National Weather Service

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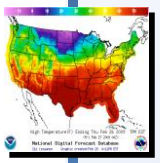

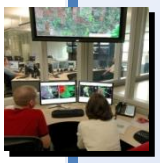

Turkey River Watershed

Mark M. Ziemer, P.E.

Senior Hydrologic Forecaster

North Central River Forecast Center

Mark.Ziemer@noaa.gov

NWS Hydrologic Model

- Inputs:
  - Mean Areal Precipitation, MAP
  - Rainfall/runoff model
  - Routing to watershed outlet
  - Observed stage/flow data
  - Rating curves
- Outputs:
  - Simulated flow/stage hydrographs
  - Adjusted flow/stage hydrographs, where observations are available

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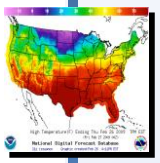
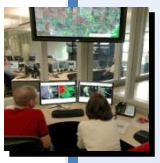
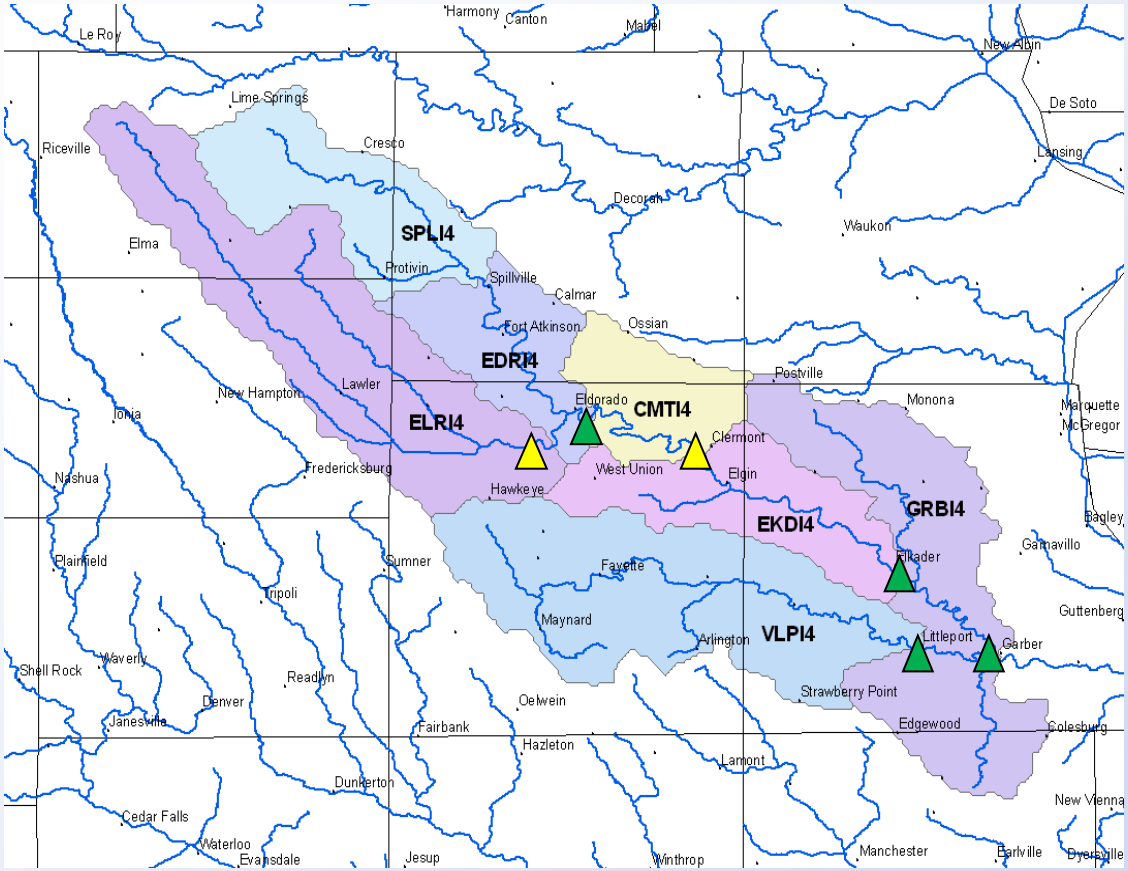




