Flood Risk and the Role of Emergency Management

DANE COUNTY LAKES AND WATERSHED COMMISSION

AND

DANE COUNTY ENVIRONMENT, AGRICULTURE AND NATURAL RESOURCES COMMITTEE

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Dane County Emergency Management

Presentation Outline:

- Overview of Emergency Management and role of the Department
- Discussion of “Risk”
- Overview of the Flood Hazard in Dane County

Dane County Emergency Management

Mission:

Provide support and assistance to individuals, agencies, and local governments to effectively plan for and manage hazards associated with major emergencies and disasters.

- Reporting Structure:
  - County Executive
  - Public Protection and Judiciary Committee (PP&J)

- Three Divisions: (9 people: 7 management/professional, 2 admin support):
  - Emergency Planning (4 + 1 admin support)
  - Emergency Medical Services (EMS) (2 + shared admin support)
  - Hazardous Materials Planning (1 + shared admin support)

Emergency Management: Legal Basis

Federal:

- Robert T. Stafford Disaster Relief and Emergency Assistance Act
- Disaster Mitigation Act of 2000
- Emergency Planning, Community Right to Know Act (EPCRA)
- Emergency Management Performance Grant (EMPG)

State of Wisconsin:

- Administrative (as opposed to Constitutional) Home Rule
- Relative to emergency management, the County functions as an "administrative arm" of State government
- Wisconsin Chapter 323

Emergency Management: Legal Basis

Dane County Code of Ordinances:

- Chapter 36
  - Emergency Planning (roots in Civil Defense and “emergency government”)
  - Local Emergency Planning Committee (Hazardous Materials) (1988)

- Chapter 15 (15.21)
  - Emergency Medical Services (1970’s)

Emergency Management: Legal Basis

Wisconsin §323.14 Local Government Duties and Powers

- Counties:
  - Develop and adopt an emergency management plan and program that is compatible with the state plan
  - Designate a head of emergency management
  - Designate a committee of the county board as a county emergency management committee (PP&J)

- Local Units (City, Village, Town)
  - Designate a head of emergency management services
  - Develop and adopt an emergency management plan and program that is compatible with the state plan

Emergency Management Plan and Program

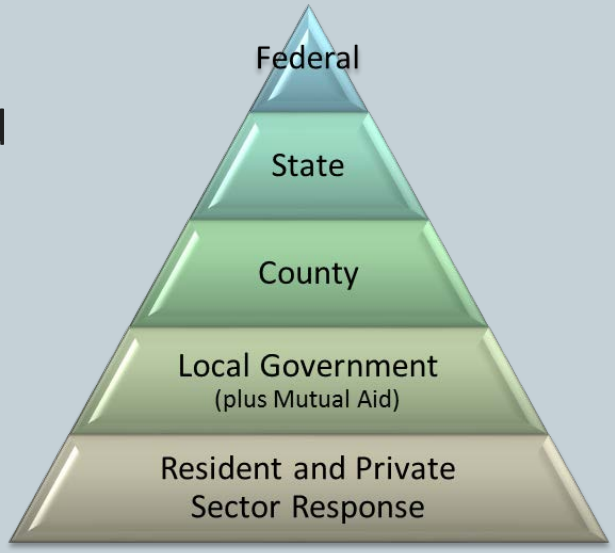
Basic Concepts:

- Hazard Analysis
- "All Hazards" Approach
  - Recognizes elements common to all emergencies and disasters
  - Basic Plan plus 15 "Emergency Support Functions" (e.g. communications and warning, mass care and sheltering, search and rescue)
- National Incident Management System (NIMS)
  - Standardized process for incident management
  - Applicable to all jurisdictions and all types of emergency incidents
  - Incident Command System
  - Intended to improve multi-jurisdictional and multi-agency coordination
- "Whole-Community" Approach
- Continuous evaluation and improvement

Emergency Management Plan and Program

Basic Concepts:

