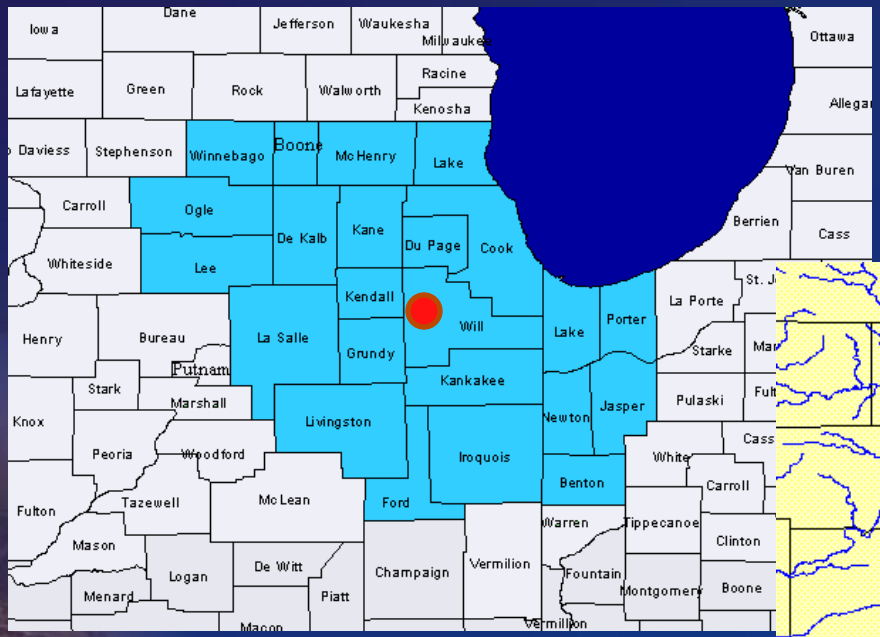
National Weather Service
Flood Warning/River Forecast Program