Turkey River Watershed



Basin ID	Basin Name	River	Drainage Area (sq mi)	Cumulative Area (sq mi)
ELRI4	Little Turkey nr Eldorado	Little Turkey	345	345
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VLPI4	Littleport	Volga	348	348
GRBI4	Garber	Turkey	294	1545

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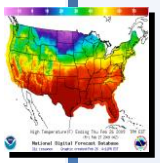

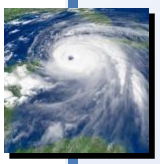

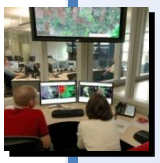

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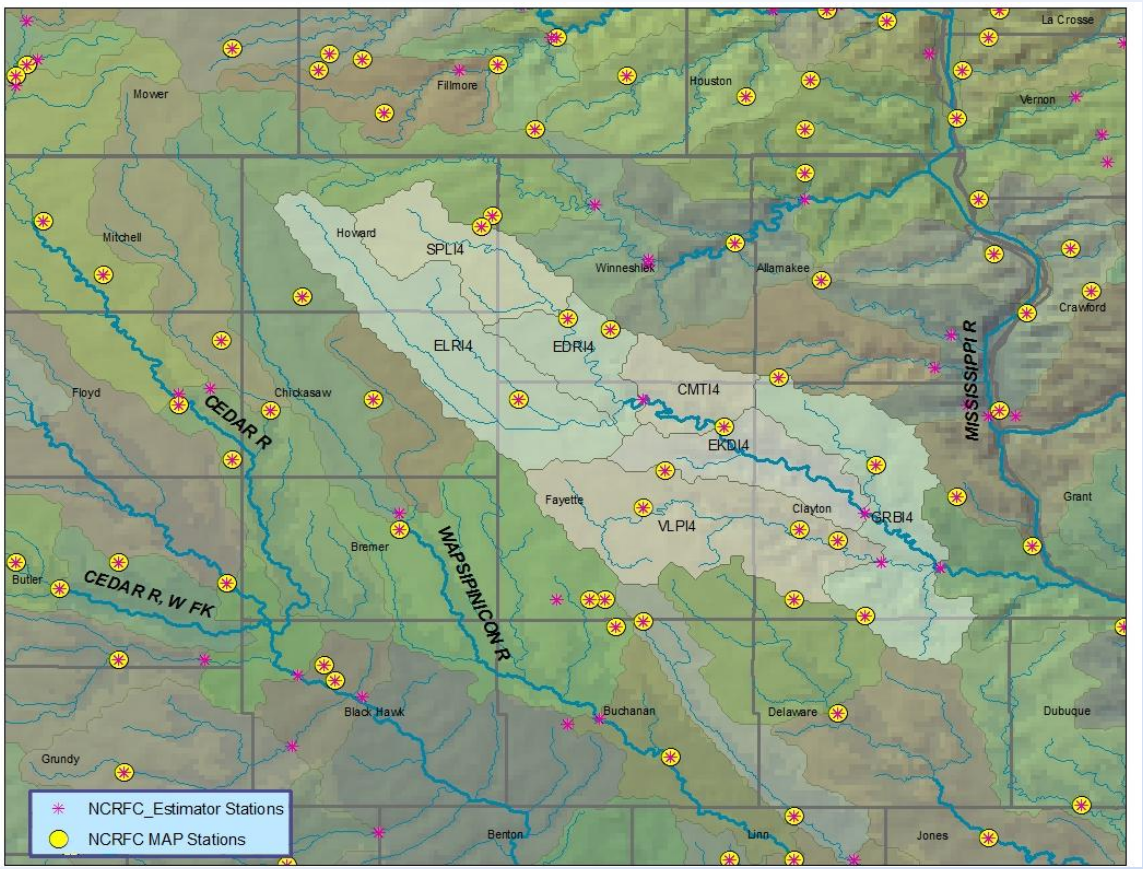
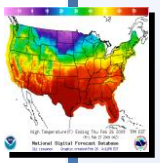
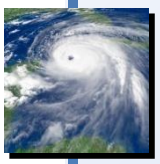
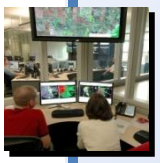