- All Emergencies are Local
  - Individuals, families, and others directly affected
  - Local government responders
  - Mutual aid response
  - County-level resources
  - State-level resources (including National Guard)
  - State-to-State mutual aid
  - Federal assistance



- Local responders and agencies are typically the first to provide assistance and the last to leave
- Local governments are “in-charge”

Dane County Emergency Management Responsibilities

- Administer State and Federal planning grants
- Prepare and administer Department budget
- Develop public education programs on emergency preparedness.
- Develop emergency response plans:
  - County agency roles and responsibilities
  - Assure consistency with local and state level plans
- Develop and administer training programs for emergency response personnel
- Develop exercises to test response capabilities
- Provide public notification and warning systems
- Coordinate county response and recovery activities through the County Emergency Operations Center (EOC)

Dane County Emergency Management Role

Descriptive Terms:	NOT:
• Partnership • Collaborate • Support • Coordinate • Assist • Manage • Facilitate • Integrate • Advise • Lead	• Order • Mandate • Control • Command • Regulate • Authorize • Direct*

Emergency Management Plan and Program

Common "Misperceptions":

- Federal (FEMA) assistance is always or often available after a disaster.
- The County, State, or Federal government will take over the response.
- If available, State or Federal funds will make the community "whole" after a disaster.
- Dane County Emergency Management has access to discretionary funding following a hazard event.
- State and Federal hazard mitigation project funding is easy to get and can fund any project that local officials feel is important.
- As planning process facilitators, the Department of Emergency Management is also responsible for the implementation and delivery of emergency services identified in the plan.

Risk

Risk is a combination of:

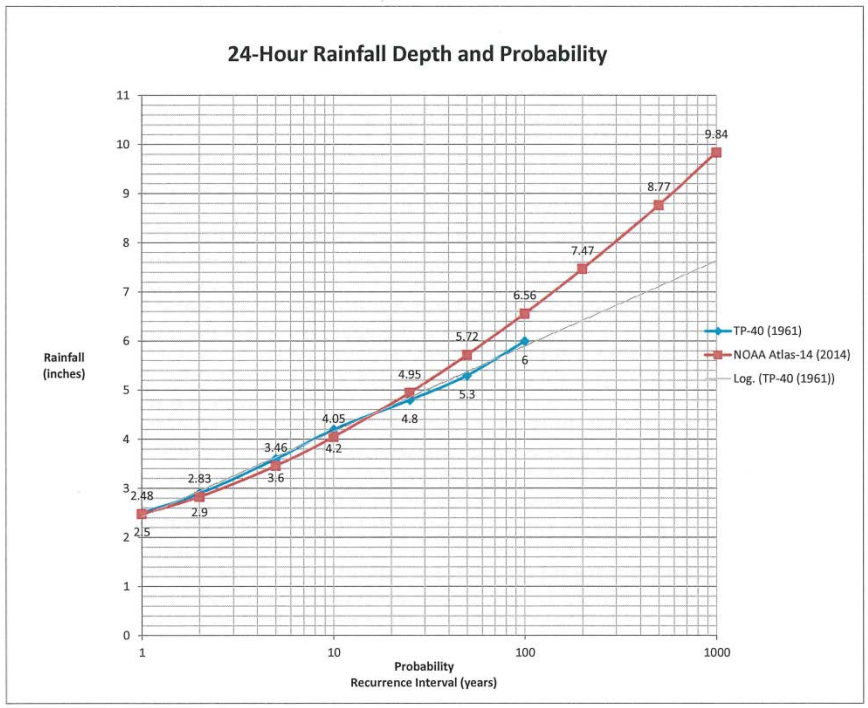
- The probability that a hazard event will occur, and
- The consequences of its occurrence

Plus

- Human Perception
- It *seems* pretty straightforward, however, understanding is fraught with:
  - Gaps in knowledge
  - Fallacies, misunderstandings, and misperceptions
  - Assumptions
  - Personal and societal biases, both implicit and explicit
- Can be a sensitive subject