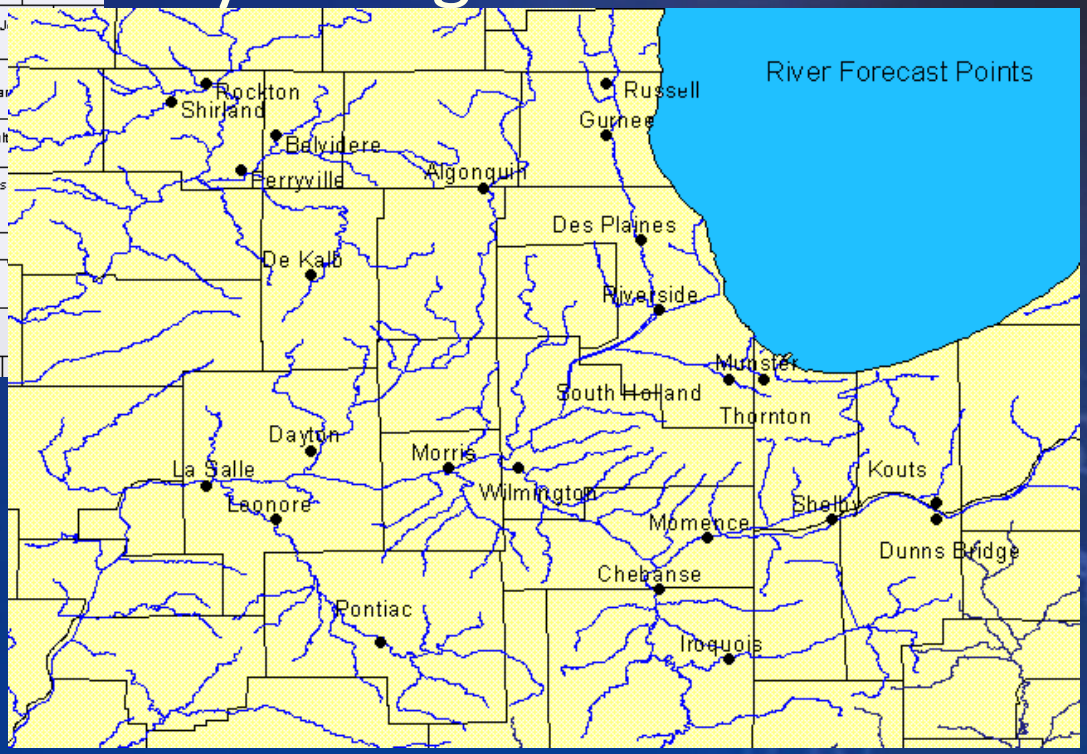

Joe Gagliano Plainfield IL, 4/18/13

Bill Morris
Hydrologist
NWS Chicago/Romeoville, IL
William.morris@noaa.gov

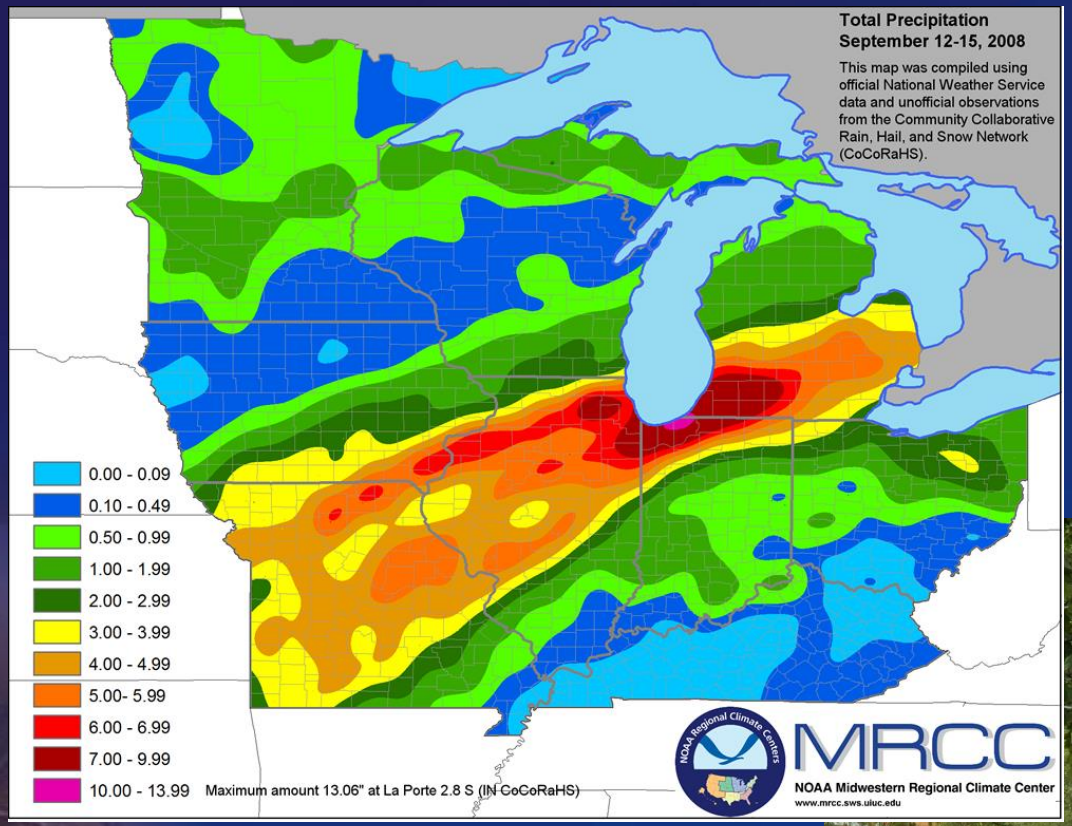
NWS Chicago
County Warning Area

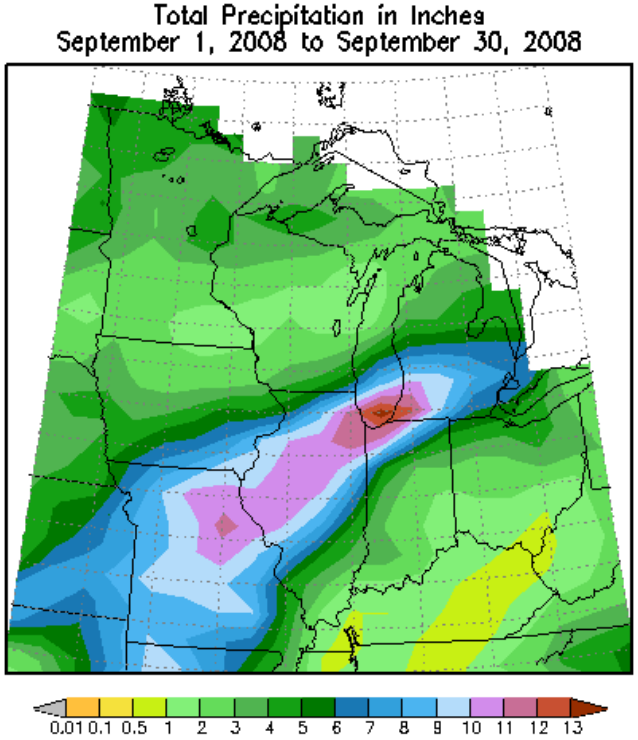


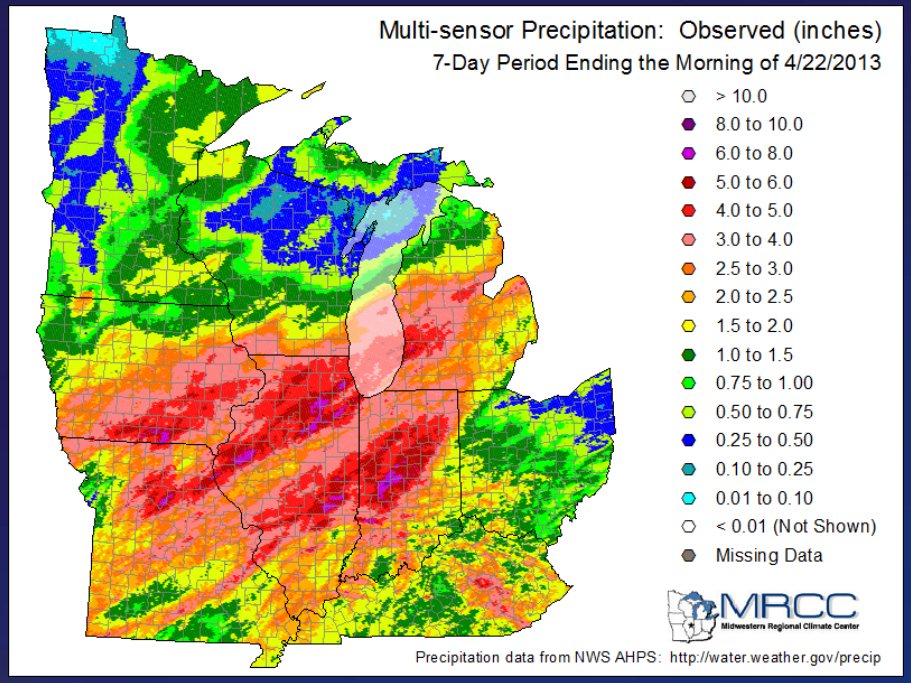
Hydrologic Service Area



September 2008



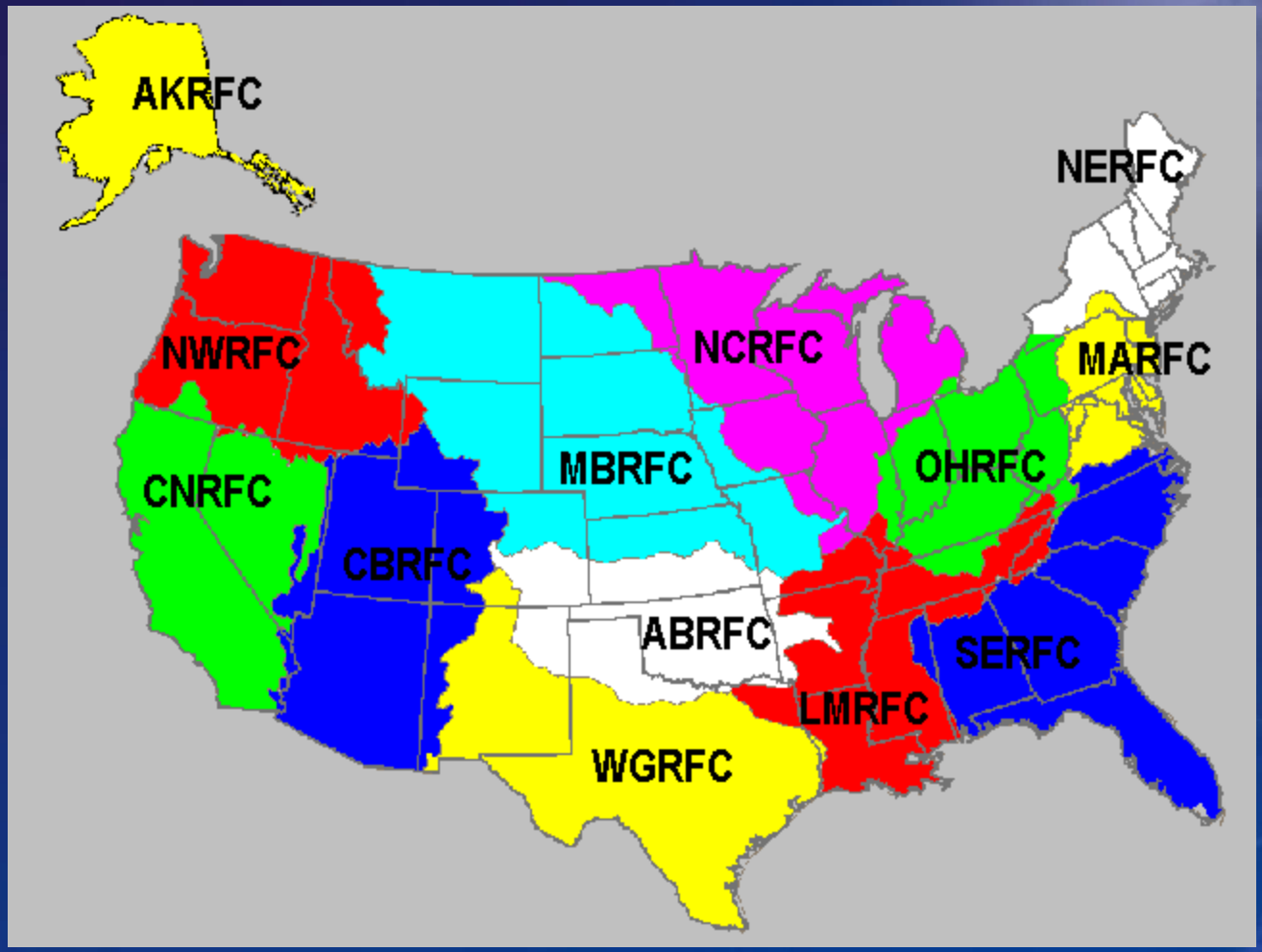



Multi-sensor Precipitation: Observed (inches)
7-Day Period Ending the Morning of 4/22/2013
> 10.0
8.0 to 10.0
6.0 to 8.0
5.0 to 6.0
4.0 to 5.0
3.0 to 4.0
2.5 to 3.0
2.0 to 2.5
1.5 to 2.0
1.0 to 1.5
0.75 to 1.00
0.50 to 0.75
0.25 to 0.50
0.10 to 0.25
0.01 to 0.10
< 0.01 (Not Shown)
Missing Data
MRCC
Midwestern Regional Climate Center
Precipitation data from NWS AHPS: http://water.weather.gov/precip

April 2013


48 Hour Rainfall Through 7 am April 19th as Estimated by Radar
Janesville
Mt Pleasant
Racine
Dubuque
Mississippi Palisades State Park
Rockford
Waukegan
Cedar Rapids
Elgin
Schaumburg
Austin
Chicago
Clinton
Naperville
Oak Lawn
South Bend
Iowa City
Bettendorf
Davenport
Joliet
Gary
Mt Pleasant
Galesburg
Peoria
Burlington
Pekin
Bloomington
Lafayette
Kokomo
Champaign
Danville
Illinois
Indiana
100 km
16
14
12
10
8.0
6.0
5.0
4.0
3.0
2.5
2.0
1.5
1.0
0.75
0.50
0.25
0.10
0.01
Missing

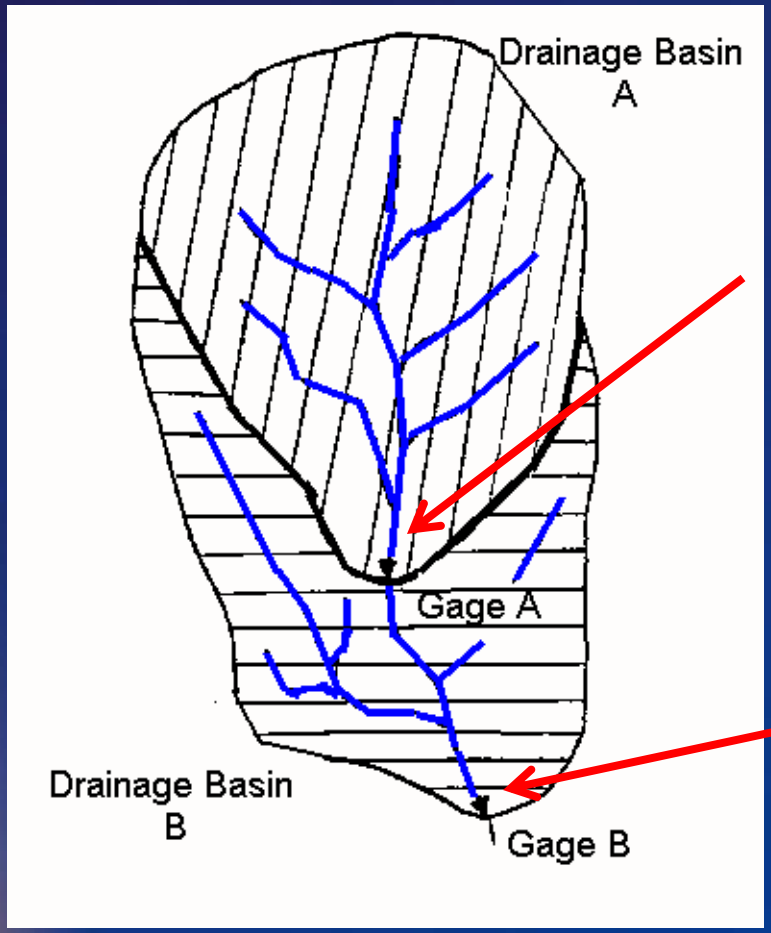
NWS River Forecast Centers



River Forecasting Steps

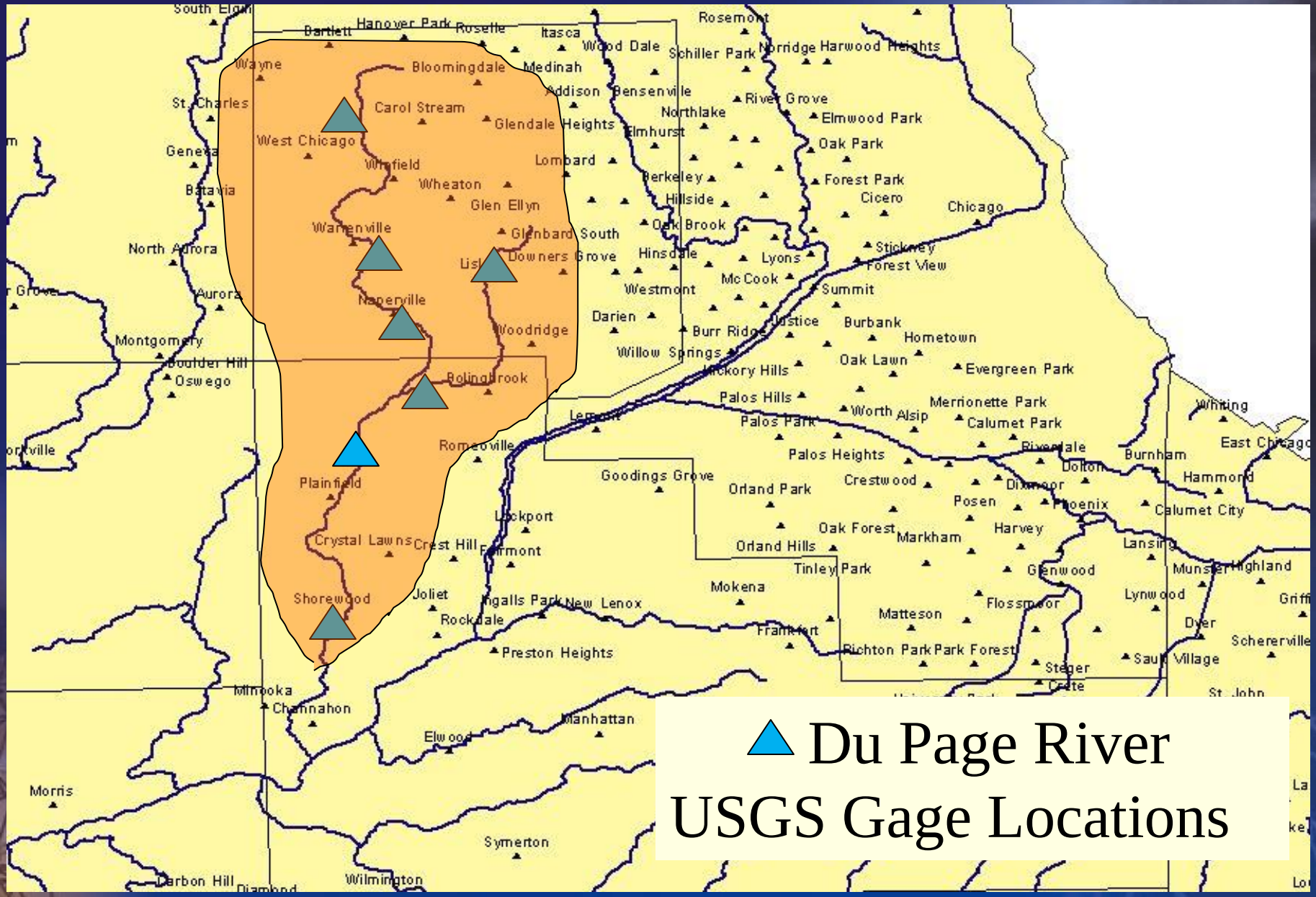
- ✓ Define the river system's hydrology
- ✓ Estimate basin average **precipitation**
- ✓ Add the QPF (Quantitative Precipitation Forecast)
- ✓ Estimate basin average **runoff** (snowmelt in winter)
- ✓ Compute how much water is coming from upstream
- ✓ Add together the water coming from all sources
- ✓ Convert the total **discharge** into a **stage**