Turkey River Watershed with rain gauges

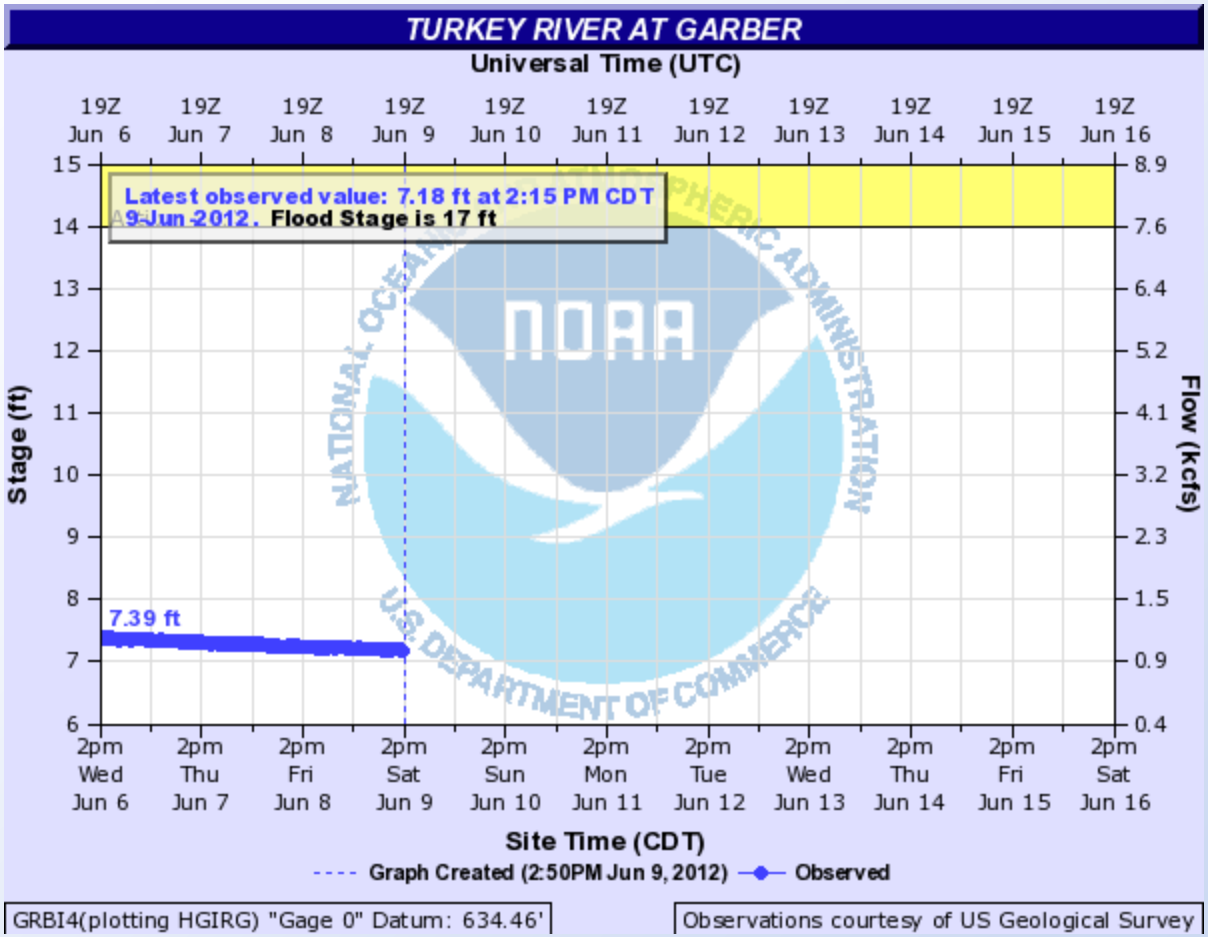
In addition to showing the different basins which make up the Turkey River, the locations of the precipitation network used in the model are also shown.







