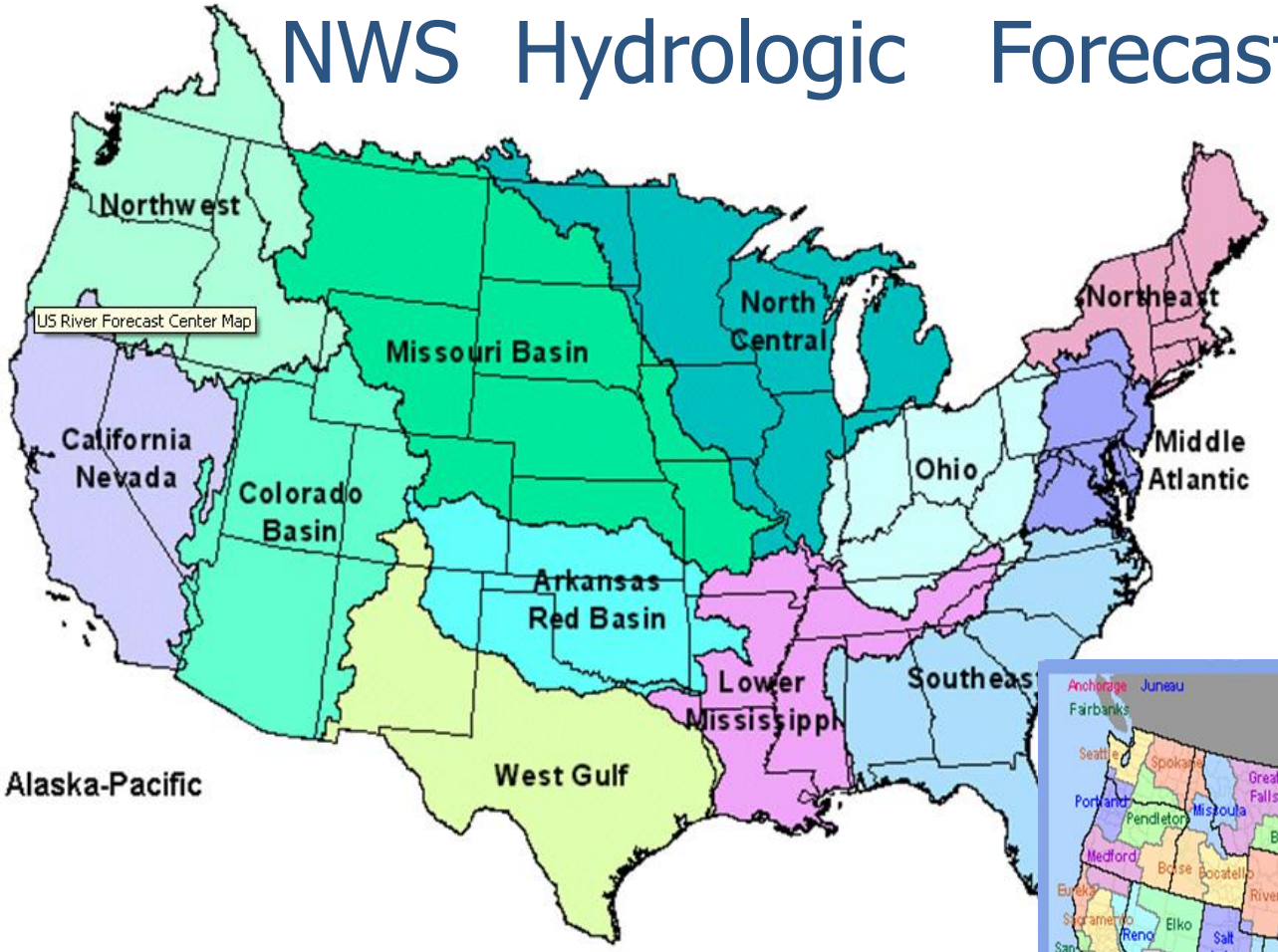