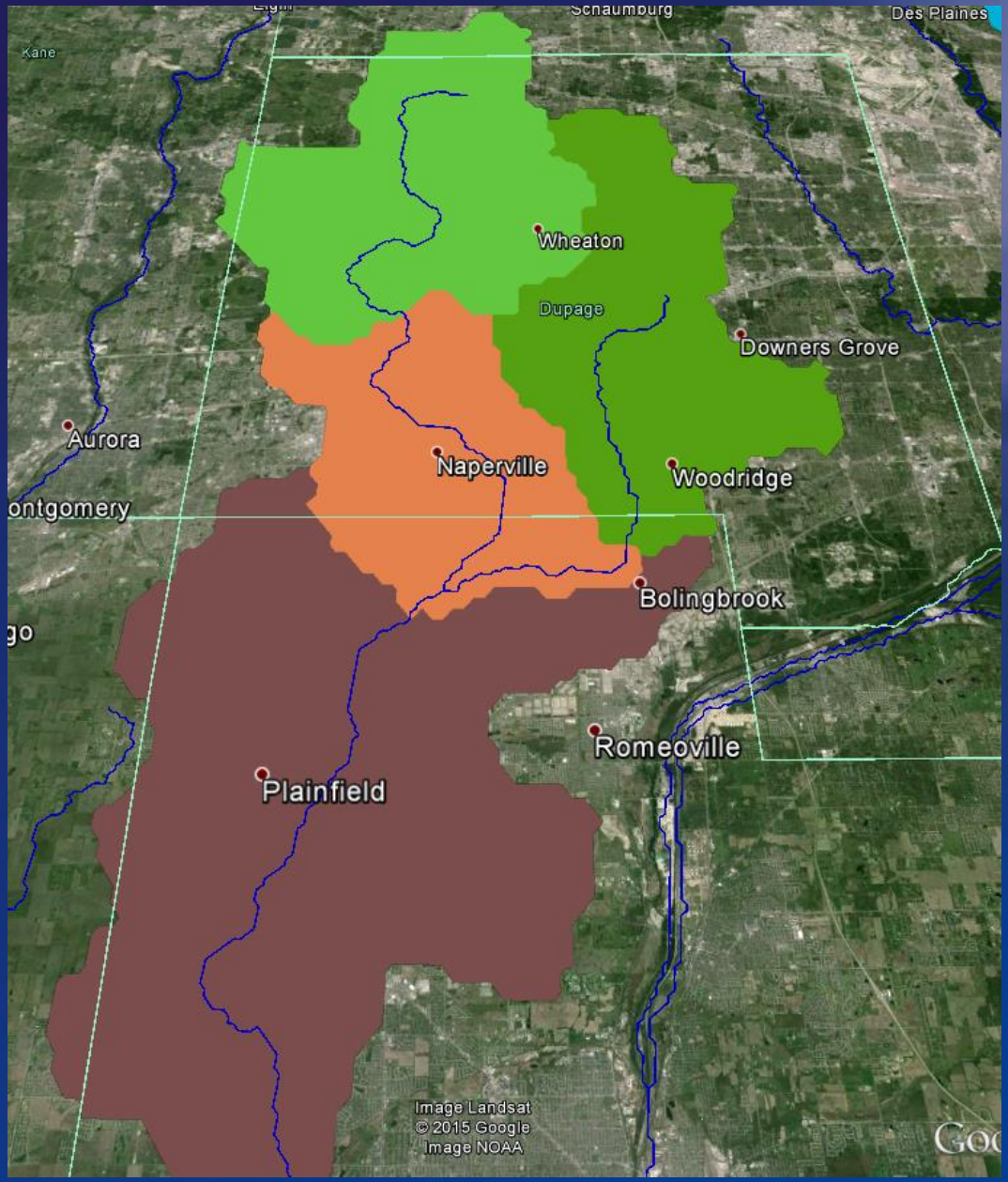
River Basins



Forecast created for location at gage "A". Includes "local" inflow from basin.

Forecast created for location at gage "B". Local inflow + routed flow from gage A.


Du Page River
USGS Gage Locations


Schaumburg
Des Plaines
Kane
Wheaton
Dupage
Downers Grove
Aurora
Naperville
Woodridge
ontgomery
Bolingbrook
go
Romeoville
Plainfield
Image Landsat
© 2015 Google
Image NOAA

Basin Precipitation

- Automated rain gauges
- Volunteer Observers
  - NWS Cooperative Observer Network
  - CoCoRaHS
- Airborne Snow Surveys
- Doppler radar estimates

Automated Rain Gauges

National Weather Service Cooperative Observers

- **Over 11,000 volunteers nationwide**
- **Report daily precipitation**
- **Record rainfall and snow data**

www.cocorahs.org

Map Type	Map Location		Date	Colors	
Precipitation	Illinois	DP - Du Page	4/18/2013	Standard	Get Map

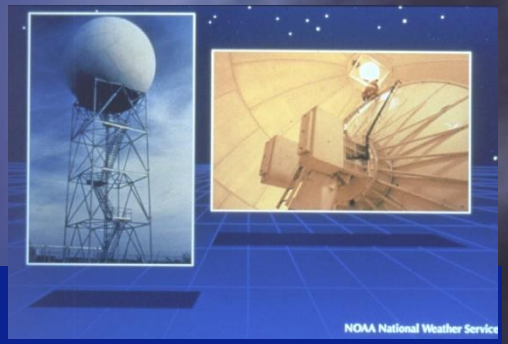
Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
Du Page County, Illinois 4/18/2013

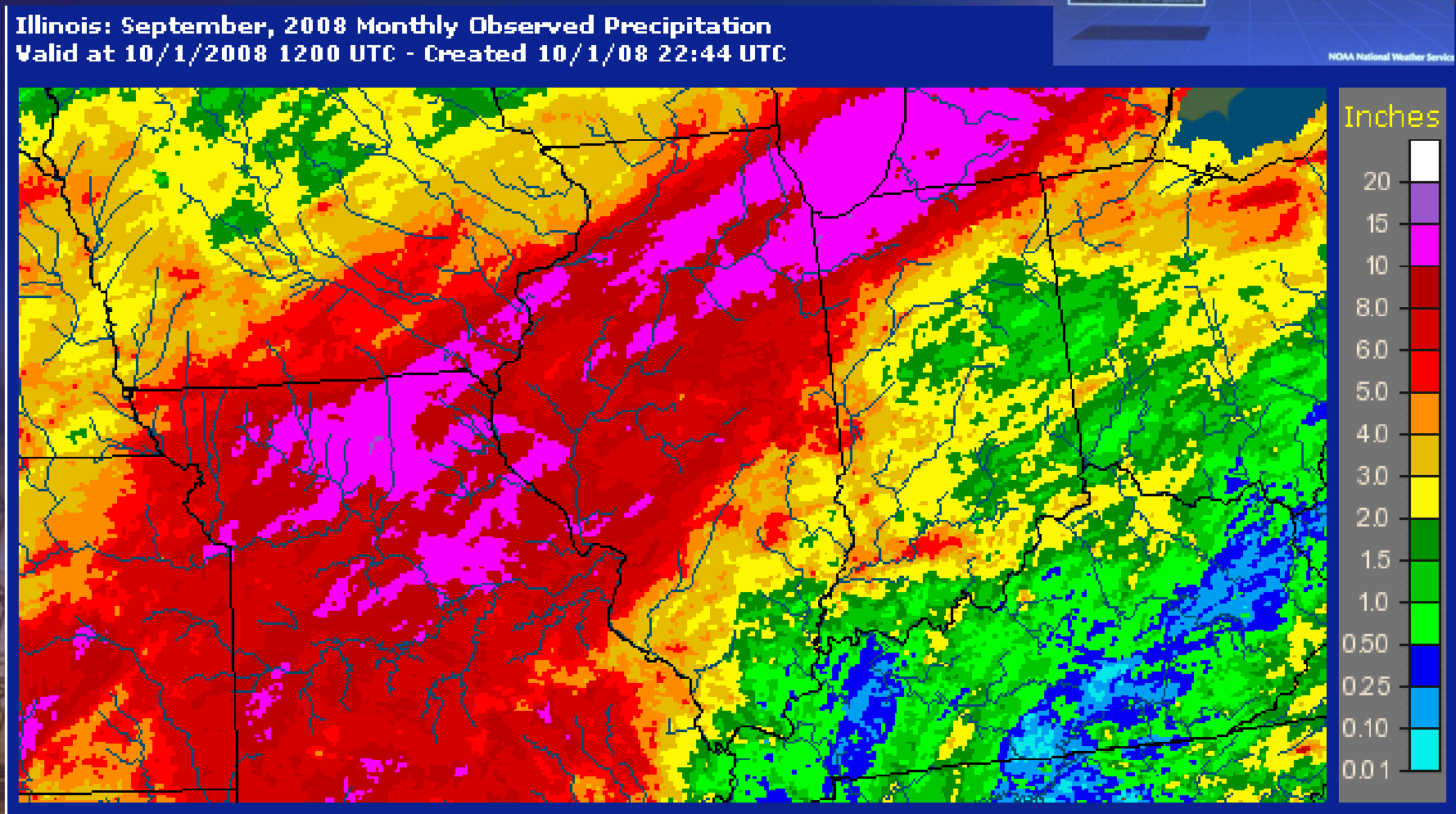
0.0 | Trace | 0.01 - 0.33 | 0.34 - 0.66 | 0.67 - 1.66 | 1.67 - 3.99 | 4.00 - 5.99 | 6.00 - 6.66