AHPS: Turkey River at Garber (7-day forecast, when needed)



http://water.weather.gov/ahps2/hydrograph.php?wfo=arx&gage=grbi4

is the link for this image. For the WFO,
http://water.weather.gov/ahps2/index.php?wfo=arx

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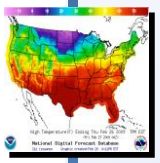
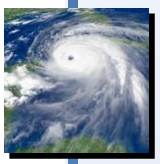
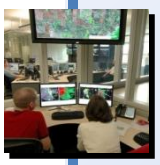
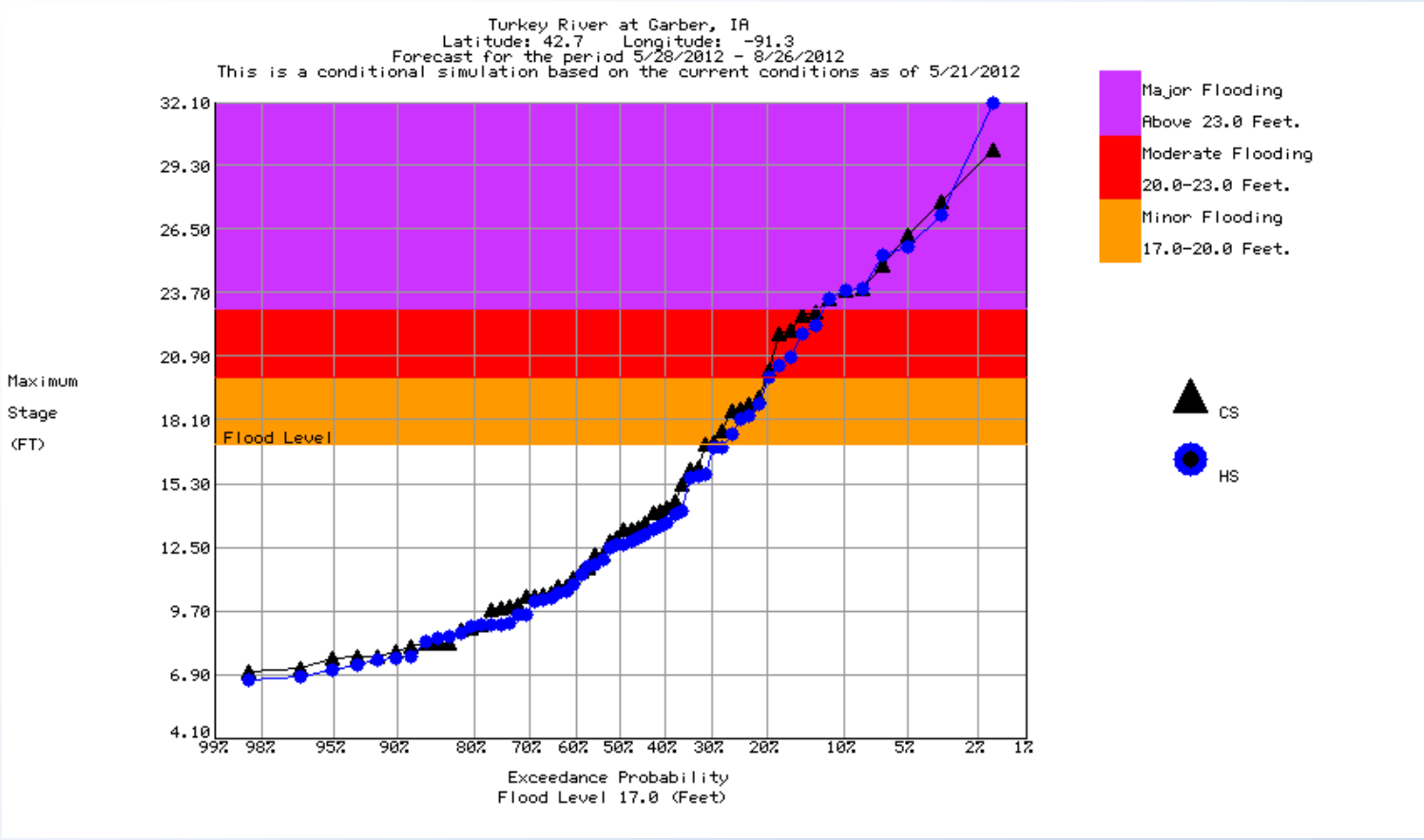