Probability of Occurrence

- Specific to event magnitude and location (or geographic area)
- Predictability (coin toss/roll of dice analogies apply only to a point)
- Past History
- Likelihood of future occurrence in the context of systems that are:
  - Dynamic
  - Continuously changing
  - Highly complex
  - Multi-variable
- Scale from 0 to 1
- Uncertainty
- Models and Estimates



Consequences of Occurrence

- Warning lead time
- Direct impacts on people and property, damage and losses to
  - Population, especially vulnerable populations
    - Death, injury, disruption
  - Buildings and other structures
  - Critical facilities and infrastructure
- Indirect or secondary impacts
  - Social systems
  - Economic losses and long-term disruptions
  - Other secondary hazards (e.g. power outage after an ice storm)
- Environmental Harm

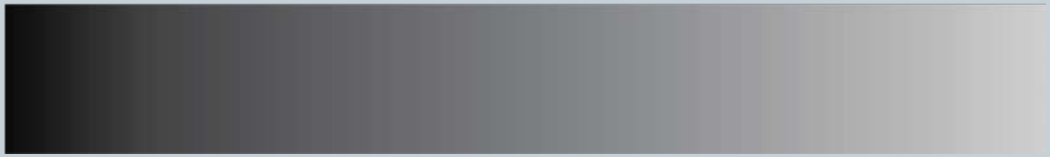
Perception of Risk

"Then we've agreed that all the evidence isn't in, and that even if all the evidence were in, it still wouldn't be definitive."

Perception of Risk

Everyone has different perception of risk:

- "Knowledge" is only part of it; it's not black and white
- Acceptable risk
  - Risk Tolerant to Risk Averse



- Complex social science, with competing models to explain behavior. Factors include, *but are not limited to:*
  - Knowledge and education
  - Personal experience
  - Personal and societal biases
  - Trust in institutions and experts
  - Familiarity
  - Equity of costs and benefits
  - Voluntariness
  - Controllability
  - Uncertainty
  - Severity of consequences
  - Ethical and moral nature
  - Human vs natural origin

Flood Hazard in Dane County*

Flood Damage History:

Year	Disaster Type	Declaration Type	Damage Assessment
1978	Flooding and Tornados	Presidential Disaster	$180,000 (Public Assistance)
1990	Flooding and Tornados	Presidential Disaster	$37,000 (Public Assistance) $30,343 (Individual Assistance)
1993	Flooding	Presidential Disaster	$888,000 (Public Assistance) $1.44 Million (Individual Assistance) $22.6 Million (Total Damages, est.)
1996	Flooding and Severe Storms	Local Sources	$1.7 Million (Public Losses, est.) $6.8 Million (Private Losses, est.) $8.5 Million (Total Damages, est.)
2000	Severe Storms (Windstorm) and Flooding	Presidential Disaster	$940,000 (Public Assistance) $1.25 Million (Individual Assistance) $9.3 Million (Total Damages, est.)
2007	Flooding	Presidential Disaster	$0.6 Million (Individual Assistance) $1.64 Million (Public Assistance) $5.1 Million (Total Damages, est.)
2008	Severe Storms, Tornados and Flooding	Presidential Disaster	$1.53 Million (Public Assistance) $1.76 Million (Individual Assistance) $1.64 Million (Housing Assistance) $120,000 (Other Needs) $35.7 Million (Total Damages, est.)

