



Flooding in the Midwest

A Minnesota Case Study

Andrea Hendrickson, MnDOT

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Your Destination...Our Priority



Flooding in Minnesota

- ▶ Extreme Flooding Events
 - Design Event
 - Snow melt (spring)
 - Flash Flood
- ▶ A Case Study – Duluth June 2012
 - Event Described
 - Response
 - Lessons Learned & Next Steps



Design Event

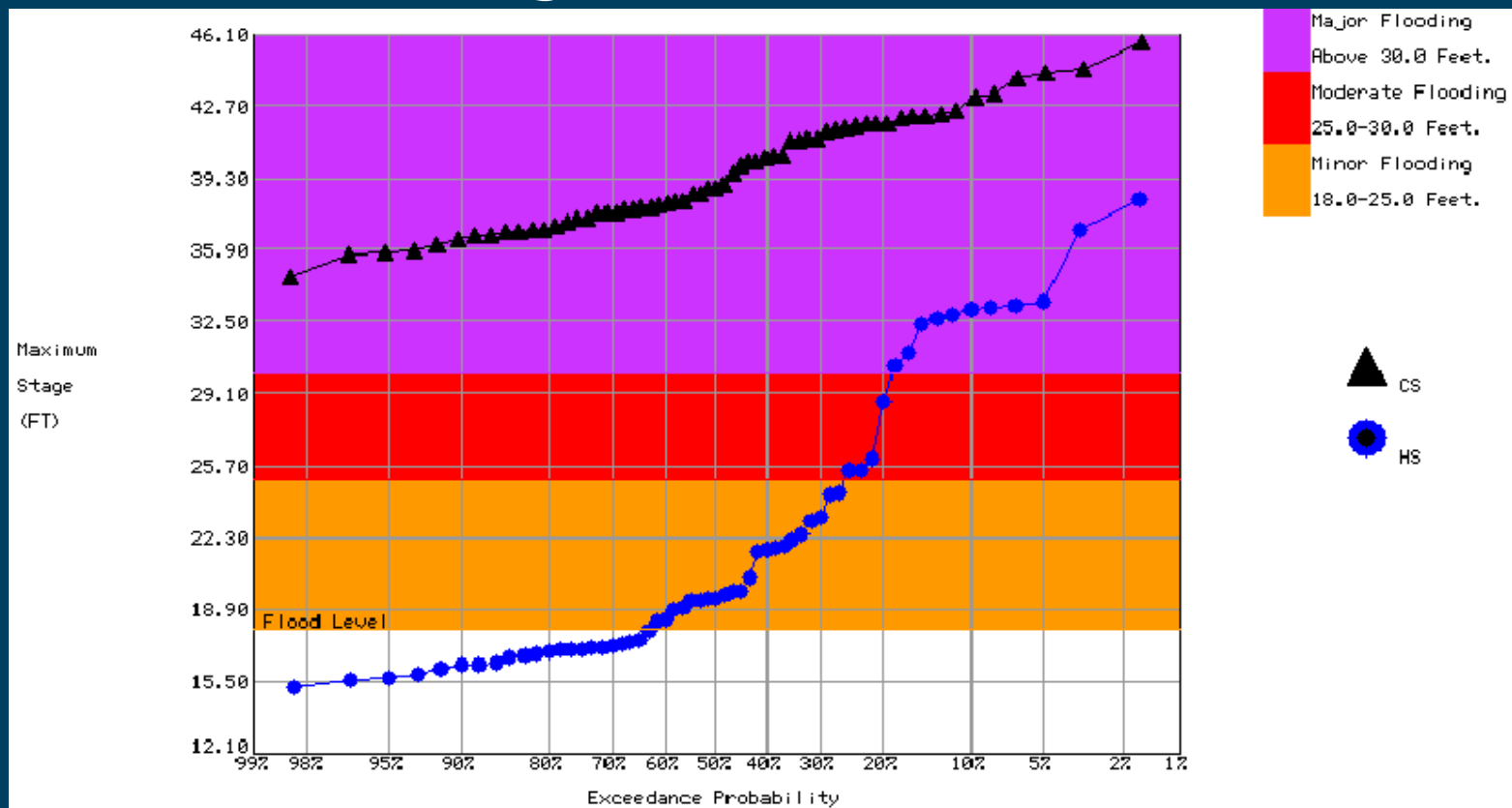
- ▶ Different design frequencies are used for different types of hydraulic structures
 - 10 year – Storm Drain
 - 50 year – Culverts
- ▶ A 100 year storm event has a 1% probability of happening any given year
- ▶ Extreme Rainfall Event > > Design Event