DuPage
Kane
Cook
Will
Kendall

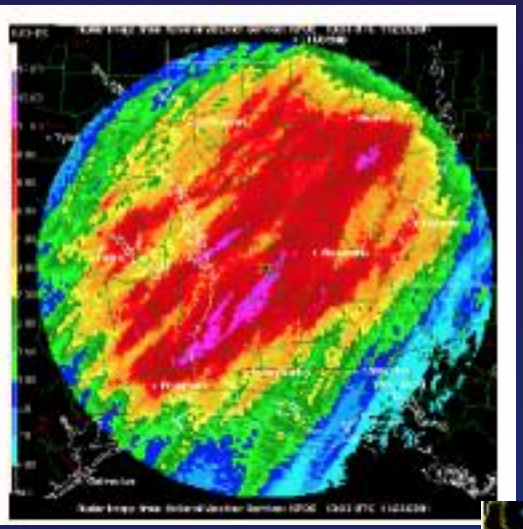
COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK
"Because every drop counts"

Doppler Radar Rainfall Estimates

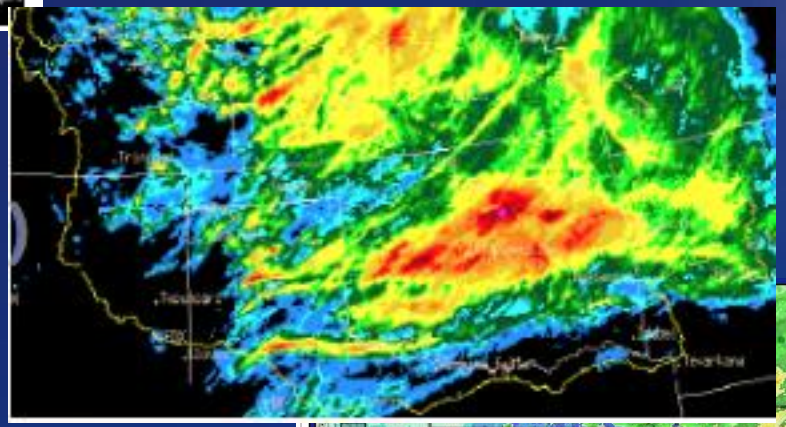




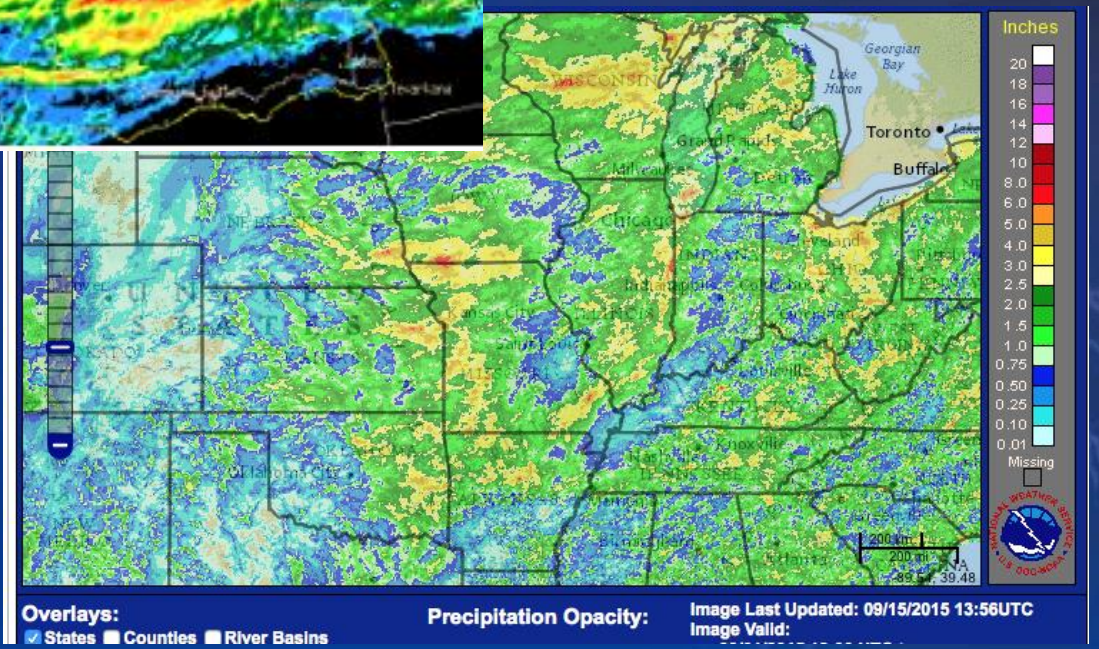
Quantitative Precipitation Estimation (QPE)



Local Radar

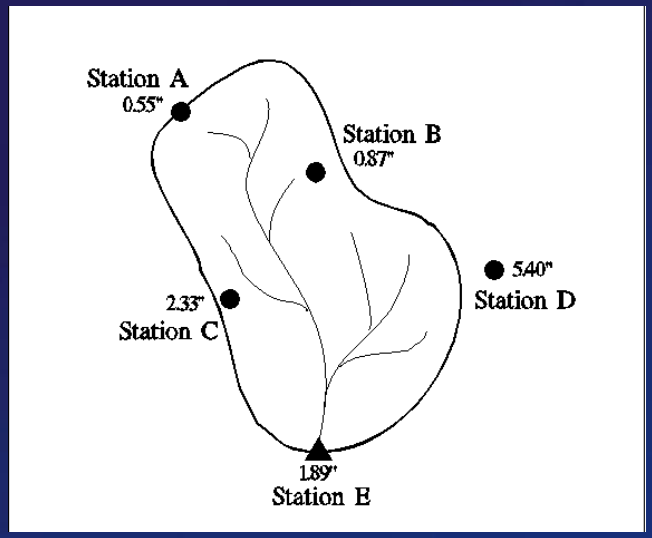


Regional QC with rain gauge data

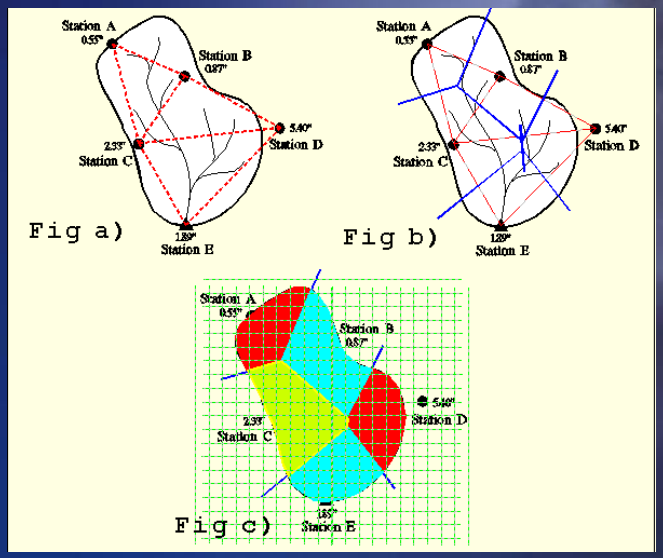


National Map

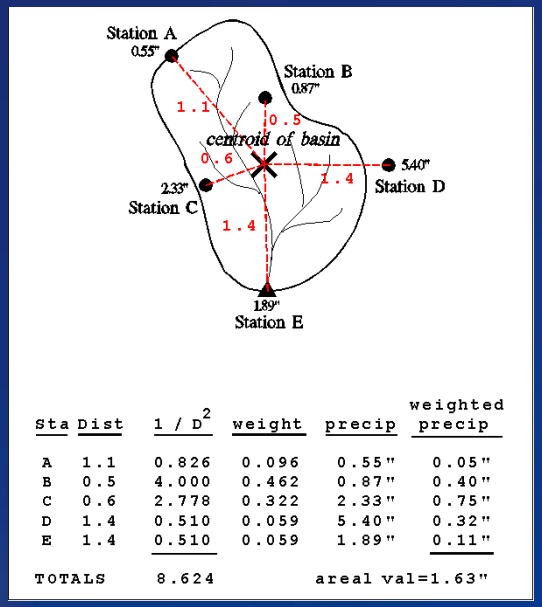
Compute Basin Average Precipitation



Arithmetic Mean

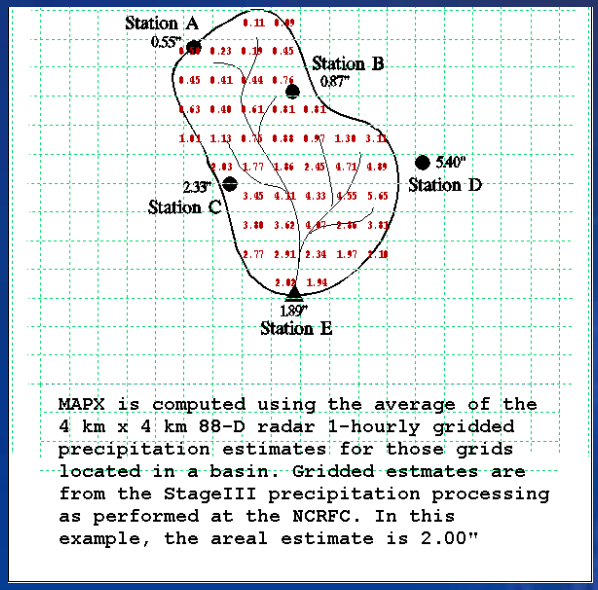


Thiessen Polygon



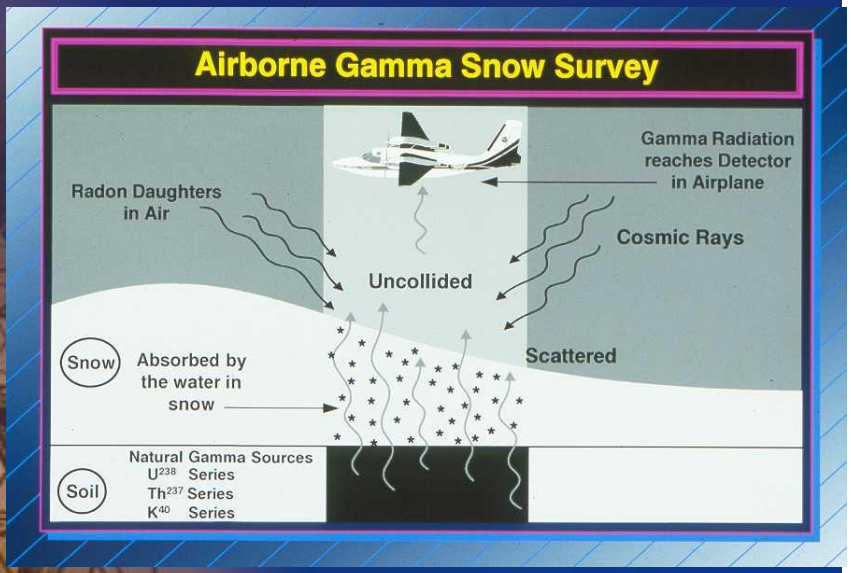
Sta	Dist	1 / D^2	weight	precip	weighted precip
A	1.1	0.826	0.096	0.55"	0.05"
B	0.5	4.000	0.462	0.87"	0.40"
C	0.6	2.778	0.322	2.33"	0.75"
D	1.4	0.510	0.059	5.40"	0.32"
E	1.4	0.510	0.059	1.89"	0.11"
TOTALS		8.624		areal val=1.63"	