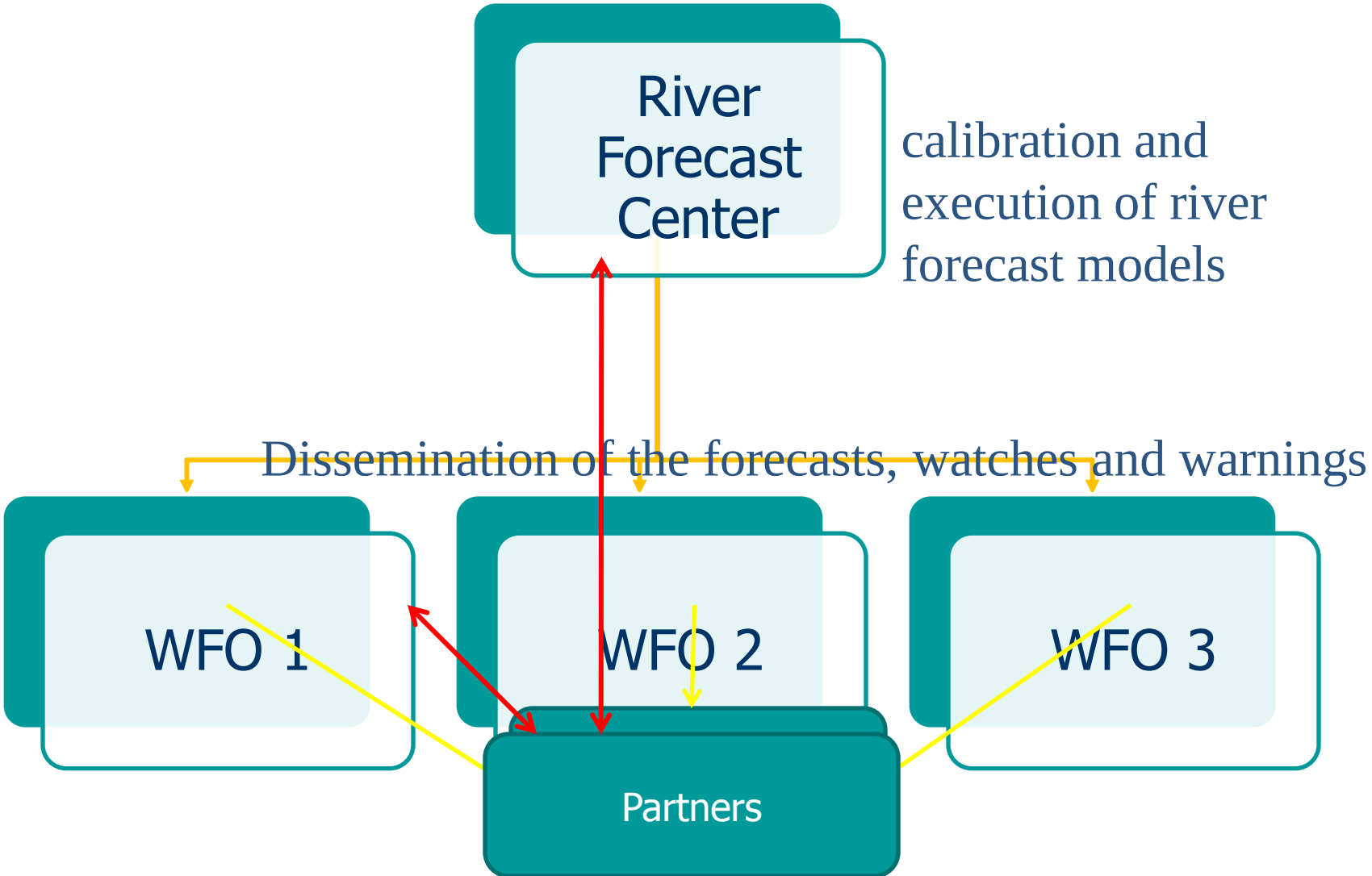
NWS Hydrologic Forecasting