Source: Dane County Emergency Management; * Federal Individual Assistance Payout; ** Federal Public Assistance Payout

*Described in detail in Dane County's Natural Hazard Mitigation Plan

Flood Hazard in Dane County

Consequences of past flood events:

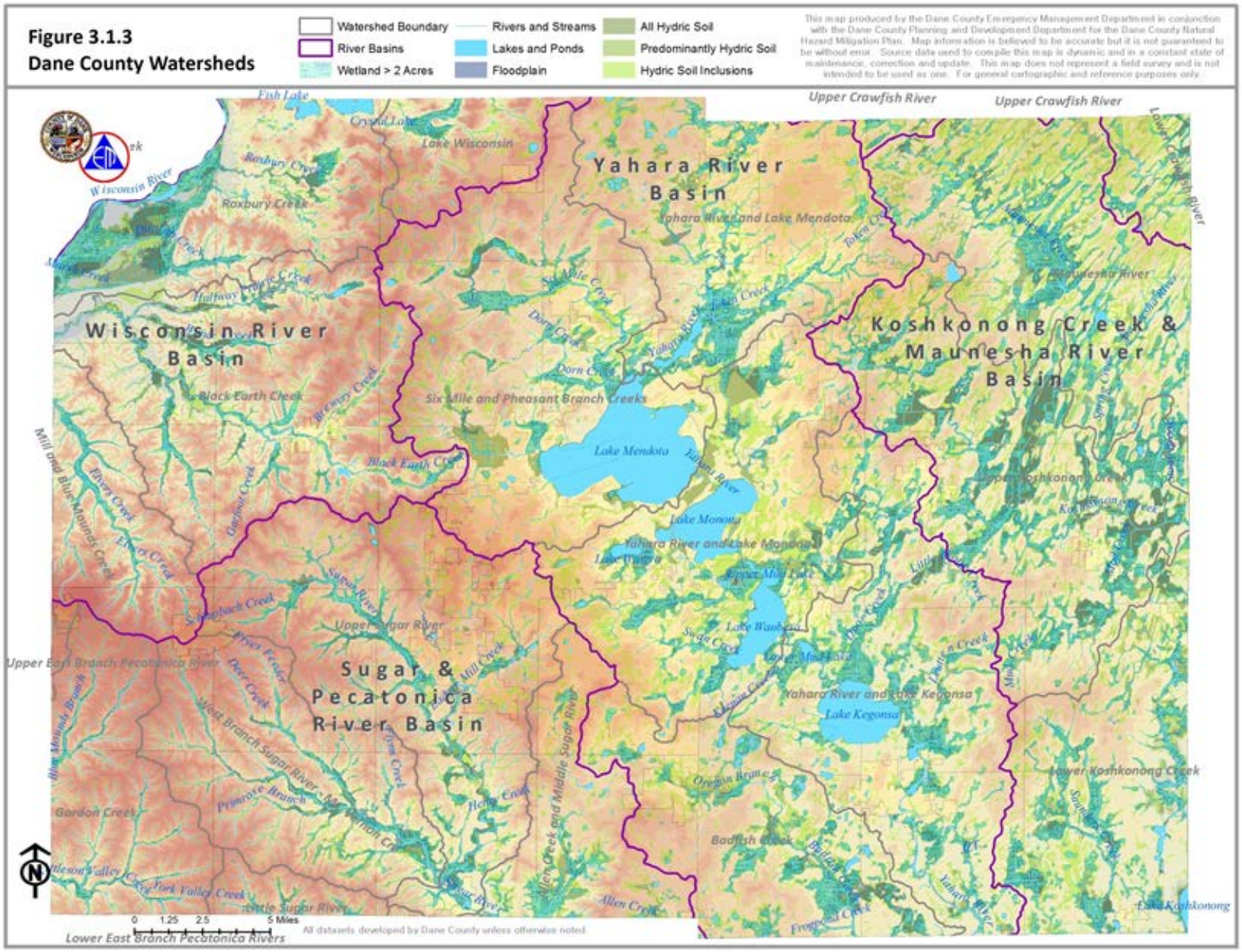
- Flooded basements of residential, commercial, and institutional buildings.
- Flooding over the first floor level occurs, but only rarely
- Sewer back-ups
- Structural damage to buildings
- Damage to and loss of personal belongings and building contents
- Road, shoulder, and ditch wash-outs
- Damage to stormwater infrastructure
- Contaminated private wells
- Crop loss