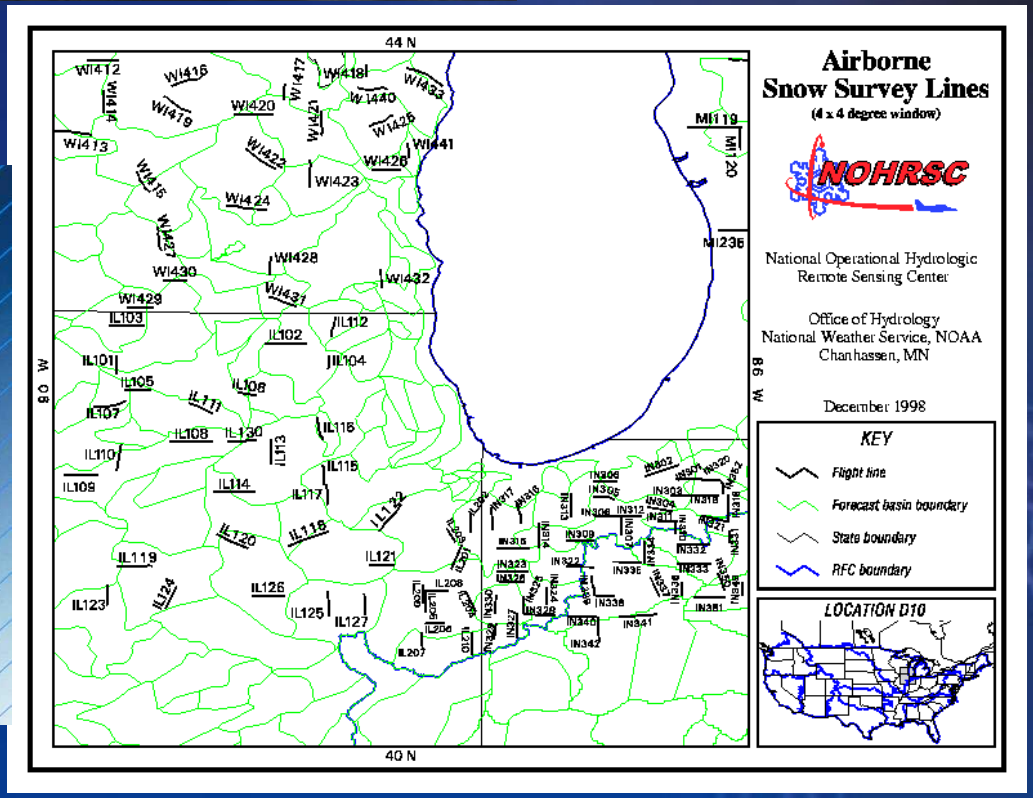
Distance Weighted



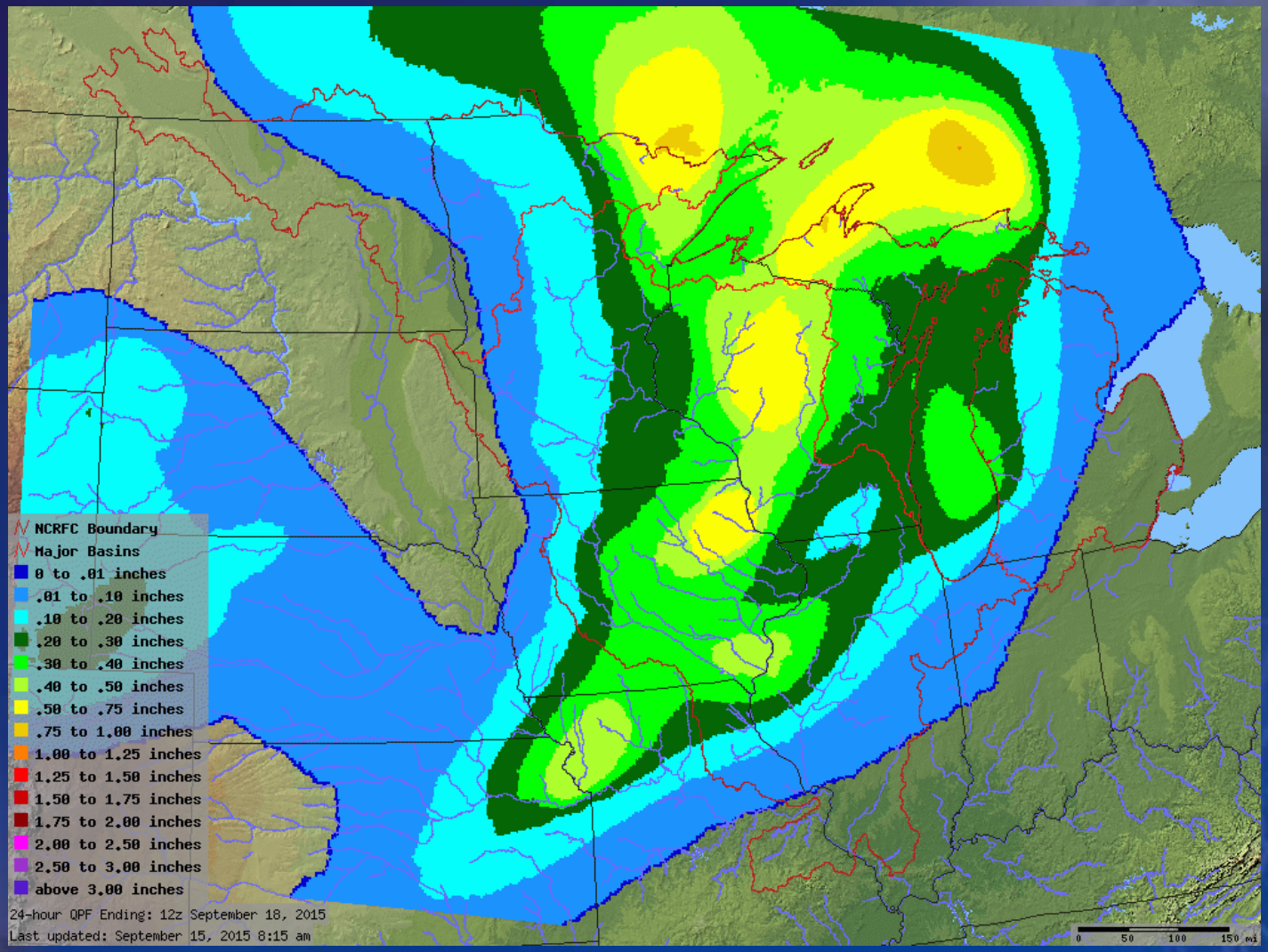
Gridded Radar Estimates

Airborne Snow Surveys



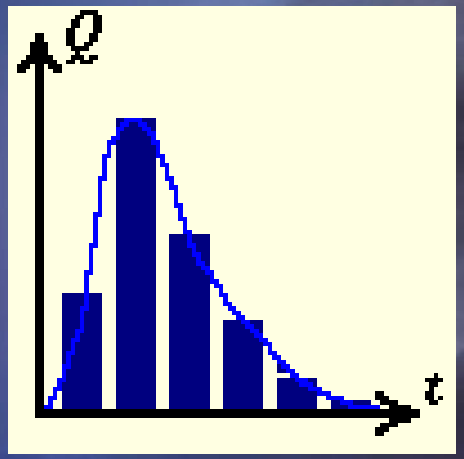


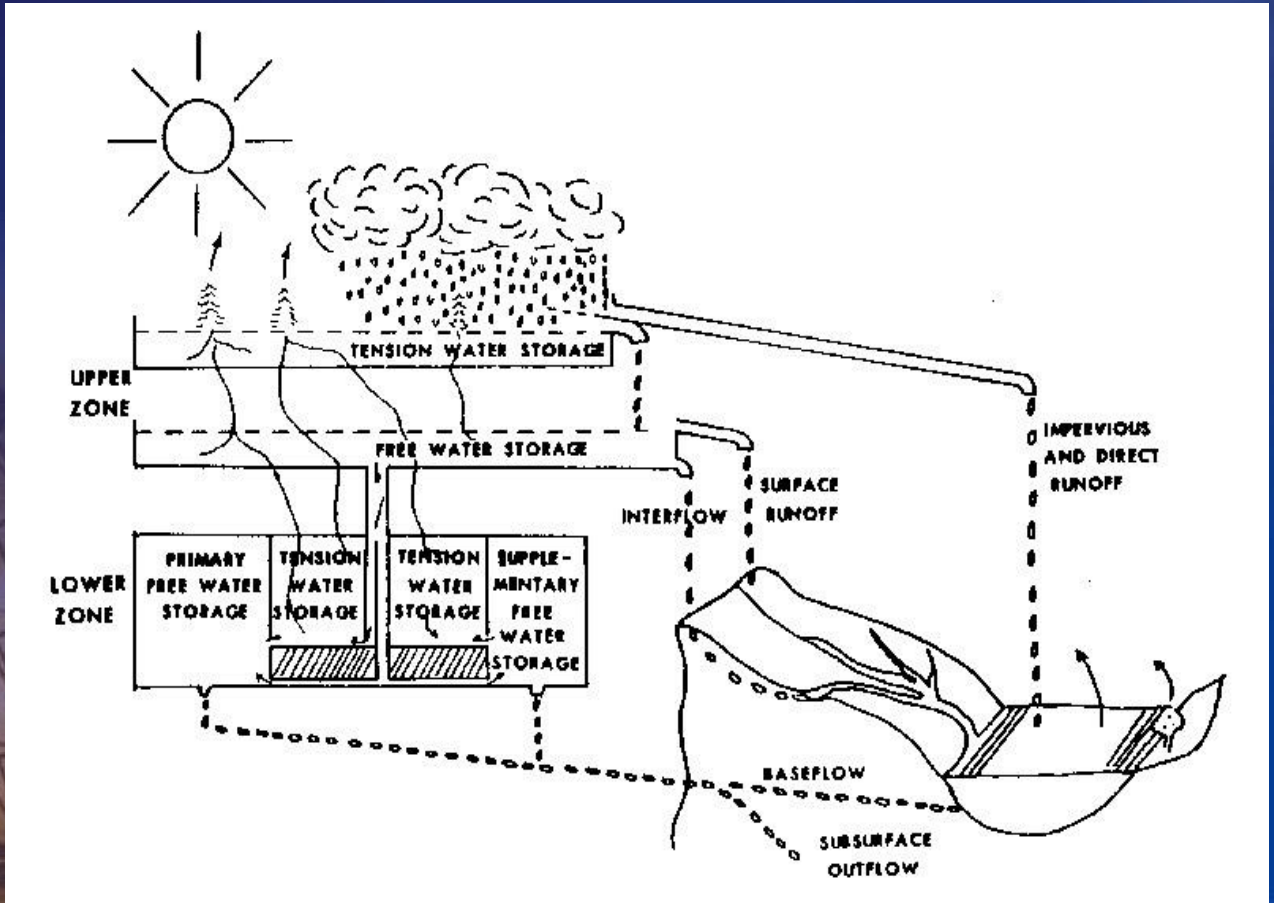
Quantitative Precipitation Forecast (QPF)