Functions and relations



Hydrology Program

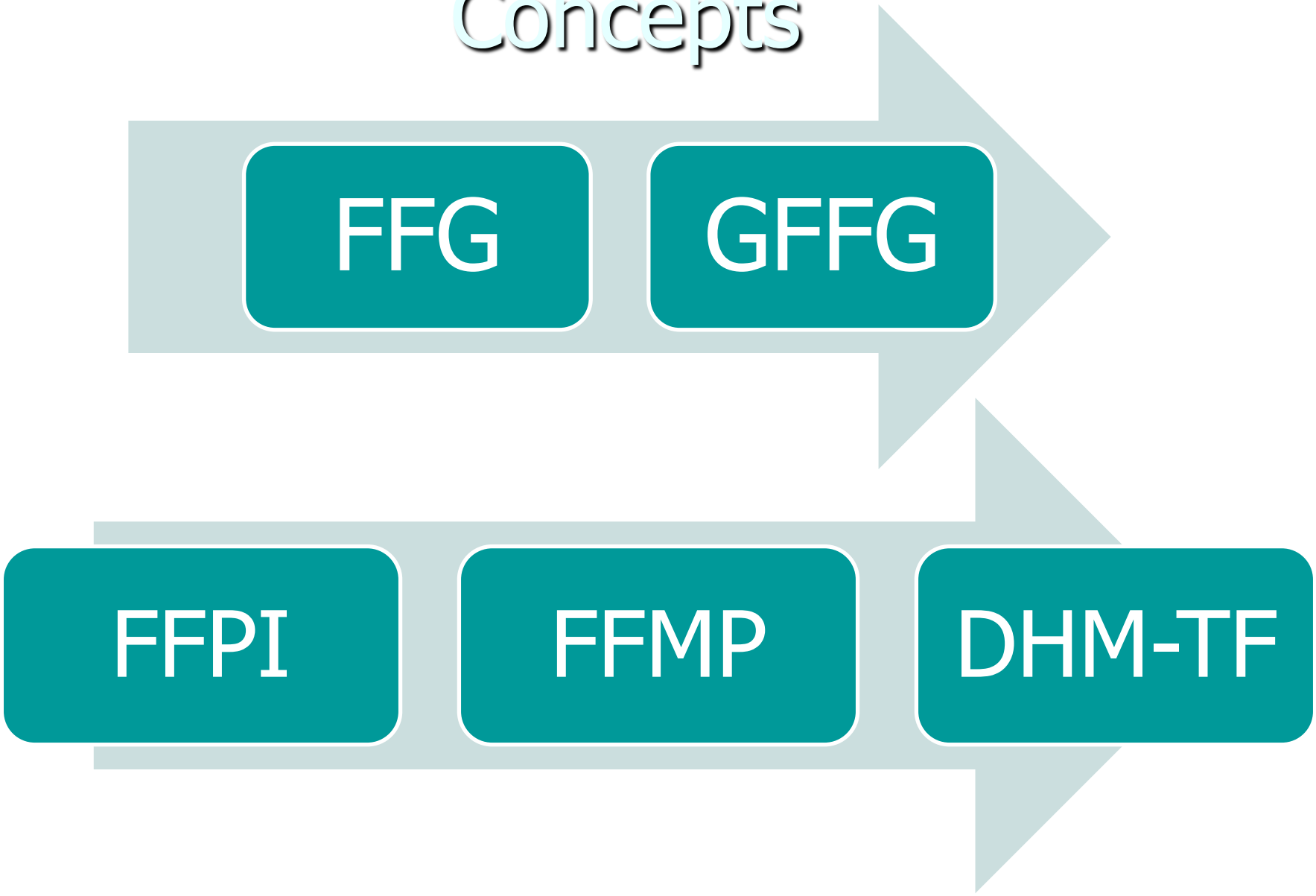
RFCs: Riverine Models > 6-hour response

WFOs: Site Specific Models < 6-hr response

Watches and Warning responsibility

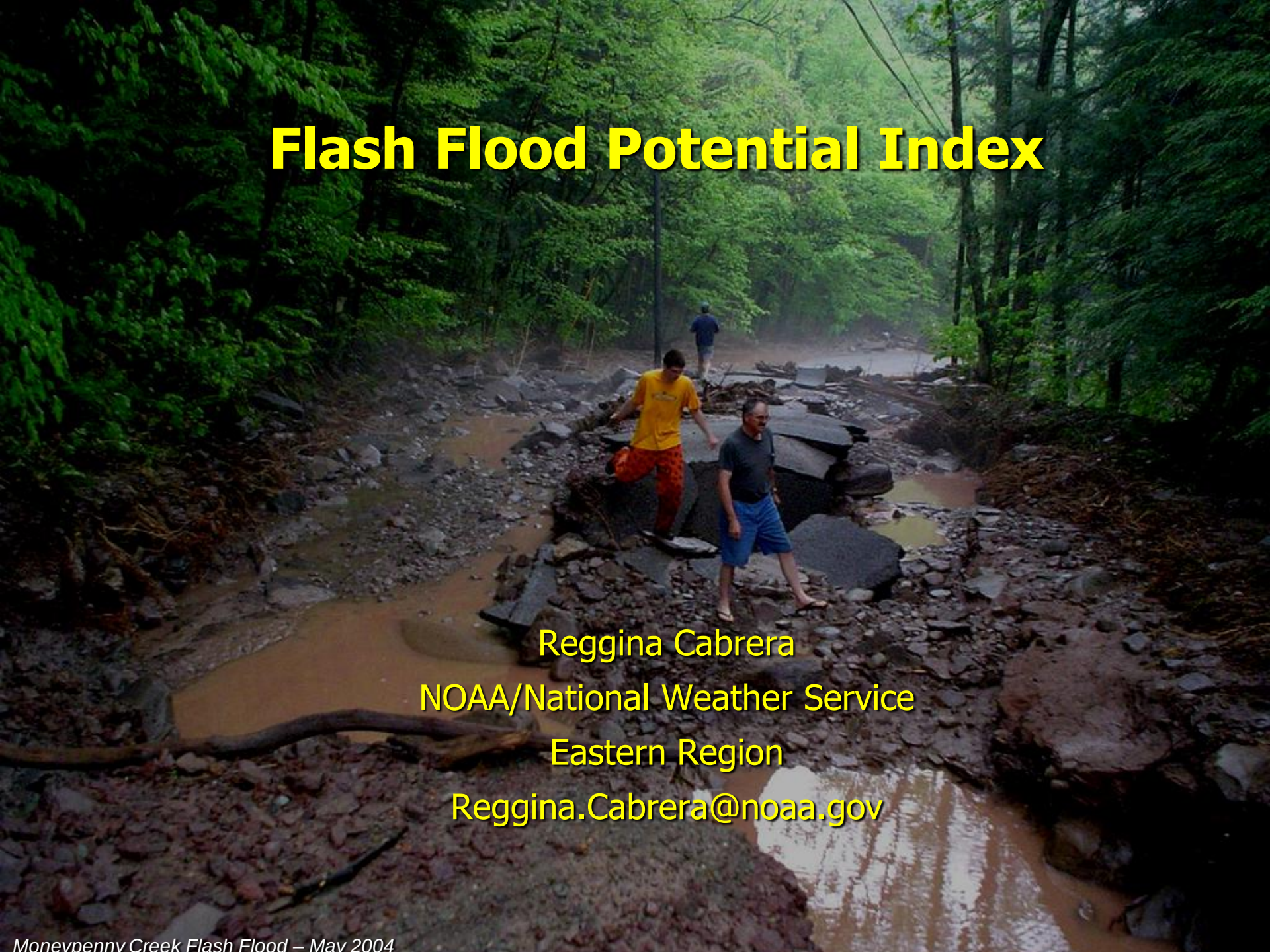
FFPI FFMP DHM-TF

Concepts



Questions ???

Flash Flood Potential Index



