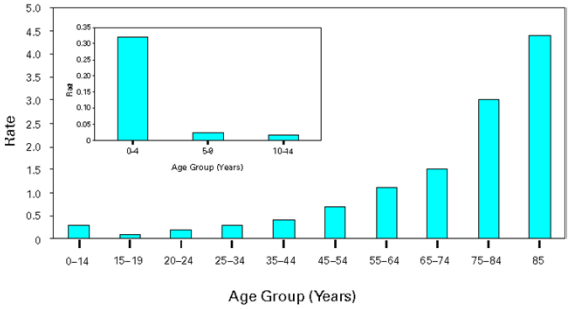
David Neitzel, MPH, MDH

Vulnerable Populations

- Personal adaptation: anyone who has difficulty adapting to rapid changes in their environment may be at risk for health impacts due to climate change
- Awareness
- Age
- Biological/medical conditions
- Social determinants

of health, income, social connections, language skills, etc.

FIGURE 1. Average annual rate* of heat-related deaths†, as the result of weather conditions, by age group — United States, 1979–1997



*Per 1 million population.
† Underlying cause of death attributed to excess heat exposure classified according to the *International Classification of Diseases, Ninth Revision* (ICD-9), as code E900.0 "due to weather conditions (deaths)."

MDH Climate Change Activities: Past Year

1. **Developed training for public health professionals**
2. **Developed MDH Strategic Plan for Adapting to Climate Change**
3. **Assessed MDH staff regarding their knowledge of climate change as it relates to public health**
4. **Developed website: http://www.health.state.mn.us/divs/climatechange/**

MDH Strategic Plan for Adapting to Climate Change

- **Vision**

  People and communities in Minnesota are resilient and are committed to reducing climate change and adapting to changing climatic conditions in ways that promote and protect public health, safety, and wellbeing

- **Mission**

  Protecting, maintaining and improving the health of all Minnesotans through preparation and adaptation to climate change.

Strategic Plan to Adapt to Climate Change - Goals

- **Goal 1: Understand, research, monitor, track, and report on the public health impacts of climate change.**
- **Goal 2: Identify and develop potential mitigation and adaptation strategies and tools to address climate change and public health.**
- **Goal 3: Identify populations that are at risk of poor health outcomes and sources.**
- **Goal 4: Enhance planning and preparedness for emergency and disaster response and recovery to effectively protect the public's health against negative impacts associated with climate change-related disasters.**
- **Goal 5: Increase the public health system's capacity to respond to and adapt to the public health impacts of climate change.**
- **Goal 6: Communicate and educate public health professionals, healthcare providers, state agency personnel, policy-makers, vulnerable populations and the general public on climate change's effects on human health.**

Public Health Focus Areas

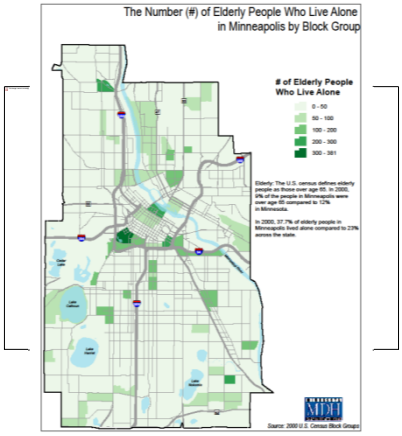
- **Extreme heat events;**
- **Extreme weather events;**
- **Vector-borne diseases;**
- **Air pollution and allergens;**
- **Water quality and quantity; and**
- **Waterborne and foodborne diseases**

Trainings

- Information compiled on the following topics
  1. Vector-borne diseases
  2. Extreme heat and extreme weather events
  3. Vulnerable populations

MDH Next Steps

- Facilitate strategic planning for local public health departments
- Perform health impact assessments of 7-county metro area comprehensive plans for activities that relate to public health and climate change
- Develop methods for identifying vulnerable populations
- Continue to educate, facilitate data sharing and develop partnerships



Thank you!

References:

Are We Ready? Preparing for the Public Health Challenges of Climate Change. 2008. www.edf.org

Confronting Climate Change in the US Midwest: Minnesota. July 2009. www.ucsusa.org/mwclimate

S. Galatowitsch, L. Frelich, and L. Phillips-Mao, "Regional Climate Change Adaptation Strategies for Biodiversity Conservation in a Midcontinental Region of North America," *Biological Conservation* 142 (2009): 2012–2022.

Intergovernmental Panel on Climate Change: http://www.ipcc.ch/

Dr. Mark Seeley: http://climate.umn.edu/seeley/

MN Climatology Working Group: http://climate.umn.edu/

Climate Change Surveys

SCHSAC Climate Change Adaptation Workgroup

August 15, 2011

Surveys

- **National** Perspective: the Yale University Survey
- **Organizational** Perspective: MDH Survey
- **Organizational** Perspective: NACCHO Survey

Yale Survey

- Purpose to assess public understanding of the climate system, and knowledge and attitudes towards global warming
- Nationally representative sample of 2030 adults (18 years +)
- 50+ questions
- Used an online research panel of American adults

Leiserowitz, Smith, & Marlon, 2010

Do you think that global warming is happening?