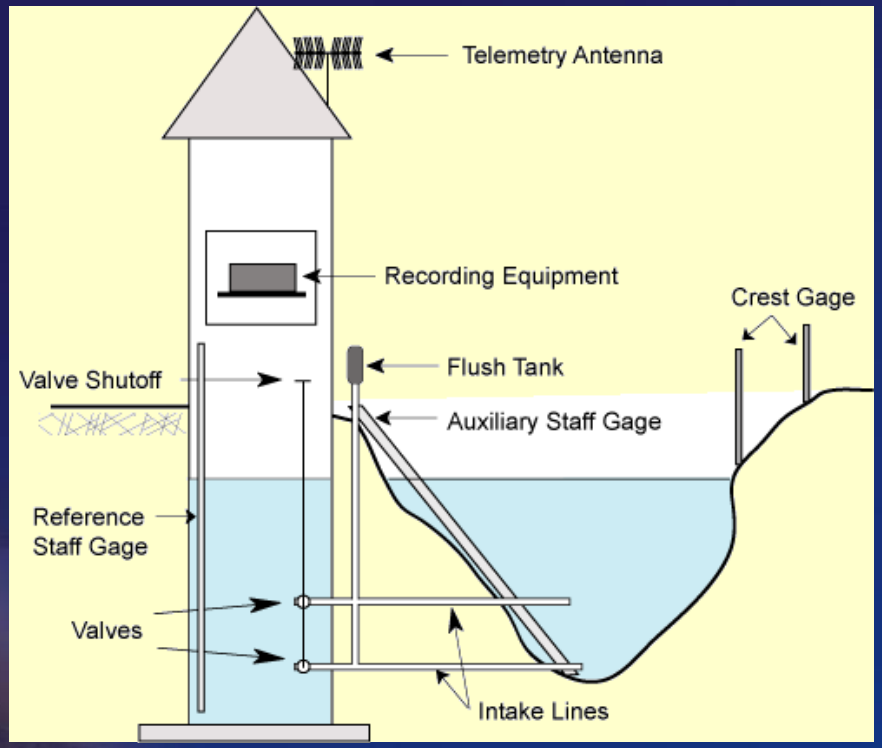
Compute rainfall to runoff

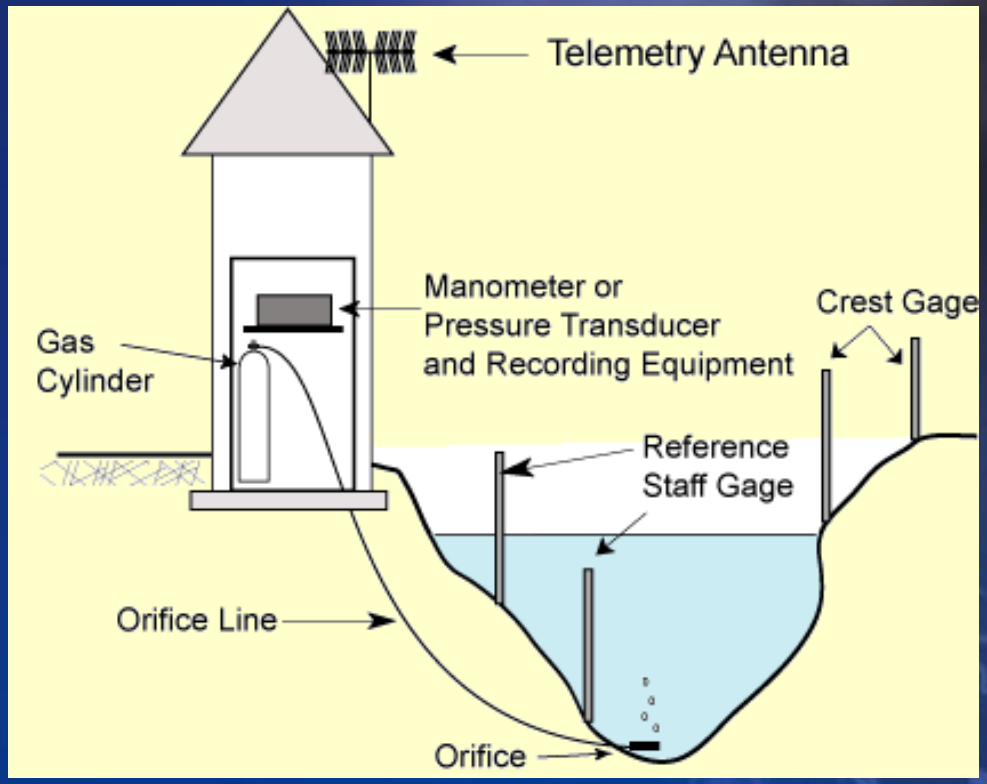
- Soil moisture model
- Unit hydrograph
  -converts runoff to flow





Measuring River Stage





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science for a changing world

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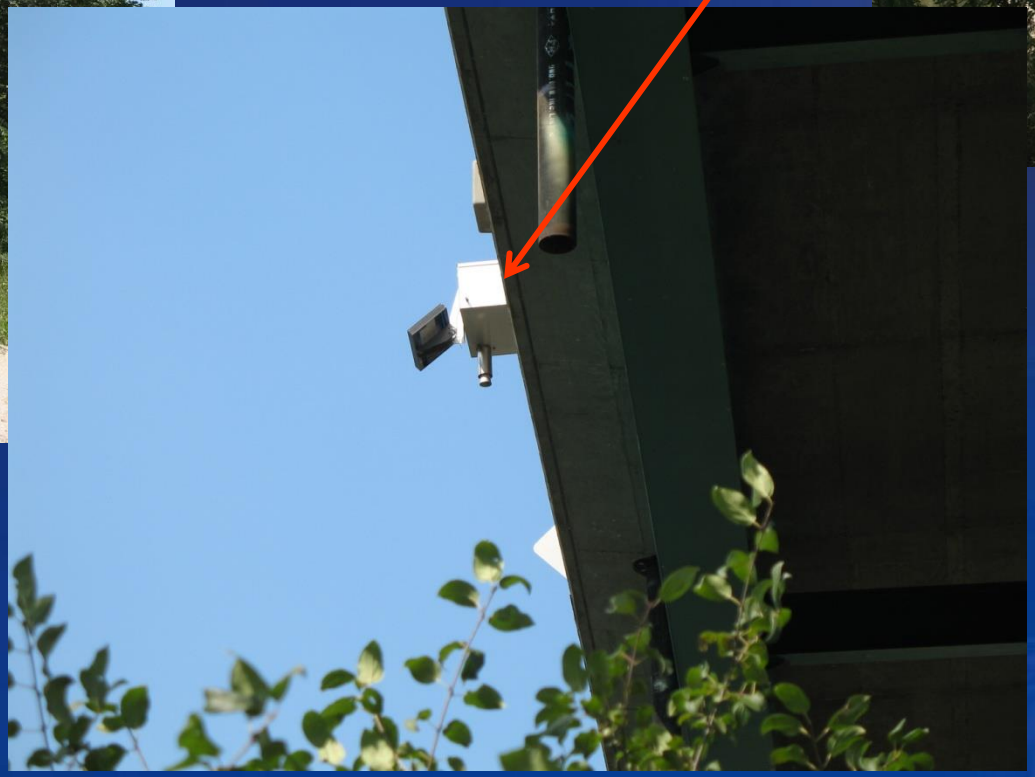
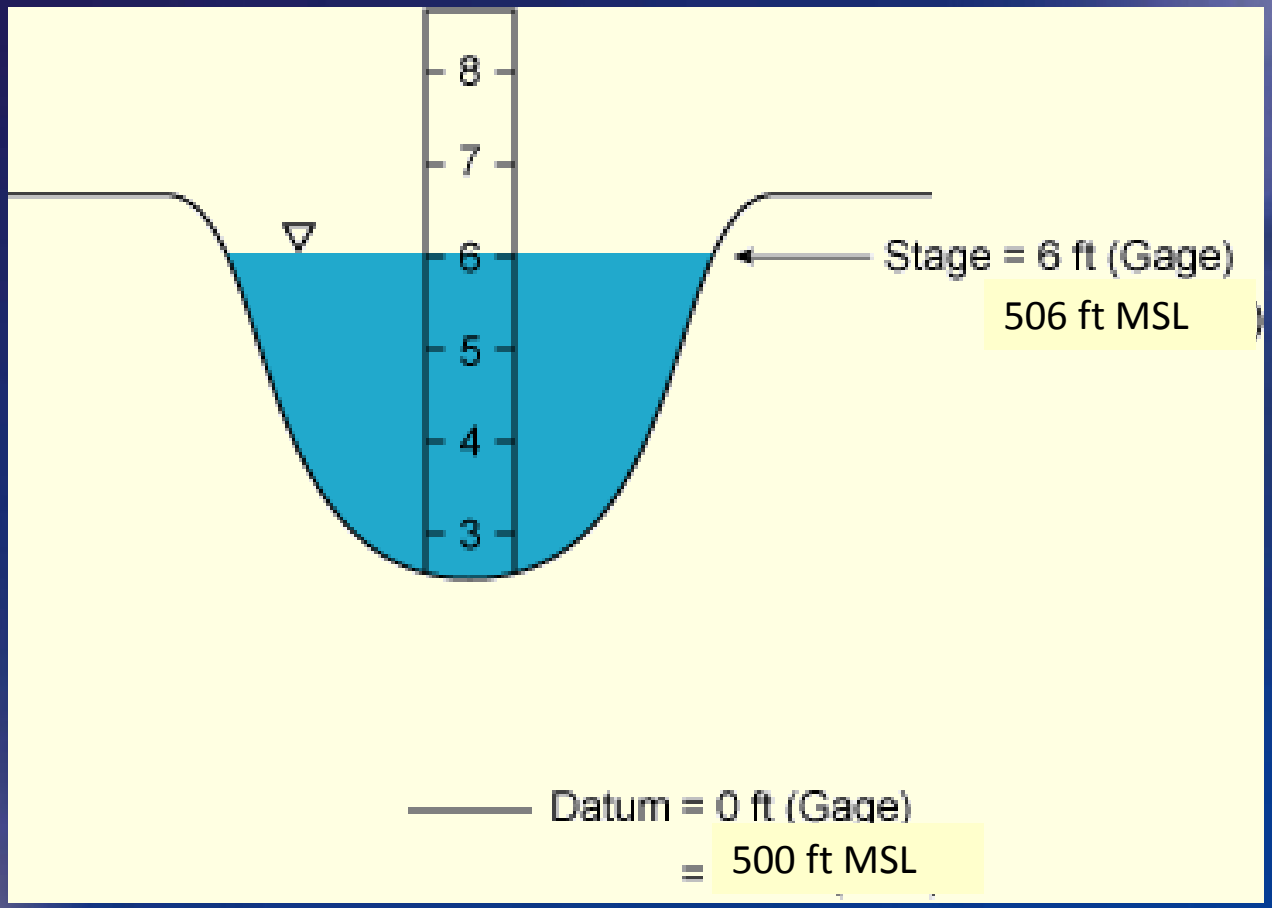
Non-contact Gages