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Moneypenny Creek Flash Flood – May 2004

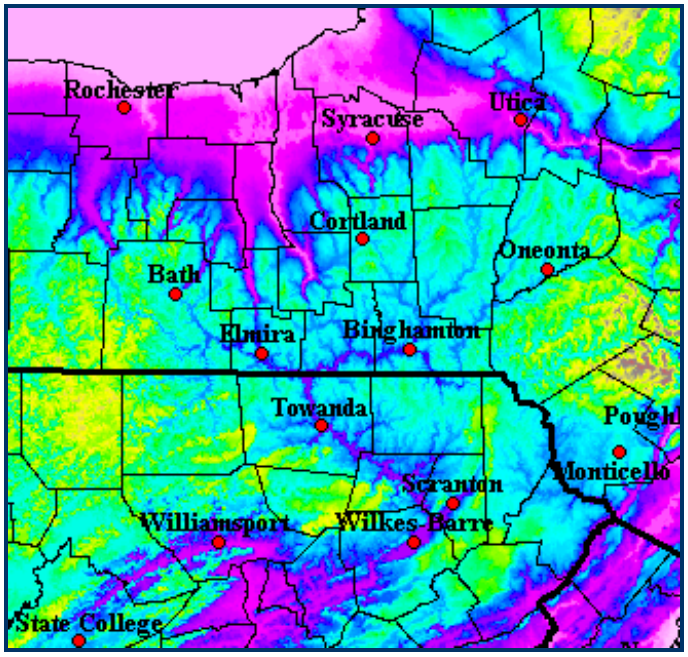
FFPI

- Shows areas that you should be concerned, where flash flooding could occur. It is static

Background

- Flash Flooding is a High Impact Hazard

- Because some areas are more prone to flash flooding than others. There is a need for a tool to visualize them.