Snow Melt Flooding

Red River Valley Example

- ▶ Larger River System
- ▶ Know its coming in advance



Snow Melt Flooding

Red River Valley Example

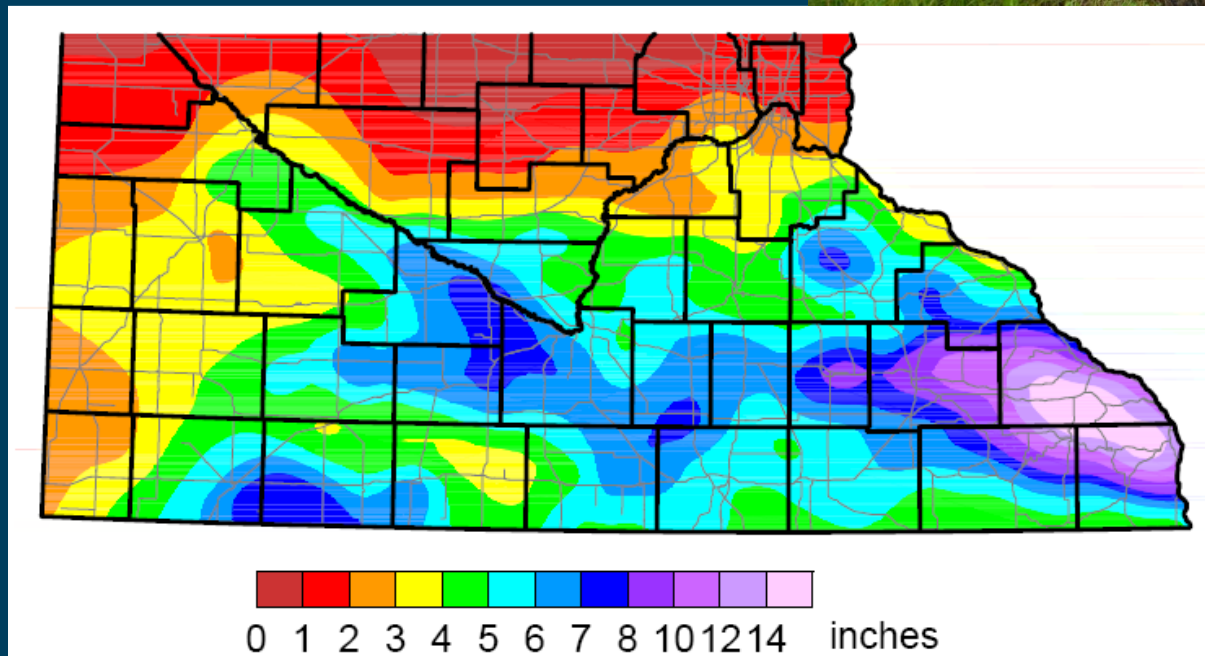
- ▶ Long duration of event
- ▶ Roadway overtopping
- ▶ Widespread flooding



Flash Flood

Southeast Minnesota Event

- ▶ Intense rainfall
- ▶ Short duration of event
- ▶ Need Rapid Response
- ▶ 117 flash floods since 1970