Flood Hazard in Dane County

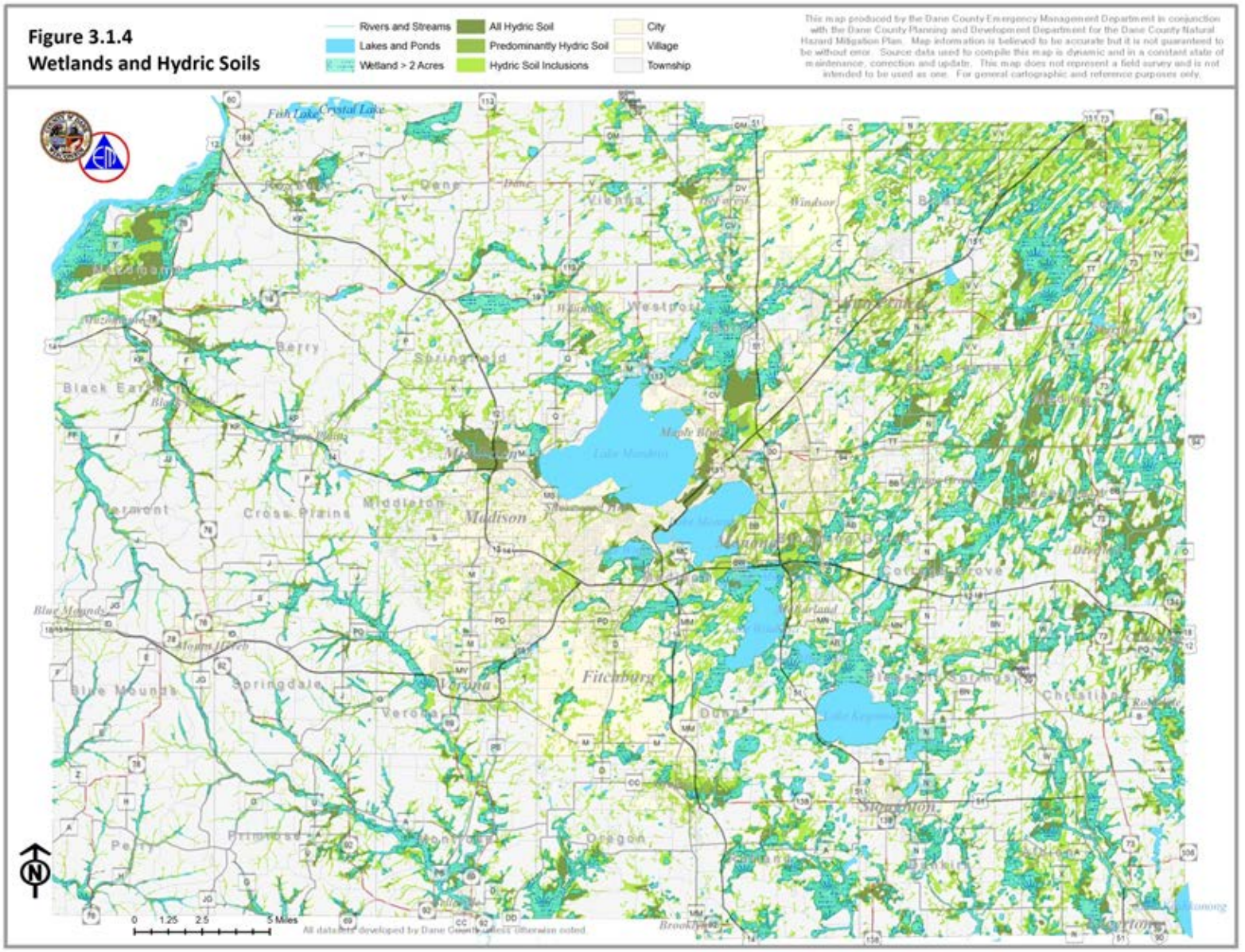
Contributing Factors (in no particular order):

- Soils and topography
- Changing land use patterns and effects of urbanization
- Growth inherently increases exposure (more people, more buildings)
- Loss of wetlands
- Historical and on-going modifications to the landscape that affect the flow of water
- Natural and constructed impediments to the flow of water
- Stormwater management practices
- Development in flood hazard areas
- Widely varying perceptions of risk, causes, effects, and needed action
- The interaction and interrelatedness of all of these. The whole is greater than the sum of its parts.

