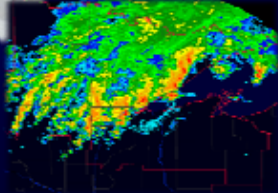


Duluth, MN Flood of June 2012



Chris Kleist
Program Coordinator
City of Duluth



Meet the Presenter

Chris Kleist

- Ely, MN
- Outdoors
- Guiding
- Stormwater and Wastewater Industry

- Program Coordinator - Stormwater
- MS4 Permit Compliance
- Duluth's Utilities



Overview

- Duluth's Uniqueness
- Stormwater
- Summary of Duluth Flood
- Recovery

Duluth, MN



Duluth's City Sewer Challenges *Terrain and soils*



Duluth Stormwater Program

- Illicit Discharge
- Stormwater Billing
- Best Management Practices (BMPs)
 - Structural
 - Non-structural
- Runoff, erosion, and sediment issues




Duluth Stormwater Program

- Cleaning
- Maintenance
- Inspection
- Plan review
- Technical assistance



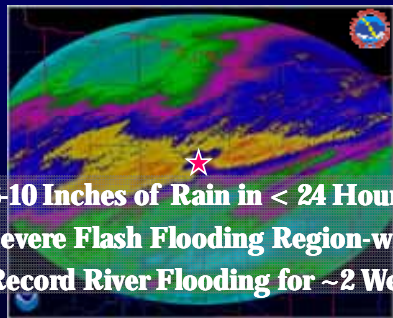

Storm Sewer Challenges

- Trout streams
 - Pollution
 - Sediment
 - Temperature
 - DNR
 - Maintenance
 - Fish passage




Overview: Duluth Flood

June 19th-20th, 2012

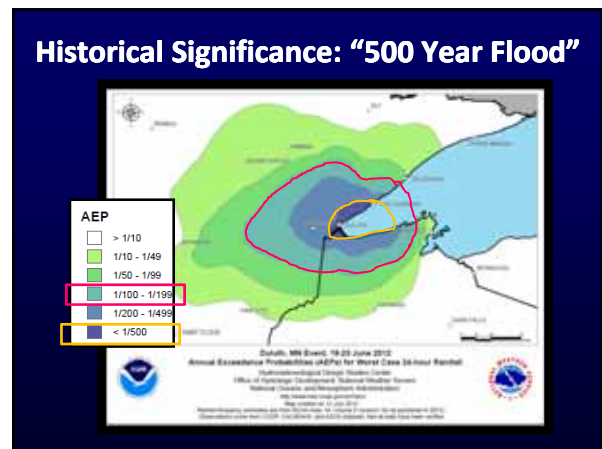


- **6-10 Inches of Rain in < 24 Hours**
- **Severe Flash Flooding Region-wide**
- **Record River Flooding for ~2 Weeks**

Duluth KDLH Radar Storm Total Precipitation

New Duluth Rainfall Records

Record Type	Previous Record		New Record	
	Rainfall	Date	Rainfall	Date
24-hr	5.79"	22-23 Aug 1978	6.90"	19-20 June 2012
2 Day	6.68"	20-21 July 1909	7.25"	19-20 June 2012
June 24-hr	4.00"	23 June 1876	6.90"	19-20 June 2012
Single Calendar Day June	4.00"	23 June 1876	4.14"	19 June 2012
June 19 th	1.55"	1998	4.14"	2012
June 20 th	1.77"	1926	3.11"	2012



Perspective; Other Significant Flash Floods

Other Significant Flash Floods

Duluth Flood of August 1972

- 3" of Rain in 2 hours
- \$18M in damages Public Facilities
- President Nixon Declare Duluth a Federal Disaster Area