Bridge Washed Out August 19th, 2007



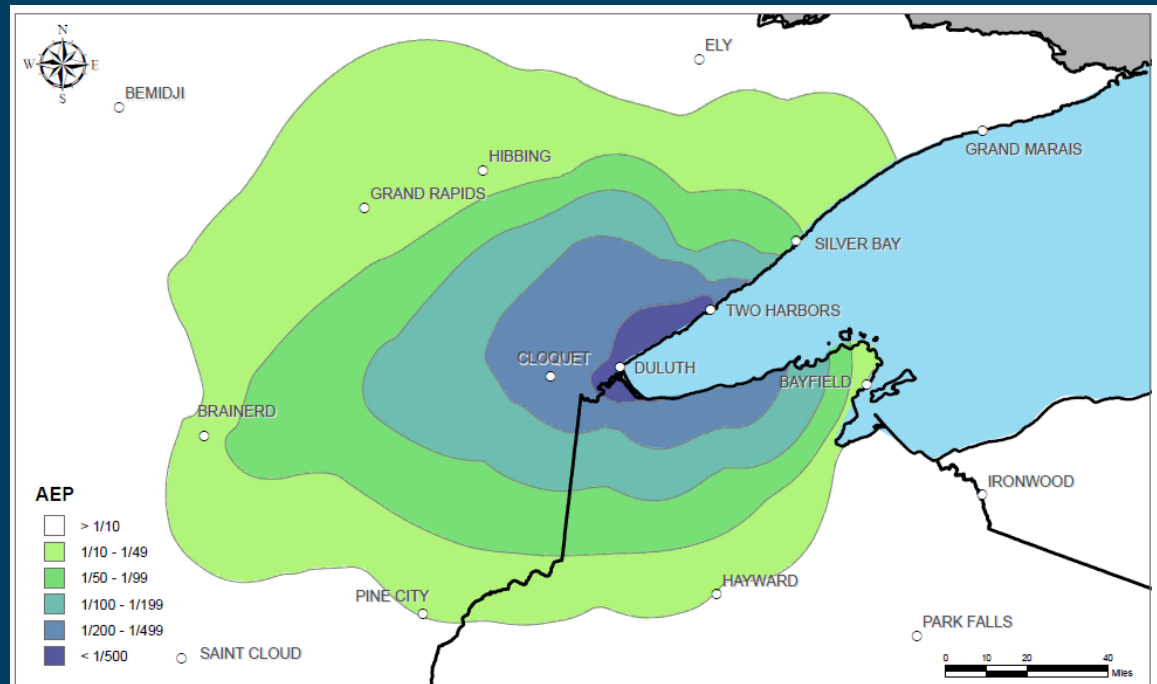
Bridge Opened to Local Traffic Nov. 16th, 2007



Case Study – Duluth June 2012

the cause

- ▶ Intense Rainfall => Flash Flood
- ▶ 9–10 inches over 2 days
- ▶ > 500 year event, a 0.2% probability
- ▶ Impacted Urban Area



Duluth, MN Event, 19-20 June 2012

Annual Exceedance Probabilities (AEPs) for Worst Case 24-hour Rainfall

Hydrometeorological Design Studies Center
Office of Hydrologic Development, National Weather Service
National Oceanic and Atmospheric Administration

<http://www.nws.noaa.gov/oh/hdsc/>

Map created on 12 July 2012.

Rainfall frequency estimates are from NOAA Atlas 14, Volume 8 Version 1 (to be published in 2013).
Observations come from COOP, CoCoRAHS, and ASOS datasets. Not all data have been verified.