	% Respondents
Yes	63*
No	19
Don't Know	19

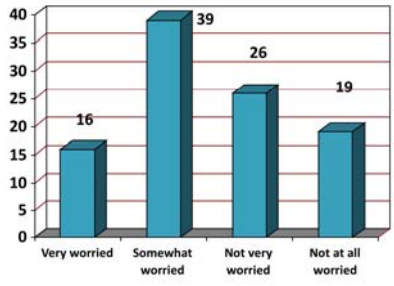
How sure are you? YES

	% Respondents
Extremely sure	21
Very sure	35
Somewhat sure	39*
Not at all sure	4
N=1261	

How sure are you? NO

	% Respondents
Extremely sure	18
Very sure	35
Somewhat sure	41*
Not at all sure	6
N=366	

Public Worries



Perceived Importance

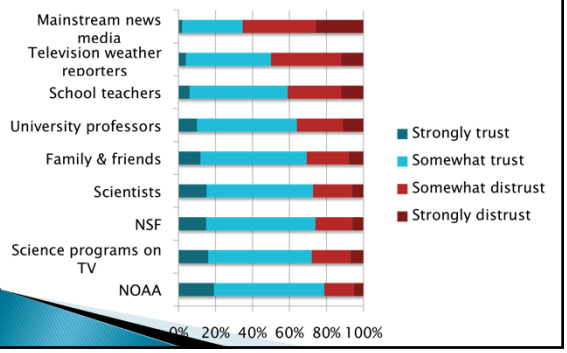
How much more information do you need to form a firm opinion about global warming?

	% Respondents
A lot more	25
Some more	26*
A little more	25
Not any more	24

How important is the issue of global warming to you personally?

	% Respondents
Extremely important	7
Very important	20
Somewhat important	38*
Not too important	21
Not at all important	14

Findings – Information



For more information

- http://environment.yale.edu/climate/files/ClimateChangeKnowledge2010.pdf

2010 MDH Climate Change Survey Results

Climate Change and public health

2010 MDH Climate Change Survey Results

- Not a randomized survey. All staff were asked to take the survey
- 703 respondents out of 1474 - Response rate 47.7%
- 13/14 divisions/offices
- 67.9% professional (managerial (15%), administrative (17%))
- Emergency preparedness (84.8% n=46)
- Environmental health (65.3% n=271)

2010 MDH Climate Change Survey Results*

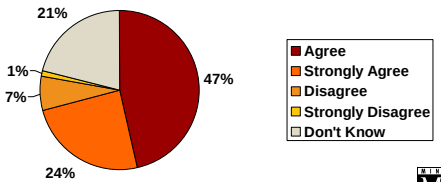
Questions	Agree	Disagree	Don't know
The United States will experience climate change in the next 20 years	82.0%	10%	8%
Minnesota is currently experiencing climate change	75.0%	14%	11%
Minnesota will experience climate change in the next 20 years*	81%	9%**	9%

*Results may not add to 100% due to rounding error.
**Respondents dropped from the remaining questions

2010 MDH Climate Change Survey Results

71% agreed

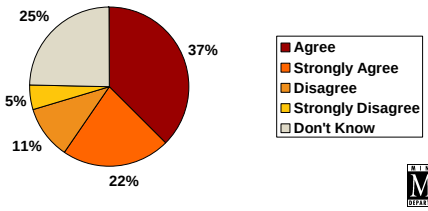
Q: Climate change will potentially adversely impact public health in Minnesota in the next 20 years n=615



2010 MDH Climate Change Survey Results

59% agreed

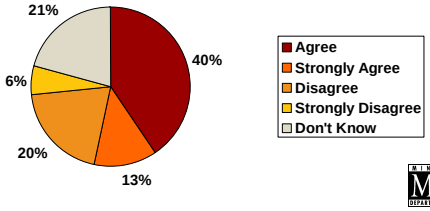
Q: There currently is adequate scientific evidence to warrant MDH action(s) to prepare for the potential public health impacts of climate change in Minnesota n=612



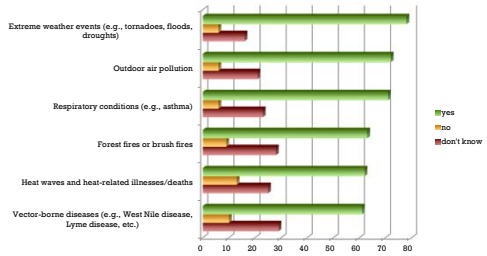
2010 MDH Climate Change Survey Results

53% agreed

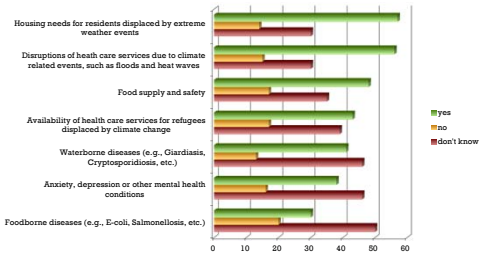
Q: Preparing for the potential adverse public health effects of climate change should be a high priority for MDH at this time n=615