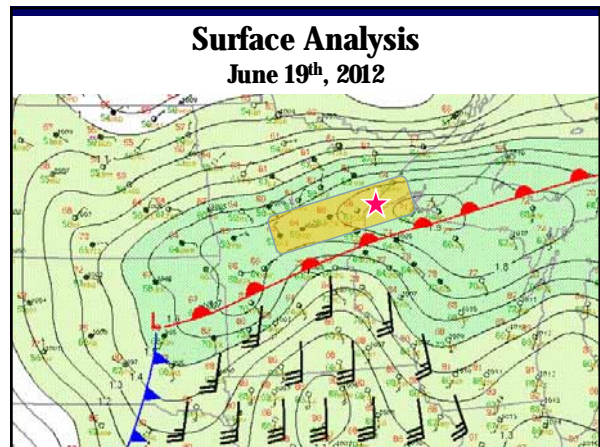
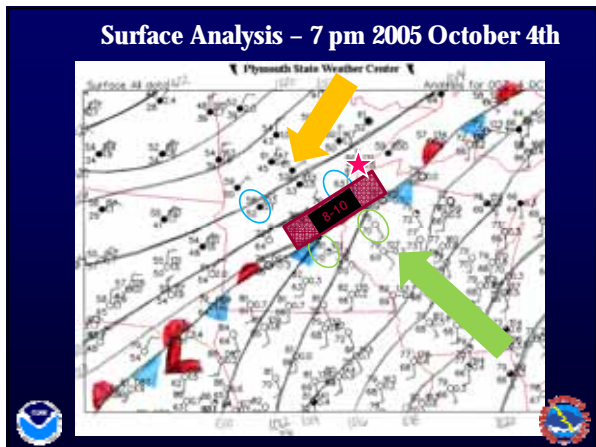
2 lives were lost

Did you know just a month later in 1972, Duluth saw another 4.0 to 5.5 inch rainfall event?

Significant Flash Floods

- 1972 July 21st – Little Falls, MN
10.84" in 24-hours
Still holds 24 hour rainfall record for MN.
Damages were estimated at \$20 million
- 2005 October 3-5th Aitkin/Pine Counties Flood
Totals Rainfall 7.9 inches
Significant Flooding in Brainerd, MN to Grantsburg, WI
- 2007 August 18-19th – La Crosse Area Flood
8 lives were lost
Totals Rainfall 10 - 17 inches
Massive Mud Slides and Debris Flows
- 2012 June 19-20th – Duluth, MN
ZERO lives were lost
Totals Rainfall 6 - 10 inches
Massive Infrastructure Damage

Pictures Courtesy Todd Shea



Tuesday, June 19th

1140 pm
Water reported to be knee-deep along Mall Drive near Wells Fargo in Duluth.



Honda Dealer / Wells Fargo Parking Lot
Haines Rd and US Highway 53

1148 pm
Water reported to be reaching the bottom of parked cars near Fitger's in downtown Duluth



Downtown Duluth, behind Whole Foods

Wednesday, June 20th

1201 am
Sidewalk along Eighth Avenue East between First and Second streets in Duluth reported to be caved in.







First Street and the Interstate 35 tunnels

Wednesday, June 20th

1213 am
gravel reported to be washing down 40th Avenue West from higher elevations along Haines Road in Duluth.




1224 am
Upper elevations of Glenwood Street reported to be "littered with chunks of asphalt."




Duluth, MN 55812
Photos by Chris Kliefst

Wednesday, June 20th

1241 am
Water reported to be shooting from manholes along Boundary Avenue in Proctor.



1252 am
Car reported to have just fallen in sinkhole on Skyline Parkway near Ninth Avenue East; four occupants escape.



117 am
Report of someone trapped in car partially submerged in sinkhole on Seventh Avenue East at First Street


Skyline Parkway, Duluth, MN

Wednesday, June 20th

139 am
The National Weather Service in Duluth reports: "This appears to be a flood reminiscent of the flood of 1972 and one that should not be taken lightly. ... We cannot stress what a major threat this is for the city of Duluth and along the North Shore."

225 am
Report of 6.38 inches of rain and counting in Duluth's Lester Park neighborhood.

evacuations under way in and near the Fond du Lac neighborhood of Duluth




Fond Du Lac Neighborhood






Wednesday, June 20th

240 am
Report on police scanner of a seal swimming on Grand Avenue near the Lake Superior Zoo



255 am



Water reported to be rising to level of windows on Grandma's Restaurant on Maple Grove Road in Duluth.