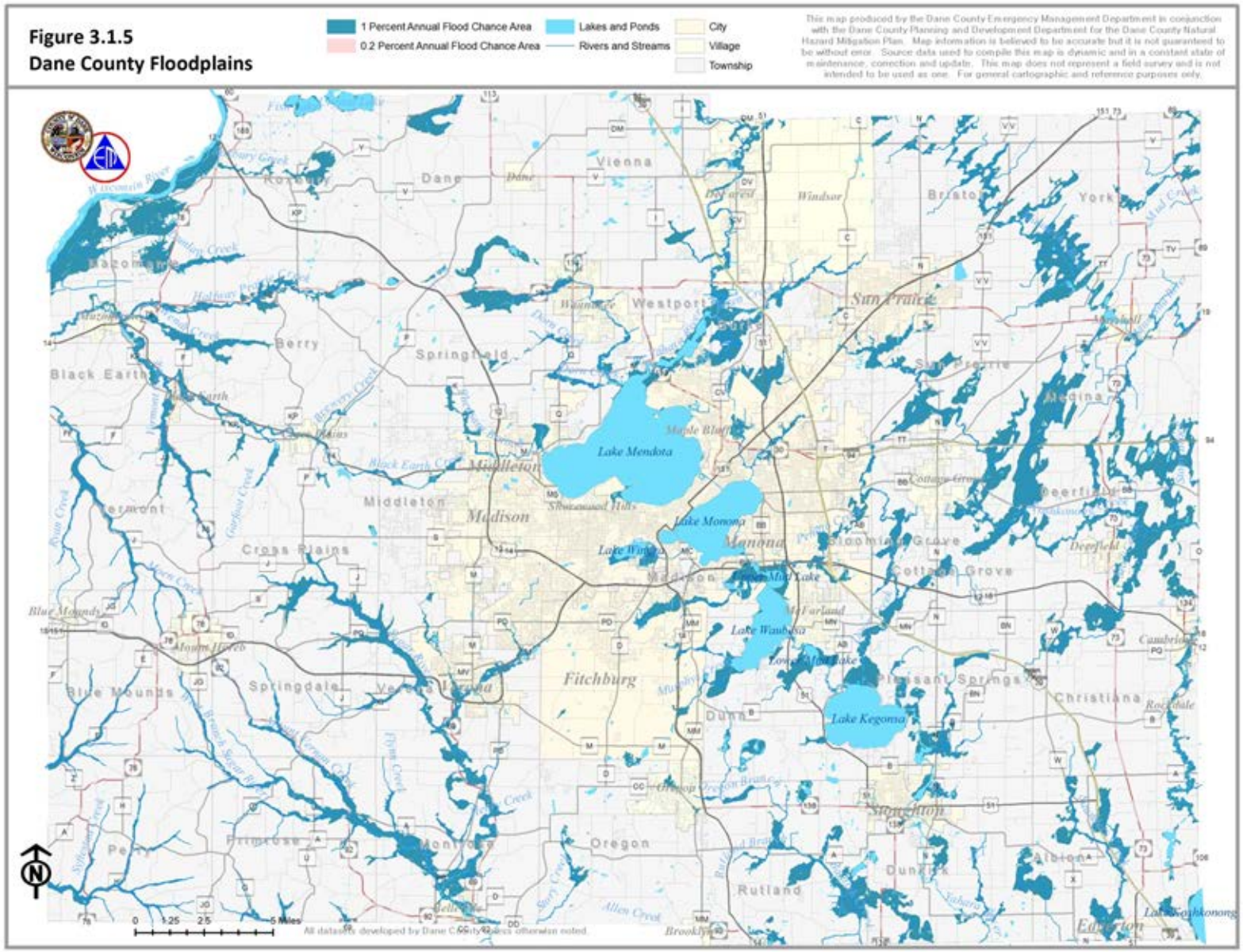
Terrain and Watersheds



Wetlands and Hydric Soils



Floodplains (1% annual probability)