Top five conditions likely to be made worse by climate change in MN in the next 20 years



Other conditions likely to be made worse by climate change in MN in the next 20 years



2010 MDH Climate Change Survey Results

Q: What would be your top priorities for MDH to work on related to climate change? n=530

Response	N
Water Quality/Supply	**83**
Extreme Weather Events	**71**
Emergency Preparedness/Strategic Plan	**62**
Air pollution	**59**
Vector-Borne Diseases	**46**

2010 MDH Climate Change Survey Results

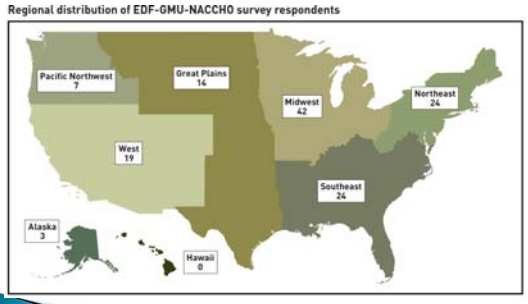
Q: What issues would you like to learn more about related to climate change? n=551

Response	N
Water supply and quality/ Water-borne diseases	**59**
Air Pollution/Quality	**38**
Food Supply Issues	**38**
Weather changes	**34**
Vector-borne illnesses	**25**

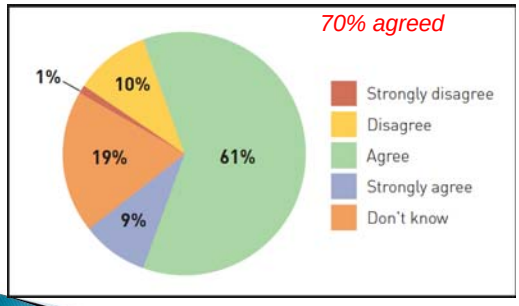
Are we ready? Preparing for public health challenges of climate change

2008 NACCHO, EDF & George Mason University

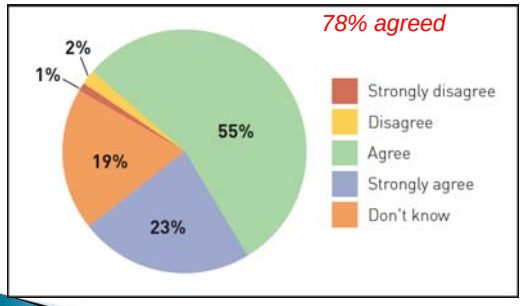
In your opinion, is climate change happening?



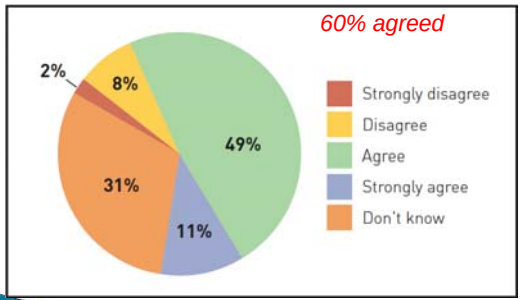
My jurisdiction has experienced climate change in the past 20 years.



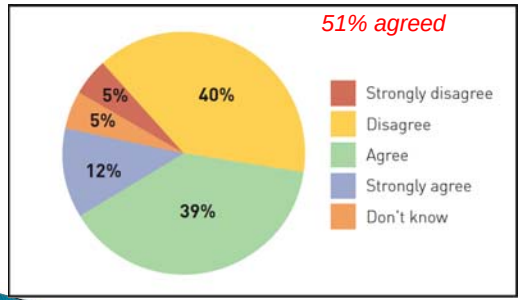
My jurisdiction will experience climate change in the next 20 years.



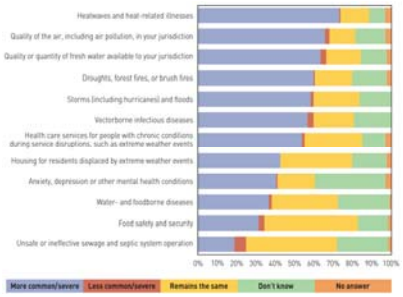
In the next 20 years, it is likely that my jurisdiction will experience one or more serious public health problems as a result of climate change.