Duluth June 2012

the impact – homes and businesses



Duluth June 2012

the impact – roadway and ditch damage
26 Road Closures on Trunk Highway System



Duluth June 2012

the response

▶ Cooperation with:

- Work with Law Enforcement to Close Roads
- Received help from other MnDOT districts and CO
- Incredible cooperation between state agencies like DNR, DPS
 - Use of the State Patrol helicopter
- Cooperation between MnDOT, cities and counties
- Immediate FWHA assistance



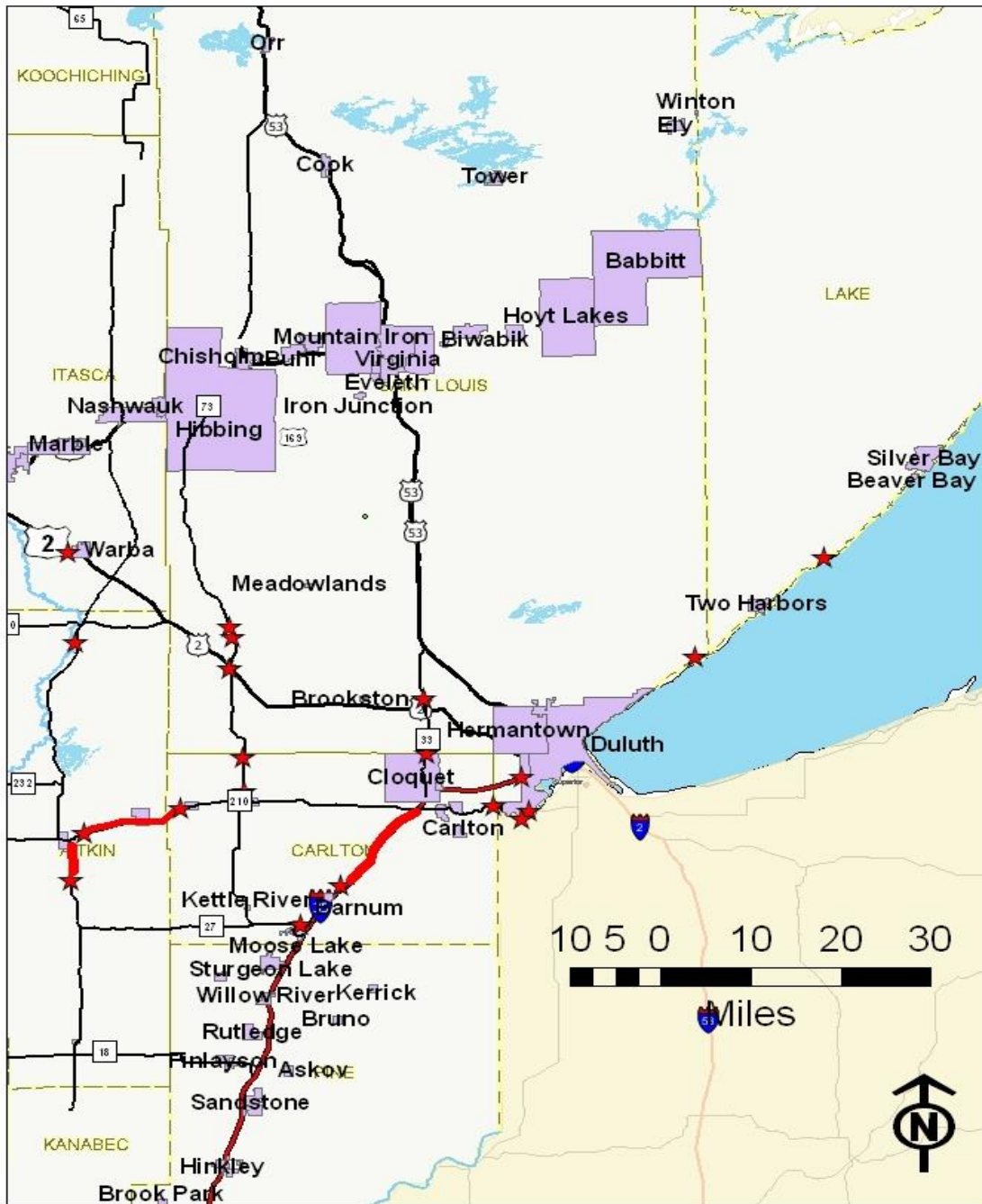
Duluth June 2012

the response

- ▶ Incident Command Center (ICS)
 - Staffed with ADE, Superintendent, Fleet Manager, Business Manager, Maintenance
 - Tactical Response Teams
- ▶ Communication
 - Media releases & interviews
 - Web, phone, Emails
 - Local meetings and briefings
 - Constant updates for MnDOT Leadership – Commissioner on down