AHPS: Turkey River at Garber Probabilistic Forecasts



Shown: 90-day Chance off Exceedence

http://water.weather.gov/ahps2/period.php?wfo=arx&gage=grbi4 is the link for this page.

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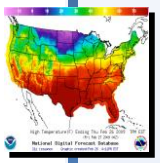

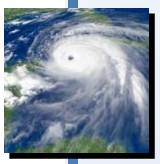

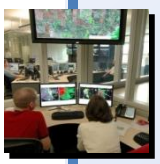

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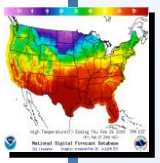

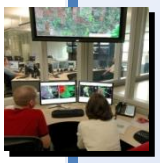

Post-analysis and Forecast Discussion for Record Floods in the Turkey River Watershed in Iowa June, 2008

Steve Buan & Laura Diamond
North Central River Forecast Center
NOAA's National Weather Service
Steve.Buan@noaa.gov
Laura.Diamond@noaa.gov

Forecast Complexity and Chronology

- Precipitation uncertainty in convective events (radar v. rain gage, observation times, etc)
- No observed river data in upper basins
- Rating curves and extrapolation above record stages leads to uncertainty in routed flows
- Real-time flow of information
  - Debris jams and impoundment
  - Levee breaches