Wednesday, June 20th

319 am
Evacuations reported at homes along 59th Avenue West in Duluth, near Keene Creek.



Four feet of water reported on streets in central Proctor.

336 am
Water reported to be several feet deep on South Street below London Road; spilling over onto Interstate 35.



7th Ave East, Duluth, MN
Photo by Derek Montgomery, MP

Wednesday, June 20th

336 am
Water reported to spilling over onto Interstate 35.



Interstate 35 near Wade Stadium
Photo by Derek Montgomery, MPR

352 am
Initial reports of a polar bear missing from its enclosure at the Lake Superior Zoo. Police and fire officials assisting zoo staff in tracking down animals unaccounted for on zoo grounds.

Duluth Zoo/Kingsbury Creek



Before




After

Wednesday, June 20th

430 am
Flooding in Duluth making Twin Cities and National News

451 am
Reports of roads caving in near Barker's Island in Superior, WI.


7th Ave East, Duluth, MN
Photo by Derek Montgomery, MP

The River Inn Bar Scanlon, MN
Photo by Amanda Grauing

Wednesday, June 20th

500 am
Duluth Police advise emergency travel only in the city.

508 am
Water rescue situation reported on Wahl Road in Lakewood Township




530 am
Carlton County Sheriff's Office recommends no travel in county; evacuations recommended in Thomson area
US Highway 210 closed in Jay Cooke State Park.

US Highway 210, Jay Cooke State Park
Photo courtesy NWS


Wednesday, June 20th

630 am
 White Pine River reported to be flowing 2 to 3 feet deep over Highway 33 north of Cloquet, MN.



White Pine River floods over US Highway 53, North of Cloquet, MN

730 am
 The Minnesota Department of Public Safety's Division of Homeland Security and Emergency Management activates the state emergency operations



Wednesday, June 20th

800 am
 Evacuations under way in Thomson after Thomson Reservoir and spillway overflow into the community.
 □ Jay Cooke State Park evacuated




Wednesday, June 20th

830 am
 Lake Superior Zoo reports that "all zoo animals have been secured. Sadly the zoo experienced the loss of several animals, among them many of the barnyard residents.



1030 am
 Interstate 35 reported closed near Carlton, MN




Saint Louis River, downstream of Scanlon Dam. Carlton, MN

Wednesday, June 20th

1030 am
 National Weather Service issues Severe thunderstorm warnings issued for Twin Ports as another round of storms sweeps across the area.


1135 am
 City of Superior declares a state of emergency.
 City of Hermantown declares a state of emergency.



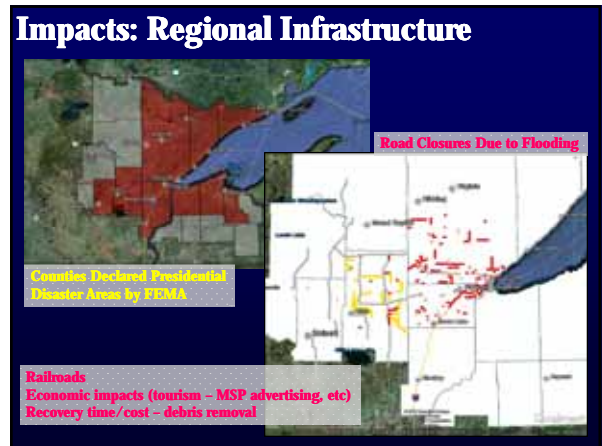
Wednesday, June 20th

1230 pm
 Reports of a child washed into a culvert near Proctor; child is found, injured but alive, within the hour.
 - He was swept into a culvert and traveled about 6 blocks before being ejected out into the woods. Only minor injuries.