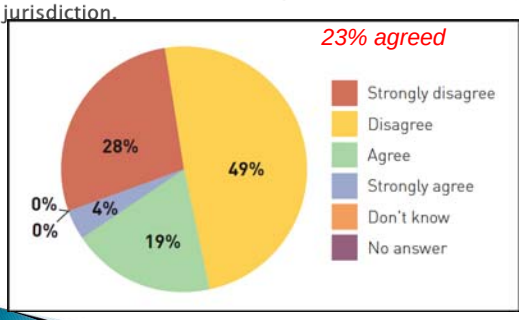
Preparing to deal with the public health effects of climate change is an important priority for my health department.



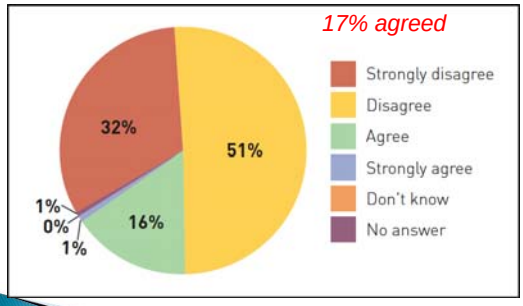
Over the next 20 years, will climate change make this issue more common or severe, less common or severe, or will it remain the same in your jurisdiction?



My health department currently has ample expertise to assess the potential public health impacts associated with climate change that could occur in my jurisdiction.



My health department currently has ample expertise to create an effective climate change adaptation plan.



Thank you!

- **For more information contact:**

Kristin Raab
HIA and Climate Change Project Director
Kristin.raab@state.mn.us
651.201.4893

Appendix C

Meeting Notes: October 7, 2011

SCHSAC Climate Change Adaptation Workgroup
Meeting Notes
October 7, 2011 | 10: 00 a.m. to 12:00 p.m.

Attendees

SCHSAC workgroup members: David Benson, Renee Frauendienst, Bill Groskreutz Jr. (Chair), Todd Monson, Ewald Petersen, Ted Seifert, and Jim Skoog

MDH staff: Lance Bernard, Becky Buhler, Gail Gentling, Kelly Muellman, Kristin Raab, Dan Symonik, and David Hutchins (CDC).

Meeting Notes

1. Welcome and roll call

Chair Bill Groskreutz Jr. welcomed everyone who could join the meeting in person or over the phone and opened the meeting with a roll call of attendees. David Hutchins from CDC – Atlanta introduced himself to the group. Mr. Groskreutz reviewed the agenda and noted as an item change that Becky Buhler would be talking about communications with OEP rather than Kristin Raab.

2. Review of preliminary results from the SCHSAC climate change survey

Kelly Muellman and Kristin Raab presented the findings from the SCHSAC climate change survey conducted at the September 2011 CHS conference. Bill Groskreutz Jr. led a discussion of responses and questions to the survey findings.

The first question Mr. Groskreutz posed to the group was for **general comments and reactions**.

Some comments and questions noted from the exchange:

Ewald Petersen commented that MDH and SCHSAC should not duplicate efforts of other agencies and departments, but rather use other resources already created. For example, a water study was conducted in Minnesota by the University of Minnesota and MDH should use this as a resource for the water training module MDH is creating for climate change. Mr. Petersen also noted that this year is an exceptional year for examples of climate change or extreme weather – both the early frost and the current drought. He stated that the Federal government should respond to these events and be leaders.

Renee Frauendienst suggested that MDH repeat the climate change survey with elected officials at the AMC conference in December 2011. Gail Gentling responded to Ms. Frauendienst and said that MDH will have a booth at the AMC conference and suggested that MDH consider whether that was the proper location for the survey.

Todd Monson noted that it was good practice to start the meeting and planning with data (referring to the survey). The survey helps the SCHSAC workgroup and MDH identify the gaps or areas of improvement needed for climate change work.

Bill Groskreutz Jr. next asked the group whether anyone was **surprised by the findings or if the findings reflected their experiences**.

Some comments and questions noted from the exchange:

Todd Monson said that he was surprised about the high response for 'respiratory conditions' (e.g., air pollution) as a concern in the survey. He questioned who was responsible for that – local public health (LPH) or the Minnesota Pollution Control Agency (MPCA)? Kristin Raab responded that LPH could be involved because of asthma or allergy issues that are affected by air pollution.

Renee Frauendienst noted that not a lot of the responses had really changed since the 2008 NACCHO survey.

David Benson mentioned that the Minnesota (MN) Extension has been meeting on invasive species, which are affected by climate change. He asked if there might be a way to consider agricultural issues related to climate change and suggested pursuing a relationship (e.g., partnership or liaison) between MN Extension, the Department of Agriculture and MDH.

Todd Monson was surprised that the survey response for 'funding' was small percentage-wise. He suggested that MDH develop a logic model that demonstrates the potential results of climate change in the short, intermediate and long-term.

Bill Groskreutz Jr. next asked the group **what they would like to see done with the results of the SCHSAC climate change survey**.

Some comments and questions noted from the exchange:

Renee Frauendienst suggested that the survey results be presented to LPHA. Todd Monson suggested that this could be proposed at the monthly LPHA meeting.