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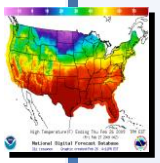
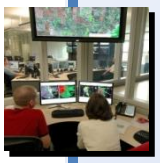
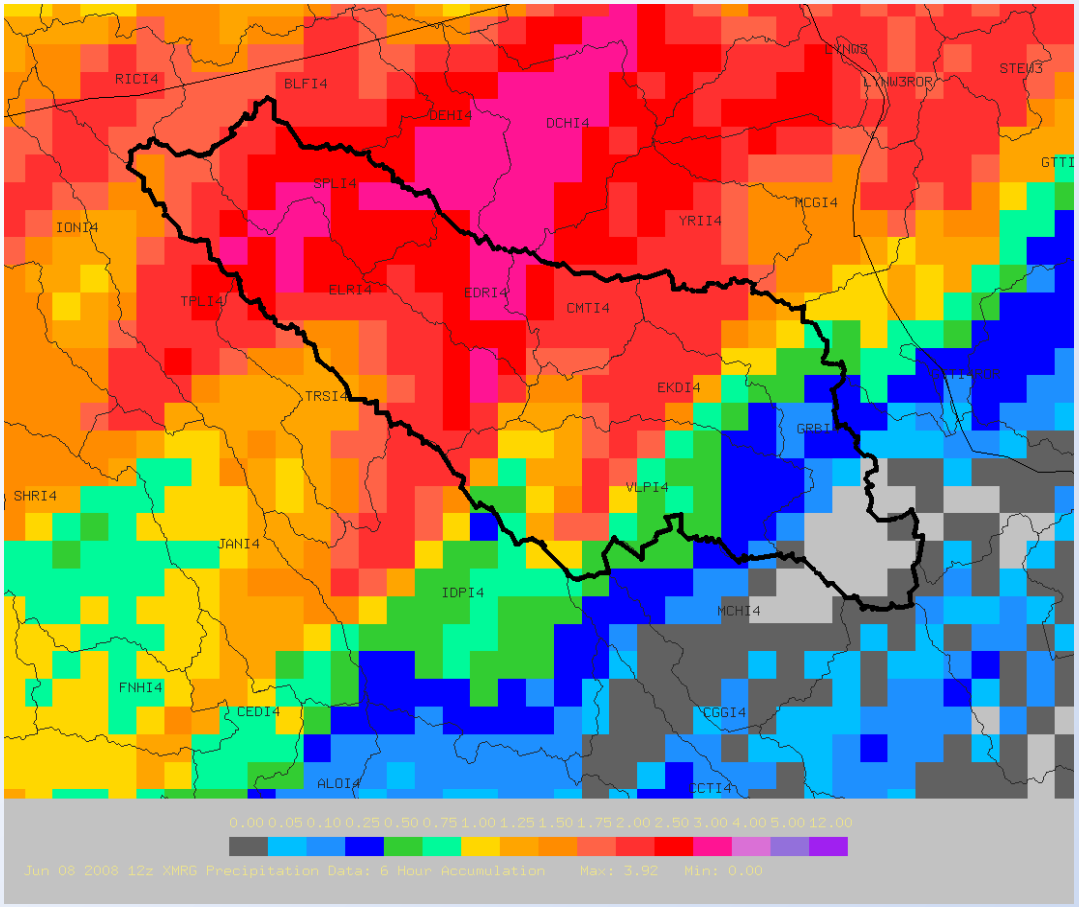




Meteorological Event



Radar estimated rainfall from 2am to 7am June 8. Bright pink areas indicate 3-4 inches.