Flood Incidents - District1



Scale 1:350,000

- ▶ Tools to track damage
 - GIS tools online:
 - Regional road closure map (MnDOT, counties and cities entered their data)
 - MnDOT site tracking spreadsheet



Duluth June 2012

the response –Thomson Dam

- Summer <1,000 cfs
- Spring Runoff 10,000 cfs
- Spike @ 55,000 cfs



Duluth June 2012

the response -TH 210 Thomson Overflow Bridge

▶ Opened 12/12/2012



Duluth June 2012

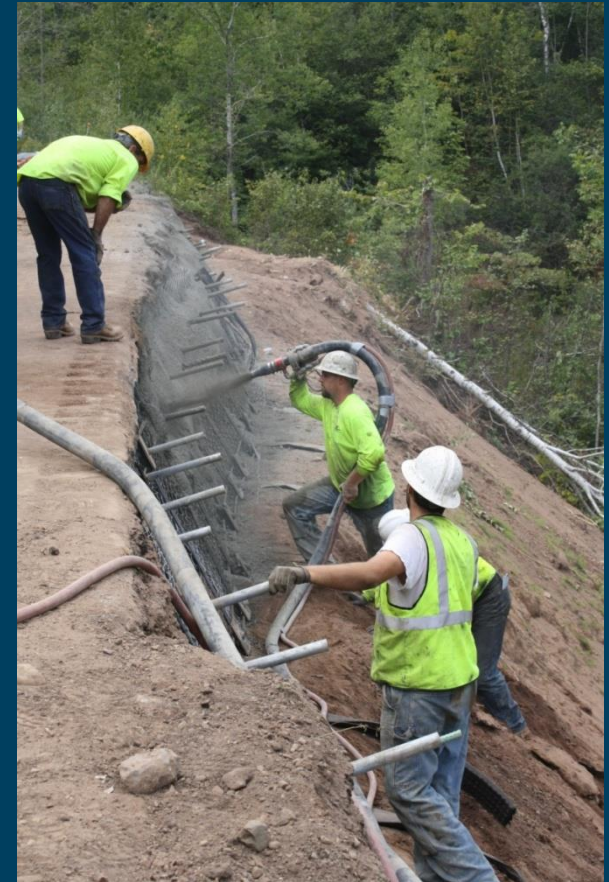
the response – TH 210 East Jay Cooke State Park Entrance



Duluth June 2012

the response – TH 210 Thomson to Jay Cooke State Park

▶ Soil Nailing – slope stabilization



Duluth June 2012

lessons learned & next steps

- ▶ Be prepared
 - Have incident response plan before an emergency
 - **Improve plan following an event**
 - Guidance specifically about floods
 - Know what needs to be tracked, bought, fixed, charged to
 - **Provide stash of cones/traffic control devices for troopers to keep with them**
- ▶ Team work – no need to go it alone
 - Cooperation and shared resources are essential
 - Support from central office technical experts, other Districts, Local Government and other Agencies
 - **Keeping track of borrowed equipment**



Duluth June 2012

lessons learned & next steps

- ▶ Communication is essential
 - Constant communication
 - GIS tool showing road closures set up with county and cities
 - **Improve interagency communication**
 - **More resources dedicated to communication**
- ▶ You can fix it fast
 - Project Development Team performing early assessments
 - Emergency contracting authority, purchasing, consultants and contractors
 - **Have large culverts on hand**



Q & A

Andrea Hendrickson
Minnesota State Hydraulic Engineer
Phone: 651-366-4466
Andrea.hendrickson@state.mn.us



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Andrea.hendrickson@state.mn.us