Todd Monson suggested that if the survey is repeated at the AMC conference then the results could be compared to the SCHSAC survey. The comparison of results could be presented at the February full SCHSAC meeting. Renee Frauendienst also suggested that the climate change survey could be given to a few LPH departments.

David Benson noted the potential for exploring episodic/dramatic climactic events versus the slow, incremental changes we are experiencing from climate change. He also suggested Dr. Mark Seeley present at the AMC conference.

Todd Monson requested practical climate change-related responses and examples from MDH and CDC for LPH that consider limited time, funding, etc. available.

Renee Frauendienst said that MDH should advertise the work and deliverables that MDH has created because most of LPH is unaware of what MDH is doing to prepare for the public health effects of climate change.

Todd Monson suggested that MDH should provide regular, steady drips of information, suggestions and recommendations. He gave the example of weekly or monthly emails so that LPH can stay informed of health and climate change information, but not be overwhelmed.

Bill Groskreutz Jr. reiterated that the general reaction from LPH is that they do not want 'another thing to do.'

3. Review of discussion with the Office of Emergency Preparedness (OEP)

Following the discussion of the SCHSAC climate change survey results, Becky Buhler presented on conversations she and Kristin Raab had with Cindy Borgen from OEP. She reported that the comprehensive assessment of the CHB's ability to conduct each of the Public Health Preparedness Capabilities is not the appropriate place to include climate change, and that the survey results may not be informative to the SCHSAC workgroup because of the subjectivity of the responses. Cindy Borgen suggested possibly including climate change in the OEP Risk Assessment that will be sent out to LPH in November and due in March 2012. Additionally, Becky Buhler mentioned that the OEP SCHSAC workgroup could be a connection for this work in the future.

4. Review of possibilities for integrating climate change planning into the MN Local Public Health Assessment and Planning Process (i.e., the Quality Improvement Plan, the Strategic Plan, and the Community Health Improvement Plan)

Becky Buhler presented on the LPH assessment and planning process and the potential places for addressing climate change in the framework. She suggested three potential places for including climate change: the Quality Improvement Plan, the Strategic Plan, and the Community Health Improvement Plan.

Todd Monson said he could guarantee that climate change would not be in the top 10 areas of community need and that it would not appear in the Community Health Improvement Plan for his jurisdiction. He said that climate change may be like 'disparities' that is related to a number of issues. He suggested MDH develop practical tools like a checklist for helping to plan for the public health impacts of climate change.

Renee Frauendienst said that climate change impacts many areas and used mental health as an example. She also mentioned that hospitals are required to do planning and wondered whether there was any potential of incorporating climate change within their plans. Todd Monson asked how MDH might help leverage the "community benefit" and mediate between LPH and hospitals. Gail Gentling said that MDH is beginning conversations with hospitals to better coordinate the different assessment and planning processes, including sharing data, prioritizing health-related problems/issues in the community, and identifying evidence-based strategies that can be implemented in the different settings.

Todd Monson also asked for examples of what successful climate change plans and annexes (e.g., extreme heat) looked like, specifically geared toward Minnesota.

Bill Groskreutz Jr. wrapped up the meeting by leading a discussion around next steps for the SCHSAC Climate Change Adaptation Workgroup. The list included:

- AMC climate change survey
- Promote/share MDH work with LPH
- Look into surveying LPH departments

- Follow-up on suggestions of incorporating climate change into LPH planning process and provide recommendations to SCHSAC

Renee Frauendienst returned to the SCHSAC climate change survey results and wondered who the 10% of respondents were that said they were planning for the public health impacts of climate change. She proposed asking CHB representatives at the full SCHSAC meeting in February. These CHBs could help inform climate change work for LPH.

Todd Monson suggested asking LPH to review the MDH climate change modules to find out if they are helpful and to receive feedback on improving them. He also proposed developing talking points and suggested presenting AMC survey results at the SCHSAC meeting.

David Hutchins spoke on CDC's new language around "Climate and Health" instead of 'climate change' to depoliticize the work.

David Benson suggested engaging MN Extension or even the University of Minnesota School of Public Health in the climate change work.

Bill Groskreutz Jr. thanked the attendees for participating and adjourned the meeting. The next meeting date in January will be announced by MDH shortly.

Appendix D

Meeting Notes: January 30, 2012

SCHSAC Climate Change Adaptation Workgroup
Meeting Notes
January 30, 2012 | 10:00 a.m. to 2:30 p.m.
Snelling Office Park (SOP), Minnesota Room

Attendees

SCHSAC workgroup members: David Benson, Renee Frauendienst, Bill Groskreutz, Harlan Madsen, Todd Monson, Susan Morris, Ted Seifert, Jim Skoog, and Karen Swenson

MDH staff: Becky Buhler, Gail Gentling, Kelly Muellman, Kristin Raab, and Dan Symonik

Meeting Notes

1. Welcome and roll call

Chairperson Bill Groskreutz welcomed everyone to the meeting, presented an article on climate change from local media in November 2011, and asked everyone to go around the table and introduce themselves. Mr. Groskreutz read the agenda and handed the floor over to MDH for updates.