Flood Hazard in Dane County

Other Observations and Findings

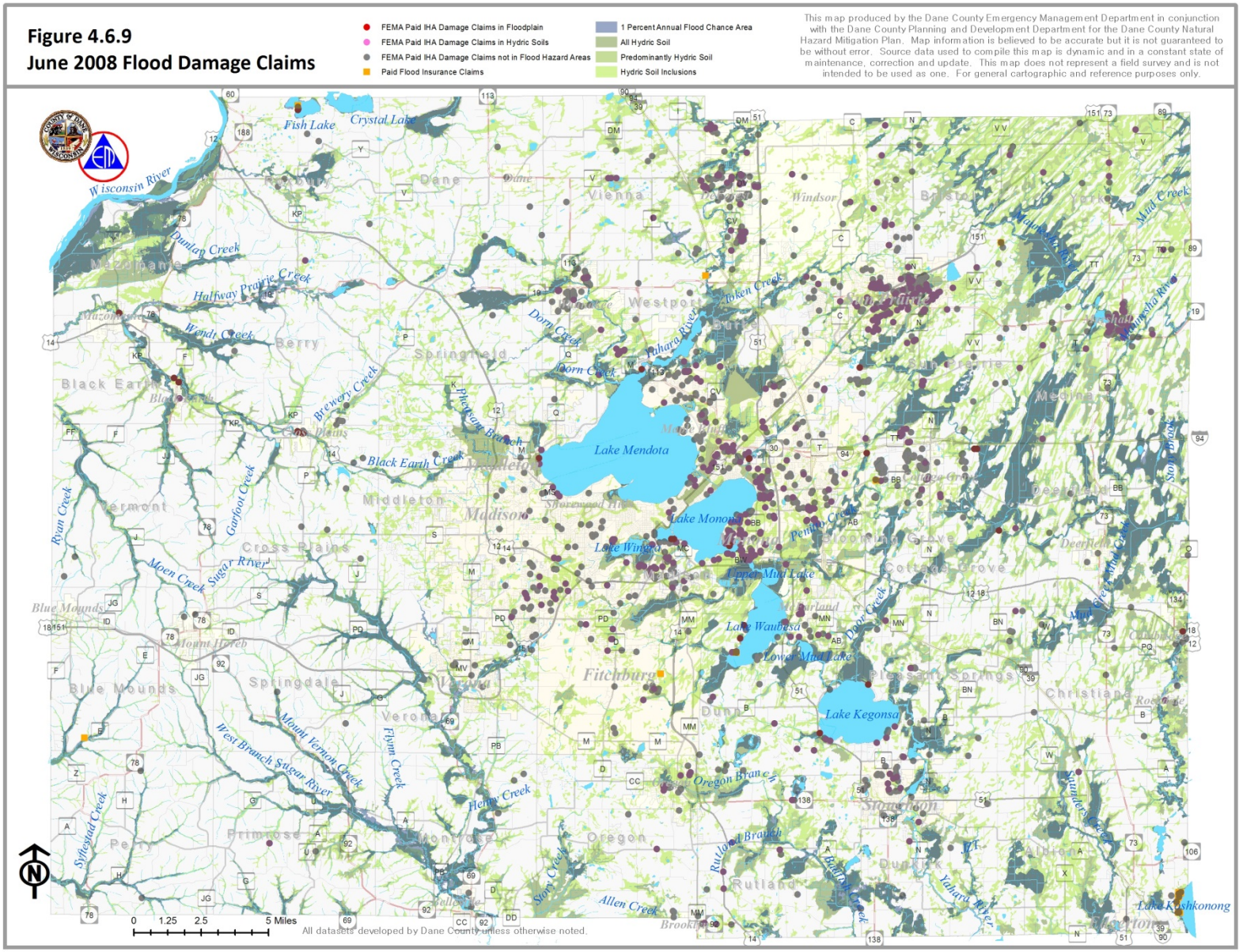
- Dane County is generally a drainage area
- River floodplain flood model generally does not apply
- Flood losses tend to occur following:
  - Localized “flash-flooding” from intense, short-duration rain events (makes for dramatic images, but actual losses tend to be relatively small
  - Repeated rain events, saturating soils and filling drainage systems, followed by a big storm or series of moderate storms
- Flood hazard avoidance strategies (e.g. floodplain zoning) have generally been effective
- There’s more to the picture than floodplains and hydric soils