Fox River at
Dayton, IL
Radar Gage



Iroquois River near Foresman, IN Radar Gage

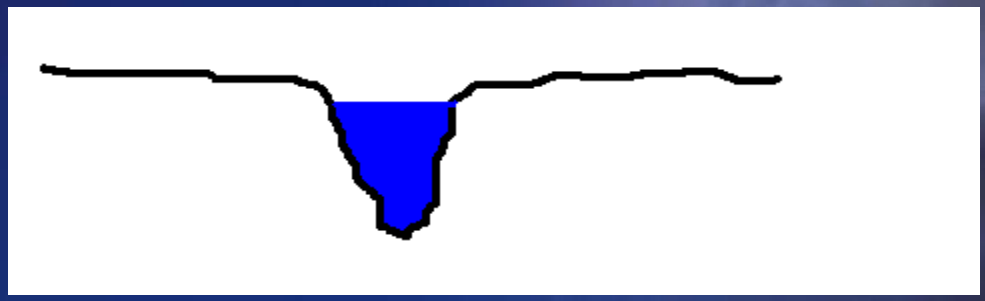
What is a river "stage"?



You can't make meaningful river stage comparisons between 2 different locations.

Flow however is more representative.

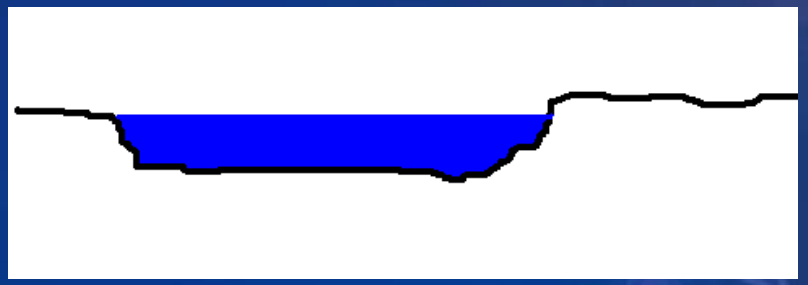
Location A



Cross section A

Stage = 8 feet Flow 400 cfs

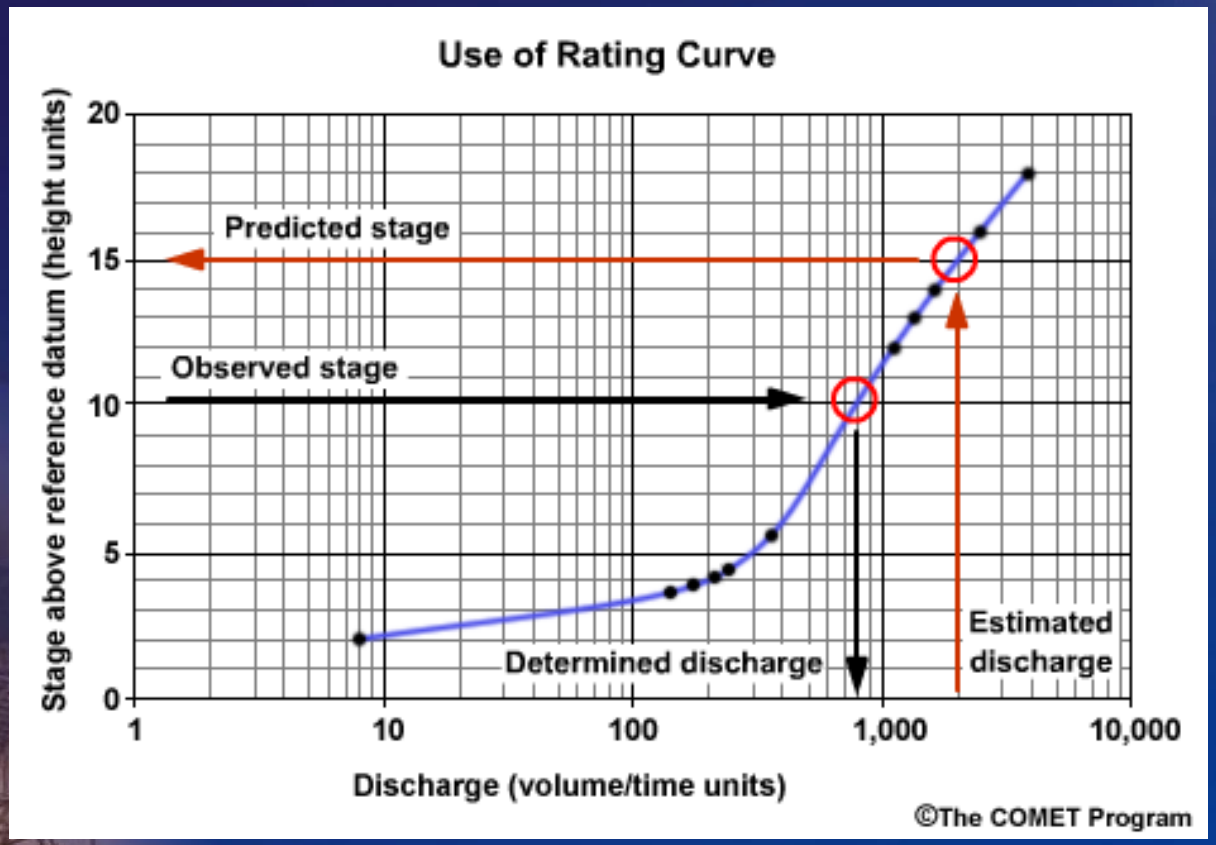
Location B



Cross section B

Stage = 3 feet Flow 800 cfs

Converting Flow to Stage with the rating curve



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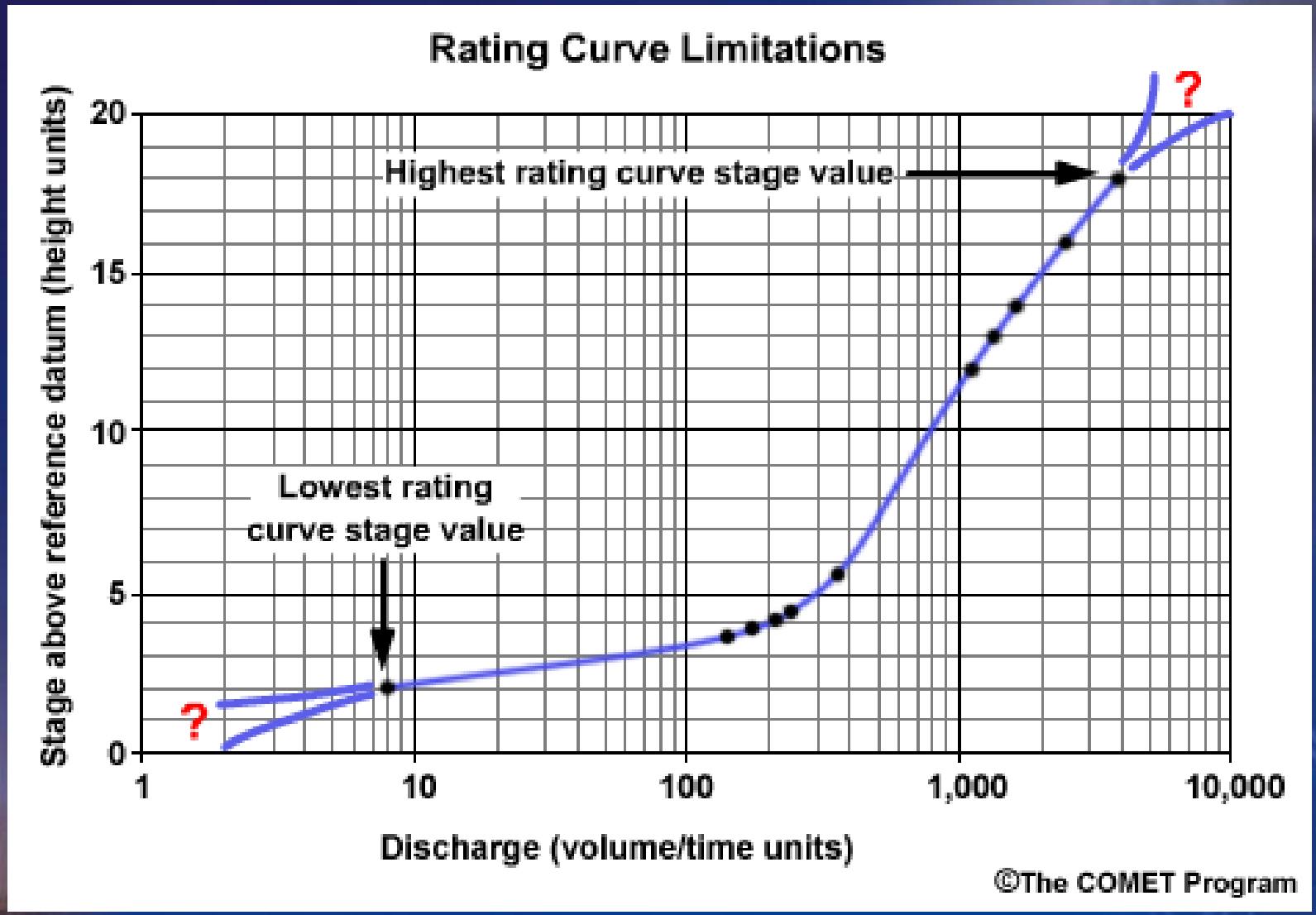
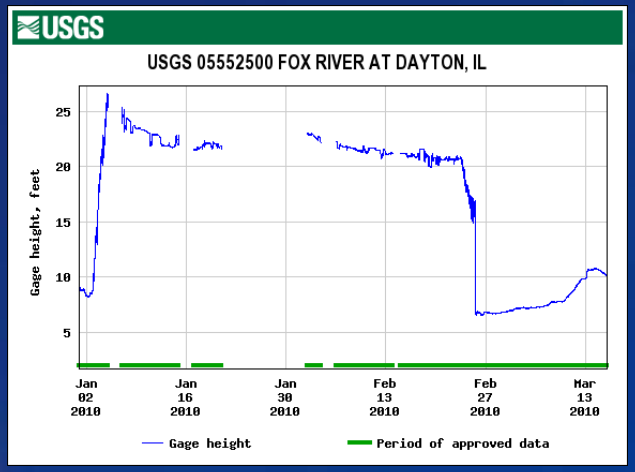
River Forecast Challenges