2. Updates on progress since the last workgroup meeting

Kristin Raab began the updates for MDH. Updates included the following:

Based on recommendations from SCHSAC, MDH inquired whether Dr. Mark Seeley could present at the AMC conference. MDH discovered that it was too late in the AMC conference planning to have Dr. Seeley present, but AMC did take the suggestion to have Dr. Seeley speak at the next conference.

MDH met with the Department of Agriculture (Ag) to share information on climate change activities and to discuss possible ways of working together. Ag is interested in planning for climate change, but no immediate joint projects were identified.

MDH is facilitating a subcommittee through the U of MN's MN Climate Change Adaptation Working Group that will look at developing partnerships between the state agencies and the University of Minnesota (Dr. Mark Seeley has agreed to participate).

MDH is working on a "logic model" that links changes in the climate to public health impacts. The workgroup agreed to review a draft of the logic model and provide comments.

MDH contacted OEP about including a question on climate change planning in the OEP Risk Assessment. No specific language was included about climate change, but many climate-related events were included in the assessment. MDH shared a copy of an assessment tool that included many issues related to the effects of climate change.

- Karen Swenson commented that the OEP risk assessment tool is a good tool. During her community's assessment, Major Power Outage scored #1 as the main concern. Also in the top concerns were floods and water supply.
- Gail Gentling stated that LPH is required to complete the risk assessment to receive certain CDC funds. MDH could work with OEP to review the results of the risk assessment to determine how to prioritize or focus climate change work (e.g., topics for guidance or tools).

MDH is developing a Toolkit on preparing for extreme heat events. It will be released in April.

- Todd Monson suggested that MDH make a 20 to 30 second video as a tool to convey information. Videos can increase awareness and understanding.
- Ms. Gentling suggested creating a short video to explain each piece of the toolkit.
- Becky Buhler announced that the toolkit will be the feature of the CHS video conference in April 2012.
- Harlan Madsen cautioned that a 20 to 30 second video or sound-bites can give out the wrong information. It is SCHSAC/MDH's responsibility to be accurate, not inflammatory.
- Ms. Gentling suggested a webinar option to walk people through the resources in the toolkit.

Ms. Raab described that she shared the SCHSAC climate change survey results with LPHA at its Jan 19 meeting. The vulnerability maps MDH has created were also presented to LPHA and were well received.

Kelly Muellman continued the MDH updates.

Ms. Muellman presented maps of vulnerable populations to extreme heat events at the state level and for Minneapolis. Ms. Muellman announced that MDH will be conducting a similar mapping project with St. Paul and one or more communities in Greater Minnesota. The statewide maps will be piloted with data groups through the Center for Health Statistics and released for public use in April 2012.

- Mr. Monson asked if MDH had considered mapping other vulnerable populations, such as those who rely on ventilators, and therefore are at health risk if there is an electricity outage. It was suggested that either Excel energy or the companies that provide ventilators would know where those vulnerable people are located throughout the state.
- Mr. Madsen suggested emphasizing prevention strategies (e.g., portable generators).
- Susan Morris stated that sump pumps also do not work during electricity outages, which occurs often during major storms where sump pumps are necessary to prevent homes from flooding.
- Mr. Monson suggested looking into Advanced Practice Centers and utilizing their information.

MDH is in the process of updating the climate change website. New content and layout were presented.

MDH will be coordinating with HSEM for Heat Day during Severe Weather Awareness Week on April 20th. MDH will promote new tools and resources for preventing illness during extreme heat events.

Becky Buhler wrapped up the MDH updates by providing an update on incorporating climate change into the MN Local Public Health Assessment and Planning Process. At this time the guidelines are being written and climate change resources and examples will be included at appropriate places throughout the guidance.

Towards the end of the updates, the issue of the political nature of the words "climate change" became a major point of discussion. Some work group members agreed that the real issue was the severe weather events that harmed the health of the public, and therefore instead of saying climate change it would be more approachable to say "weather related public health threats," "severe weather events and climate change," or "climate health preparedness" in place of "climate change." The other point of view shared by some workgroup members is that it is important for MDH, as a reputable, lead state agency, to not shy away from using "Climate Change," the direct terminology, if that best describes the issue. Renee Frauendienst suggested asking the whole SCHSAC group at their next meeting in February or May.

3. Review of results from the AMC survey and questions

Ms. Muellman reviewed the results of the AMC survey taken at the December AMC conference. One major issue with the survey results is that MDH is unfamiliar with the AMC membership. Mr. Madsen was able to shed some light on the membership, pointing out that the Policy Committee is actually the Health and Human Services Committee. Additionally, the geographic location of respondents was evident by their responses. For example, 'wild fires' was within the top six concerns of respondents – a reaction to the wild fires in the NE portion of the state in 2011. Disruption of health services was also in the top six concerns of respondents – a reaction to recent disruption of services from floods.