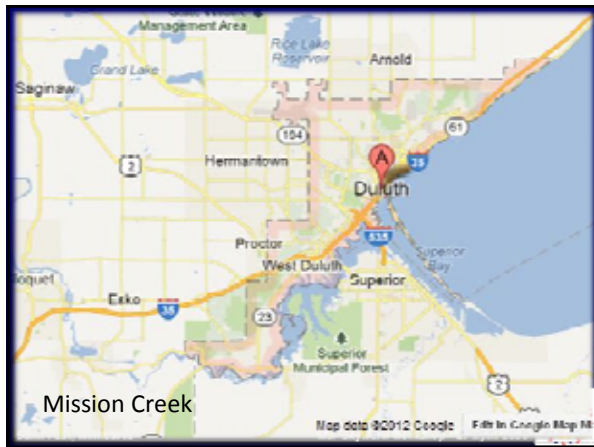
442 pm
 Spotter reported storm total of 10.10 inches of rain northeast of Duluth.



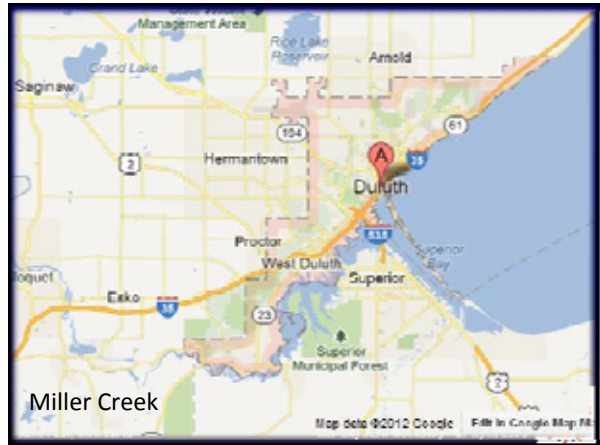
The Impacts

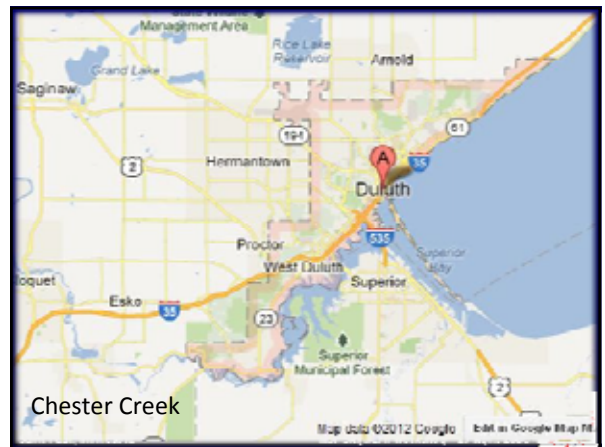














Chester Creek



Chester Creek



small creek that carried debris down
Chester Parkway in Duluth Wednesday
morning.
(Bob King / rking@duluthnews.com)

Chester Creek

Saint Paul, Minnesota



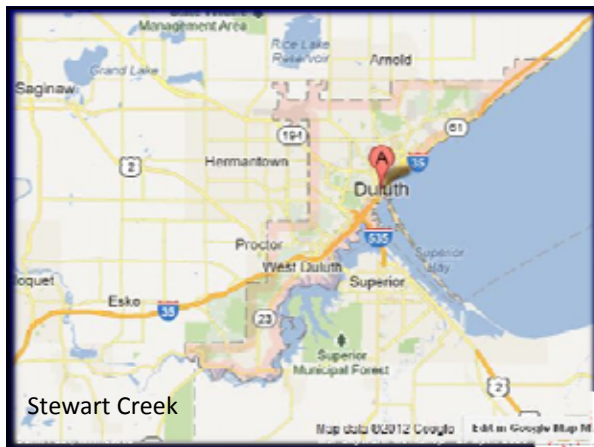
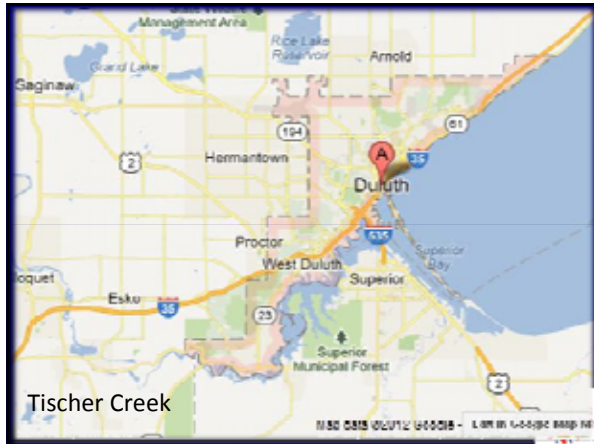
Chester Creek