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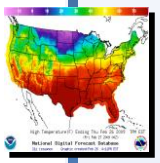
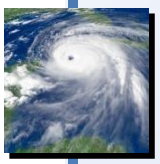
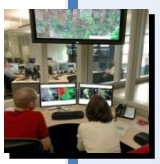
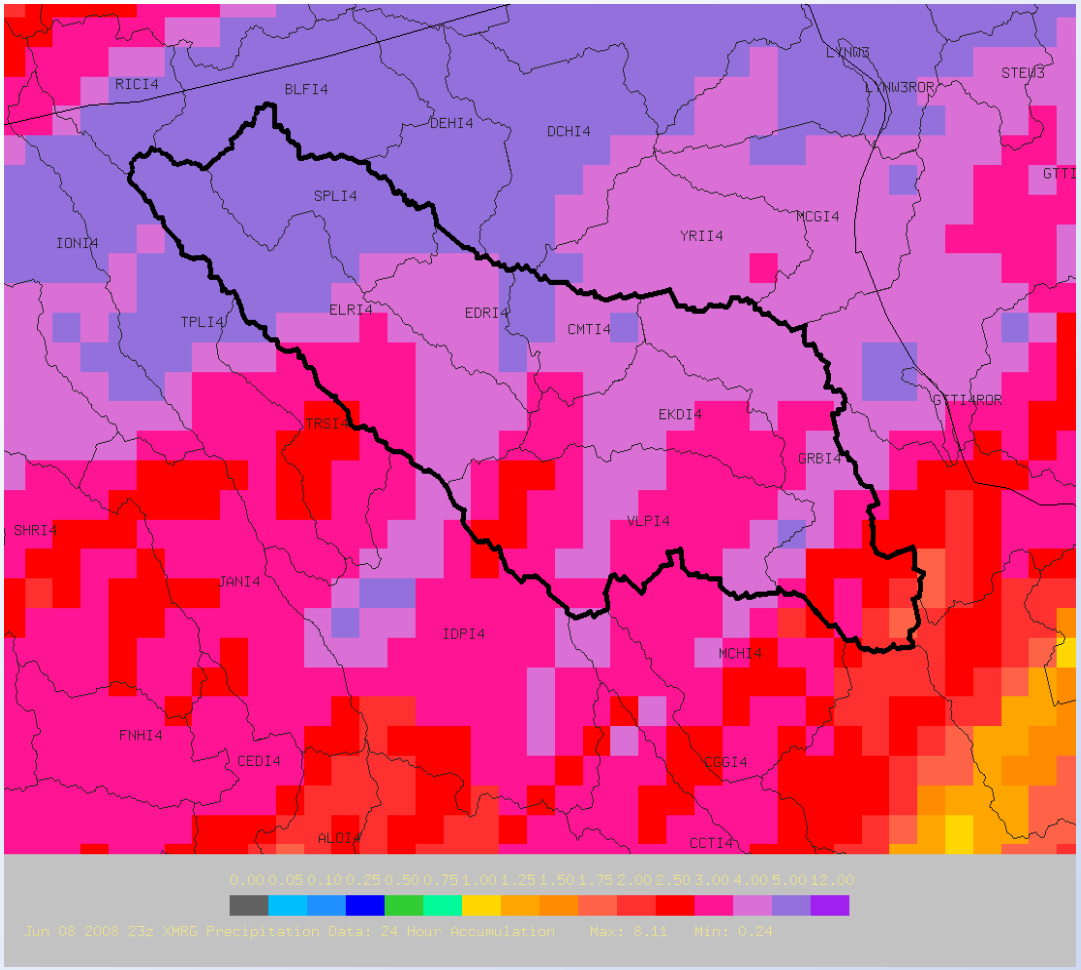






Total Precipitation



Radar estimated rainfall from 7pm June 7 to 7pm June 8. Purple areas indicate in excess of 5 inches.

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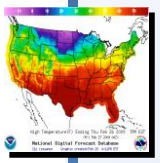
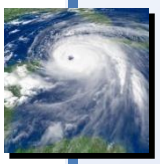
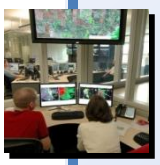
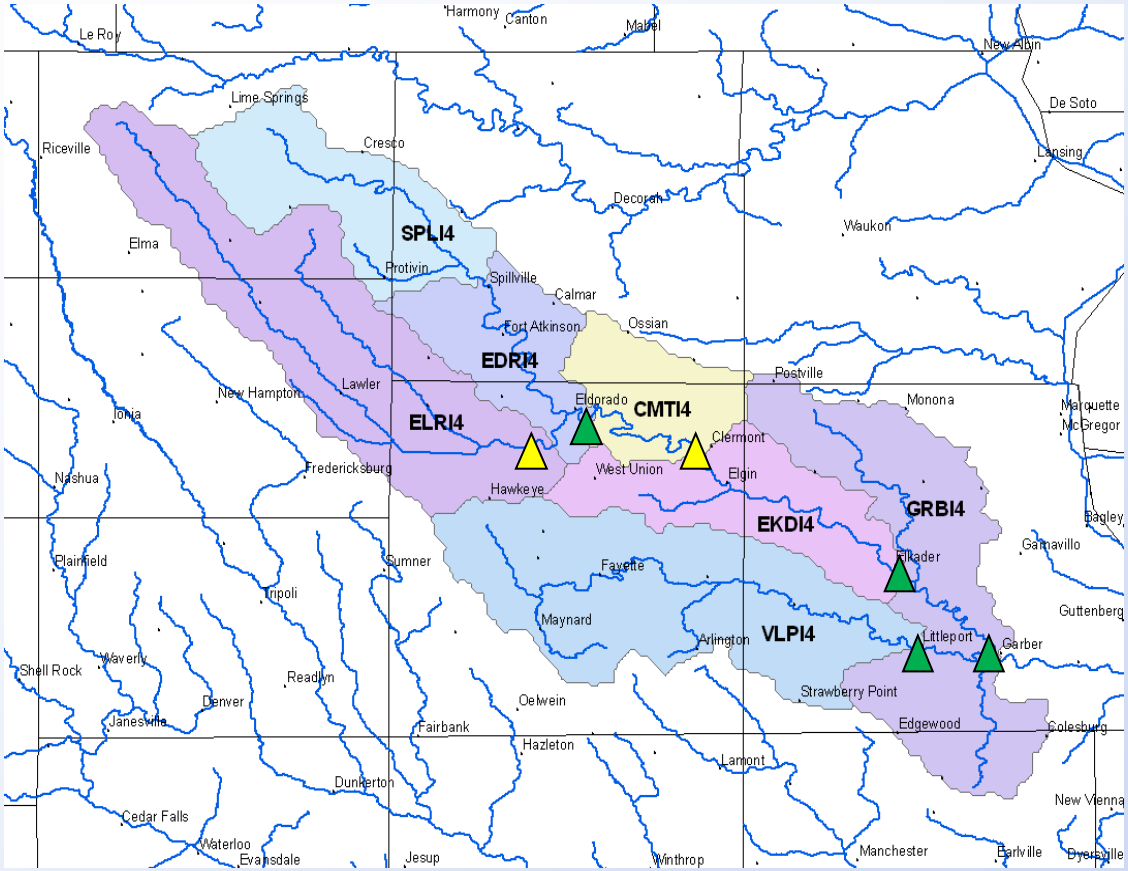