4. Discuss draft recommendations

The review of the draft recommendations involved a combination of wordsmithing, tweaking of recommendations and the development of a vision and goals.

Vision: To prevent injuries, illness and deaths related to climate changes.

Goals:

1. Advocate for partnerships and collaboration (across jurisdictions, departments, levels of government, and between sectors) around planning and responding to climate changes that affect the health of the public
2. Raise awareness of the effects of climate change on the health of the public
3. Refocus from the political to practical, local responses to the real threats to health from extreme weather events and climate changes
4. Recognize the vulnerability of the economy to extreme weather and climate changes and how these changes impact the health of the public (e.g., like the documentary Unnatural Causes that recognizes "social policy is health policy; economic policy is health policy").

Specific wording changes of draft recommendations include:

- Change 'public health' to 'the health of the public' or 'human health' to open responsibility to other departments and agencies, such as environmental or planning department.
- Replace 'climate change' with 'severe weather events and climate change' along the lines of the third goal, to remove the political nature of the words 'climate change.'

Other general suggestions to the recommendations included:

- Address the effects of climate change on staff (e.g., capacity).

- Remove emotional language, such as 'devastating' and 'overwhelming.'
- Acknowledge that this work is focusing on the negative public health impacts of climate change and state that there are some positive impacts of climate change.
- Connect recommendations to the 10 Essential Services of Public Health. A good reference for this is included in "Climate Change: The Public Health Response" (Frumkin et al. 2008) handed out at the August workgroup meeting.
- Use 'share' in place of 'review,' 'train' or 'educate.'
- Consolidate recommendations that overlap or are redundant.
- The logic model should be a product of the workgroup, not a recommendation.
- While the recommendations are not necessarily in order of importance, the first one should be "MDH will continue to facilitate the SCHSAC Public Health Emergency Preparedness Oversight Workgroup and include connections between planning for emergencies and climate change impacts. This workgroup should expand to include members of the Climate Change Workgroup."
- MDH should develop a communications plan (not talking points specifically) for the health effects of climate change.

There were so many suggestions to the recommendations that it was agreed that the workgroup would benefit from meeting again to review another draft of the document.

5. Next steps

The workgroup agreed to one more face-to-face meeting before the May SCHSAC meeting. In the interim, MDH will revise the recommendations and draft the final report, complete a logic model, schedule the next workgroup meeting, and provide the workgroup with the draft final report and logic model prior to the next meeting.

Chairperson Bill Groskreutz thanked everyone for attending and providing a lively discussion and adjourned the meeting approximately one hour early.

Appendix E

Meeting Notes: March 26, 2012

SCHSAC Climate Change Adaptation Workgroup
Meeting Notes
March 26, 2012 | 10:00 a.m. to 2:30 p.m.
Snelling Office Park (SOP), Red River Room

Attendees

SCHSAC workgroup members: David Benson, Renee Frauendienst, Bill Groskreutz, Harlan Madsen, Todd Monson, Susan Morris, Ewald Petersen, and Karen Swenson

MDH staff: Becky Buhler, Gail Gentling, Kelly Muellman, Kristin Raab, and Dan Symonik

Meeting Notes

1. Welcome and roll call

Chairperson Bill Groskreutz welcomed everyone to the meeting and asked for updates from MDH.

2. Updates on climate change-related work since the last workgroup meeting

Kristin Raab updated the workgroup on MDH climate change-related work. Updates included the following: an announcement of the statewide videoconference for elected officials and local public health on extreme heat (April 24); the release of the extreme heat toolkit in April; and MDH's coordination with Homeland Security and Emergency Management on Severe Weather Awareness Week (April 16 – 20). Workgroup members suggested presenting the toolkit and its use to LPHA. Additionally, MDH will follow up with staff from the Science Museum of Minnesota who are studying the impacts of land use on sediment erosion and water quality in agricultural watersheds and their findings related to climate change.

3. Discuss final report and recommendations

Ewald Petersen brought up the issue of extreme precipitation on existing and closed landfills. He mentioned that many older landfills in Minnesota do not have liners and are not capped, so that runoff from an extreme rainfall event could become contaminated with landfill pollutants and potentially lead to surface and groundwater contamination. He also mentioned that certain climate changes could increase the number of small animals that carry diseases such as rabies. It was suggested that MDH work with MPCA to map the location of landfills and include landfills in vulnerability assessments for climate change impacts. Harlan Madsen suggested emphasizing collaboration, even within MDH, on issues such as well monitoring and source-water protection. The workgroup recommended adding a sentence about landfills and small animals to the final workgroup report.