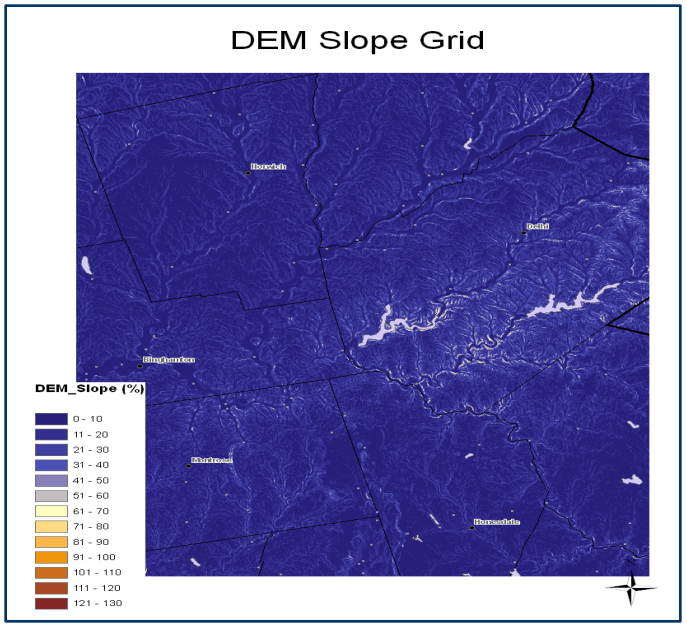


Flash Flood Potential Index (FFPI)

- Geographical features play a key role in flash flooding. By using FFPI, the influences of land, vegetation, and urbanization in flash flooding are visualized
- Developed as background information to be incorporated into production of better gridded Flash Flood Guidance
- "Guesswork" to the flash flood problem is reduced

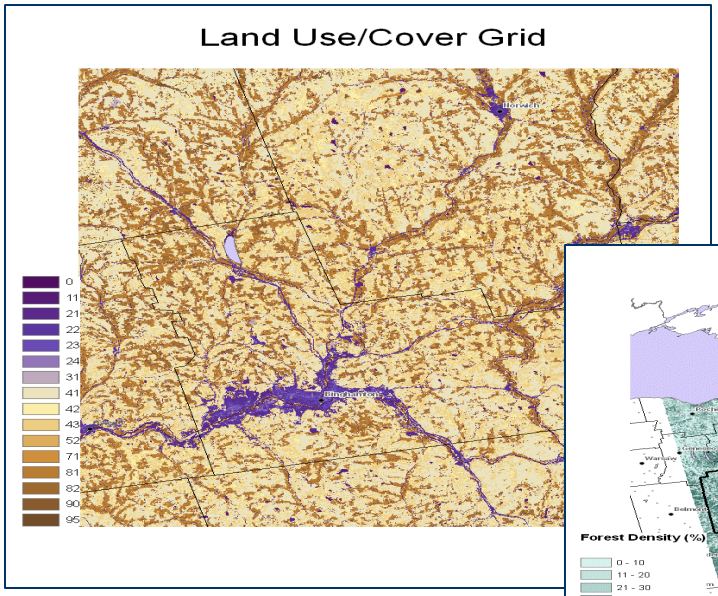
Methodology

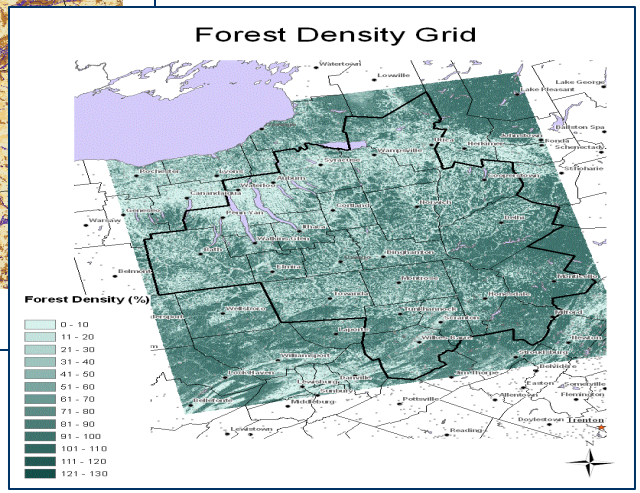
- Collected available geographic data sets
- Used GIS technology to resample, project and index the data into to a common value
- Develop a new geographic index grid…the FFPI