Analysis of the 2008 "Flood of Record"

Paid FEMA Assistance Claims:

- Number of paid claims – FEMA Individual and Household Assistance: 1,627 ($1.76 million)
- Number of paid claims – National Flood Insurance: 28 ($1.38 million)
- Total number of paid claims: 1,655 ($3.14 million) of >144,000 structures
- Number of claims in the FIRM floodway: 4
- Number of claims in the FIRM 100-year flood hazard area: 38 (excluding floodway)
- Number of claims in the FIRM 500-year flood hazard area: 26
- Total number of claims in FIRM flood hazard areas: 68 (4% of the total)
- Number of claims in hydric soil types: 162 (10% of the total)
- Number of claims in soil types with hydric inclusions: 416 (25% of the total)
- None of the above: 1009 claims (61% of the total)

Analysis of the 2008 “Flood of Record”



Analysis of the 2008 "Flood of Record"

Observations:

- Most of the flood damages occurred outside of the mapped floodplains.
- Localized stormwater drainage and sewage issues may be more of an issue than floodplain-related (including the lakes) flooding.
- High groundwater table flooding may be more of an issue than floodplain-related (including the lakes) flooding.
- Hydric soils areas do contribute to flood problems, but perhaps not as much as initially believed.
- Flood problems are more widely distributed across the County than mapped flood hazard areas would indicate.
- Existing mitigation efforts and floodplain management is generally working effectively in Dane County's mapped floodplains.

Flood Risk Management Challenges

- Flood insurance studies and FEMA floodplain maps are useful tools, however they:
  - Do not fully portray the flood hazard in Dane County
  - Are based on analysis of past flood events only
  - Do not account for changes in hydrology associated with urbanization or other development in the watershed.
  - Do not account for changes in hydrology associated with climate change
- The Risk is changing (at a faster rate than it had in the recent past)
  - Trend toward more frequent extreme rainfall events
  - Trend toward increased magnitude (larger) extreme rainfall events
  - More people and buildings exposed to the hazard
  - Increased uncertainty
  - Increased variability

Flood Risk Management Challenges

- The Risk is changing,
  - But, by how much?
  - Past conditions are not a good indicator of future conditions
  - What, then, is a good indicator?
- Infrastructure, water management systems, and societal mindset are (generally) based on expectations built on past conditions.
  - To adapt or not to adapt to change?
  - How much modification is appropriate, acceptable?
  - Ties back to perceptions of risk - widely differing points of view
  - Cost-benefit/risk-reward of action vs. cost-benefit/risk-reward of no action.
  - These decisions inherently involve a public process
  - Dane County government does not exist in a vacuum
- Where are we on the spectrum of acceptable risk? Who decides?

Flood Risk Management Challenges

"We cannot solve our problems with the same thinking we used when we created them." – Albert Einstein

"The idea that the future is unpredictable is undermined every day by the (apparent) ease with which the past is explained." – Daniel Kahneman, Thinking, Fast and Slow

Comments and Questions?