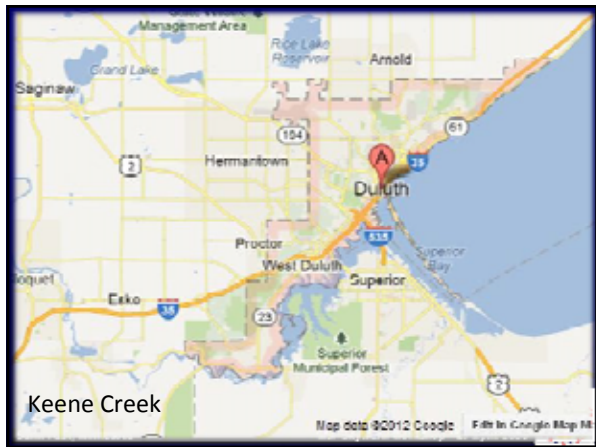


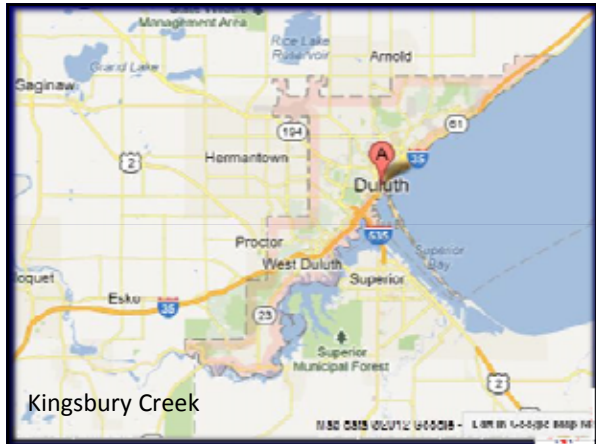
Chester Creek



Chester Creek







Kingsbury Creek



Kingsbury Creek



Kingsbury Creek



Kingsbury Creek




Kingsbury Creek



Duluth Zoo/Kingsbury Creek

Flood Issues

- Undersized system
- Under-maintained system
- Public/Private drainage
- Drainage in mind
- Debris Management



Where do we go from here?

- FEMA
- MRTC
- NRCS
- DNR
- SOGL



Considerations

- Maintenance
- Storm was rare event
- Long recovery



Questions?

ckleist@duluthmn.gov



Acknowledgements

NWS Duluth Meteorologists:

-  Geoff Grochocinski – Forecaster
-  Brian Tentinger – Forecaster
-  Rose Sengenberger - Met Intern
-  Steve Gohde - Observing Program Leader
-  Dan Miller - Science and Operations Officer
-  Diane Cooper - Service Hydrologist

City of Duluth:

- Todd Carlson
- Limnotech
- Barr

- The Duluth News Tribune
- Timeline of the Duluth Flood. Andrew Krueger, Duluth News Tribune
Published June 24, 2012, 01:12 AM
<http://www.duluthnews-tribune.com/events/article?id/235117/group/homepage/>
- Daryl Herzmann at Iowa State University/Iowa Environmental Mesonet
- Minnesota Department of Transportation
- Wisconsin Department of Transportation
- U.S. Geological Survey (USGS)
- National Aeronautics and Space Administration (NASA)
- North Central River Forecasting Center
- Various Photo Contributors