Turkey River Watershed



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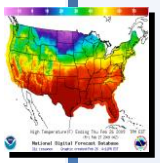
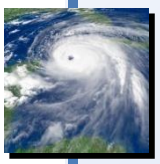
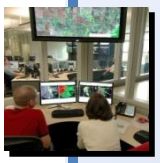
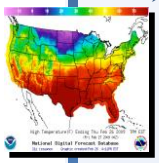


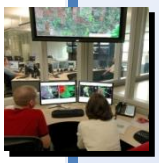


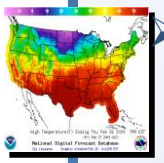
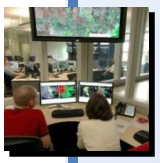


Summary of modeling challenges

- Lack of data from the Spillville headwater basin and only one reading from the headwater basin on the Little Turkey River near Eldorado severely impacted the ability to accurately simulate the peak flow level for the Turkey River near Eldorado.
- The 3-per-day wire-weight readings from Clermont (with no midnight readings) were limiting to the hydrologic forecaster(s), when combined with the lack of information from the headwater basins above Eldorado.
- The debris jams, bridge washouts, road cuts, flow measurements, etc. were not relayed to the River Forecast Center in real-time.
- Gage malfunction at Elkader, resulting in overforecast





Lesson Learned/Looking to the Future

- Critical to share information in real-time.
  - The National Weather Service deployed an internet based “chat” service that allows the National Weather Service, the U.S Army Corps of Engineers, the U.S. Geological Survey and various state agencies to exchange information collectively with each other in real-time.
- The lack of an adequate number of real-time river monitoring stations.
  - The State of Iowa Department of Natural Resources worked with the U.S. Geological Survey to install gauges at Spillville on the Turkey River and at Fayette (upstream of Littleport) on the Volga River, in the spring of 2010. The addition of these stations will help to prevent communities from being “blindsided” by an undetected record flow coming from an unmonitored watershed.
- The extension of rating curves above previously observed stage/flow levels is a long recognized problem.
  - A solution to this problem remains elusive as mathematical modeling solutions have proven to be too expensive to implement on a wide scale. More research will have to be done, but that research is out of the realm of the National Weather Service.