Harlan Madsen questioned how to appropriately address instances of severe weather in the context of climate change. For example, talking about extreme precipitation events, one could say "climate change is projected to increase the number of extreme precipitation events, such as the rains experienced in southeast Minnesota." The

workgroup decided not to include projections within the report as they may be more controversial than observed, measured trends. Renee Frauendienst requested qualifying 'trends' to be 'observed trends' to de-politicize them.

Gail proposed a separate recommendation on collaboration and relationships with MPCA, Department of Agriculture, DNR, University of Minnesota, etc. Later the work group decided to build this information into MDH recommendation #3.

Harlan Madsen suggested using the word "redesign" in the context of thinking, communicating, and educating around climate.

Specific suggested changes to the final report included the following:

- Change the name of the report to "Assessment of Health and Climate Preparedness"
- Strike the acronym "CCAW" and just use 'workgroup' for short
- Define weather and climate in the Introduction and clarify their differences
- Add a discussion of what the report is (recommendations for planning and strategies to prevent injuries, illness and deaths from severe weather and climate change) and what the report is not (why or how climate change is happening)
- Move the discussion of the political nature of climate change to the Introduction and clarify that there are communication challenges with the words "climate change"
- Change "climate change" to "extreme weather events and climate changes" where it is mentioned in the vision, goals and recommendations
- Potentially state the vision and goals in the Introduction as well as under the Recommendations section
- Remove "Negative" from the heading Potential Health Negative Impacts of Climate Changes and the fourth paragraph of the Introduction
- Strike Goal #4 regarding economic impacts, but add economic impacts and mental health impacts of extreme weather events and climate to the Potential Health Impacts of Climate Changes
- Strike "quantity" from "the quantity and character of precipitation is changing" in the third climate trend under Changing Weather and Climate in Minnesota
- Clean up the paragraph after the chart in The Quantity and Character of Precipitation is Changing (also strike Quantity)
- Remove 'landslides' and change to 'severe erosion'
- Add emergency managers, environmental health, DNR, MPCA, Agriculture and University of Minnesota as potential partners for climate change work
- Delete the sentence "no decision was made regarding terminology" under The Political Nature of Saying "Climate Change"

Specific suggested changes to the recommendations included the following:

- Move essential services after the recommendation
- Label the LPH recommendations as "LPH 1, 2, 3" and MDH recommendations as "MDH 1, 2, 3 . . ."
- Introduce the 10 Essential Public Health Services – what value it adds to mention them (for example, they are linked to accreditation and provide a linkage to an existing framework)
- Add sidebar of list of all 10 essential services

- LPH 1: remove ‘negative’; add ‘within existing processes (e.g., local public health planning and assessment process)’
- LPH 2: change ‘train staff’ to encourage/support staff get trained
- LPH 3: remove ‘many of whom are outside of the public health area’ and add ‘social services’ to list
- MDH 1: change ‘will’ to ‘should’ for consistency; add ‘for example’ before ‘this workgroup should . . .’ and change ‘should’ to ‘could’
- MDH 2: reorganize wording – move ‘develop a communications plan’ after ‘MDH should’
- MDH 3: change ‘review’ to ‘partner with’
- MDH 4: reorganize wording and add mental health at the end
- MDH 5: change ‘develop’ to ‘identify and maintain’; add ‘with the help of LPH’ in second sentence
- MDH 6: add ‘existing processes, such as’ before ‘the MN LPH Assessment and Planning Process; add ‘and implementation’ at the end

4. Next steps

MDH staff will make changes/update the final report and send it to the workgroup for final modifications. MDH staff will help the workgroup members develop a short PowerPoint presentation to present their work and recommendations at the May 4th SCHSAC meeting. Volunteers from the work group to present included the following: Renee Frauendienst, Bill Groskreutz, Harlan Madsen, and Susan Morris. Volunteers and MDH staff will have a conference call prior to the SCHSAC meeting to coordinate the presentation.

The meeting was adjourned one hour early.

Appendix F

Workgroup Membership

Workgroup Membership

William (Bill) Groskreutz Jr, Faribault-Martin CHB (Faribault County Commissioner)
David Benson, Nobles-Rock CHB (Nobles County Commissioner)
Renee Frauendienst, Stearns County CHB
Harlan Madsen, Kandiyohi County CHB (Kandiyohi County Commissioner)
RaeAnn Mayer, North Country CHB
Todd Monson, Hennepin County CHB
Susan Morris, Isanti-Mille Lacs CHB (Isanti County Commissioner)
Ewald Petersen, Sherburne County CHB (Sherburne County Commissioner)
Ted Seifert, Goodhue County CHB (Goodhue County Commissioner)
Jim Skoog, Carlton-Cook- Lake-St. Louis CHB
Karen Swenson, Brown-Nicollet CHB

MDH Staff to Workgroup

Becky Buhler, Office of Performance Improvement
Gail Gentling, Office of Performance Improvement
Kelly Muellman, Environmental Health Division
Kristin Raab, Environmental Health Division
Dan Symonik, Environmental Health Division

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