- Assumes even rainfall distribution
- Timing of precipitation
- Rainfall network density
- Radar rainfall estimate issues
- Forecast rainfall (QPF) may have significant impact on crest forecasts
- River stage data availability

Extending the Rating During Record Events



Ice Jams

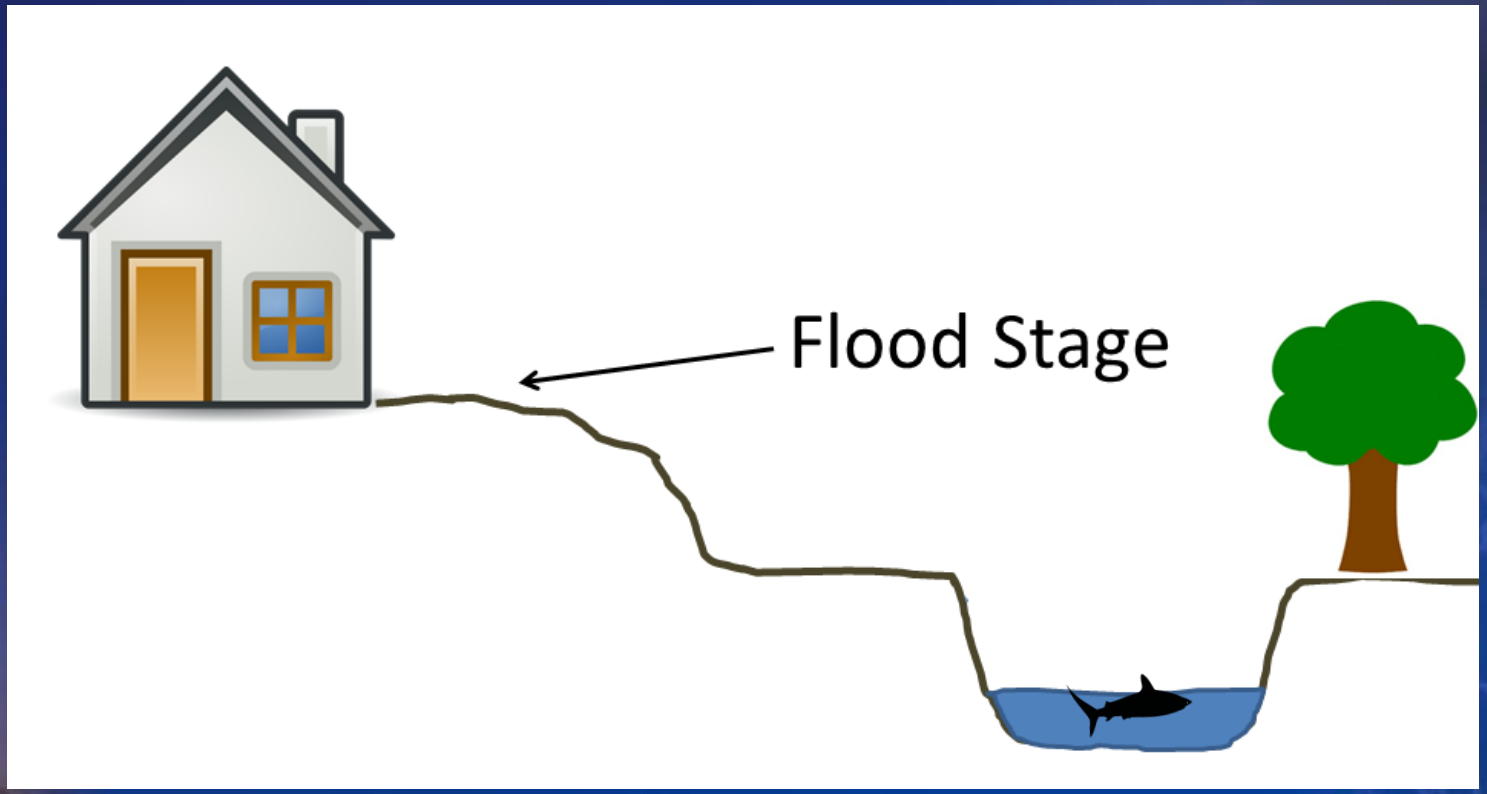

USGS
USGS 05552500 FOX RIVER AT DAYTON, IL
Gage height, feet
25
20
15
10
5
Jan 02 2010
Jan 16 2010
Jan 30 2010
Feb 13 2010
Feb 27 2010
Mar 13 2010
Gage height
Period of approved data

Cooperative Effort

- National Weather Service
- U. S. Geological Survey
- U. S. Army Corps of Engineers
- Other state and local agencies

NWS Flood Stage

The elevation, or stage, at which overflow of the natural banks of a stream begins to cause damage or begins to present a potential flood-damage hazard in the reach in which the elevation is measured.



Flood Categories

Minor Flooding - minimal or no property damage, but possibly some public threat.

Moderate Flooding - some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations.

Major Flooding - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations.

Impact statements add value to river forecasts and correlate river stages to flood impacts.

We need your help to ensure the impacts we have are current/valid.

Flood Impacts & Photos

Collapse

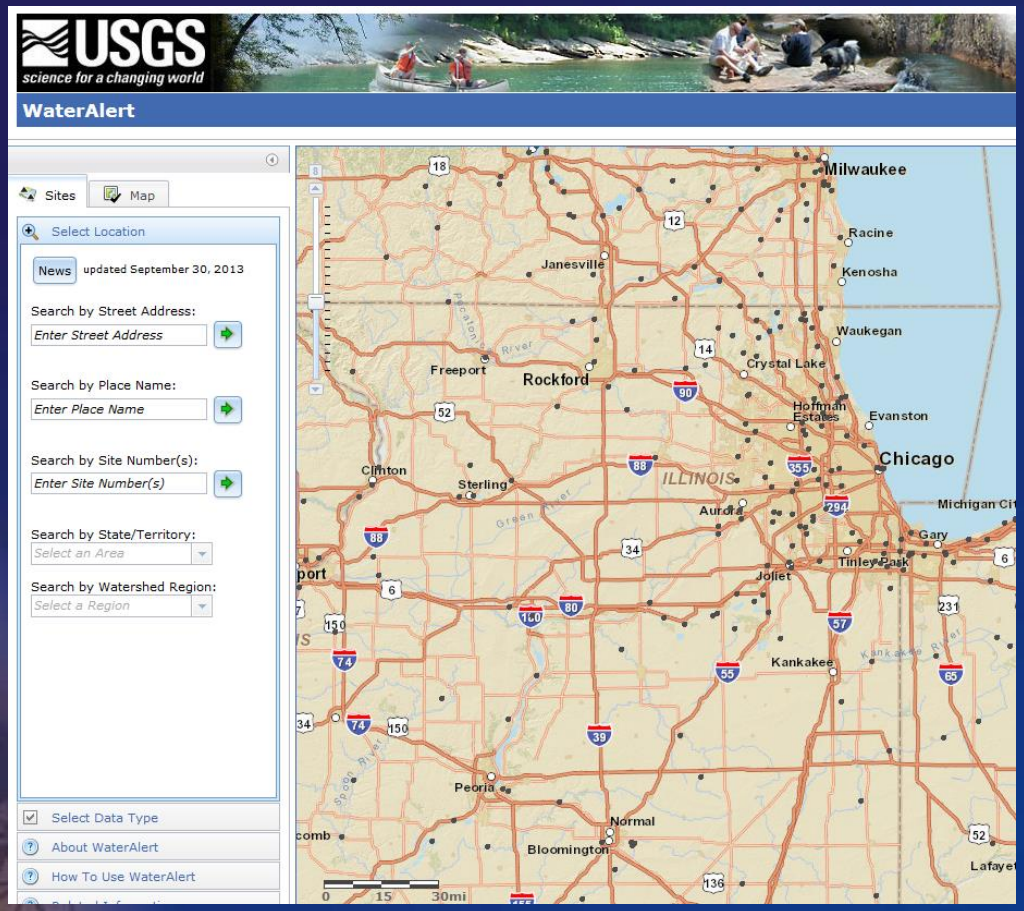
If you notice any errors in the below information, please contact our Webmaster

17.5 Lincolnshire Drive is closed from Cambridge Lane to Oxford Drive; Wiltshire Dr closed from Lincolnshire Dr to Cumberland; Cumberland Dr impacted; Oxford Drive between Half Day Rd and Essex Lane impacted; Stonegate Circle impacted; Half Day Rd between Village Hall and Oxford Drive (including Rt 22 bridge over Des Plaines River) potentially impacted.

15.5 Water approaches the top of the river bank on the east side of the Des Plaines River.

12.7 Water begins to pond on Lincolnshire Drive at Wiltshire Lane. Londonderry Lane is closed between Lincolnshire Drive and 45 Londonberry Lane.

12.3 Water begins to overflow onto Londonderry Lane.



Email
- or -
Text alerts

water.usgs.gov/wateralert/

June 2015 Flooding

Iroquois River, Rensselaer, IN


Kankakee River Shelby, IN

QUESTIONS?