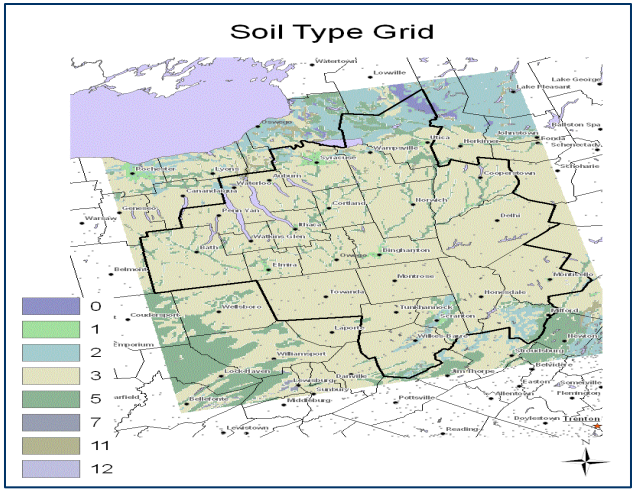


The Data

- Four geographic data sets :
  - Slope derived from the USGS DEM (Digital Elevation Model)
  - MLRC Land Use/Land Cover Grid
  - AVHRR Forest Density Grid
  - STATSGO Soil Type Classification



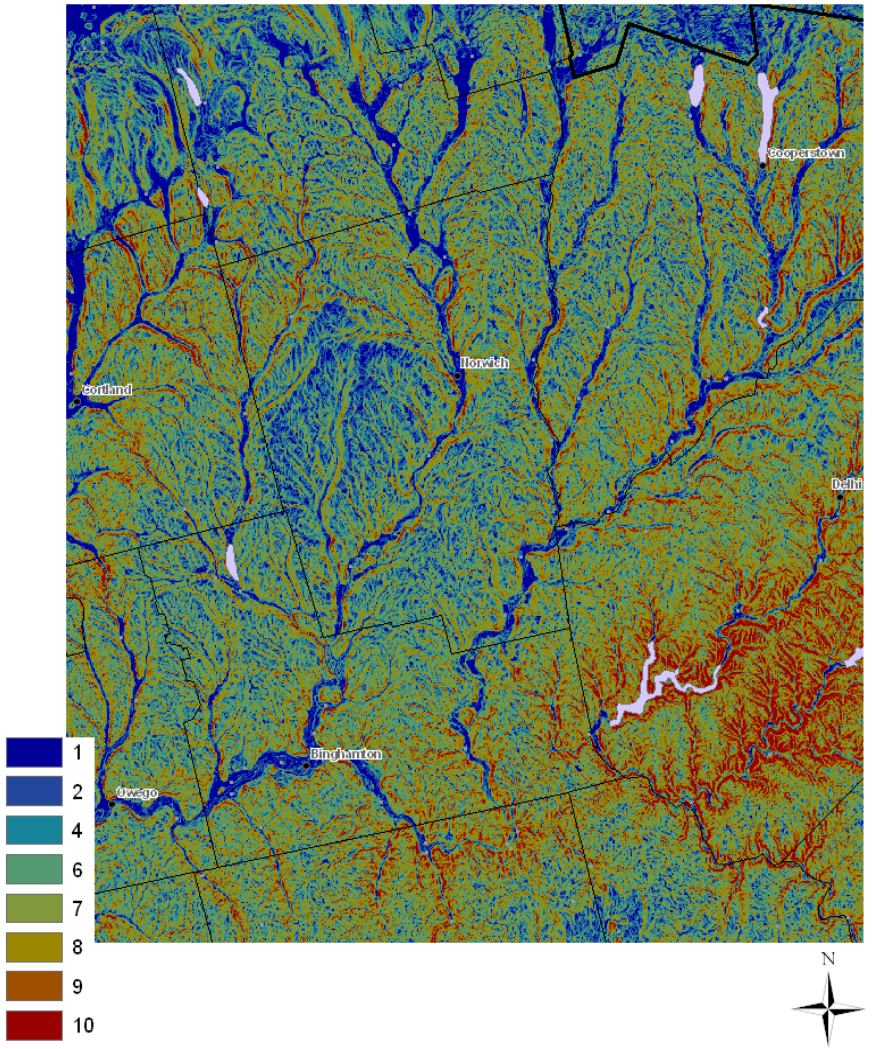




Slope Index

- Exponentially scaled from 1-10
- USGS & engineering studies
  - ~30% slope is rated strong-very strong slope.
  - Approx 20^{o} angle.
- Indexed >30% as 10.

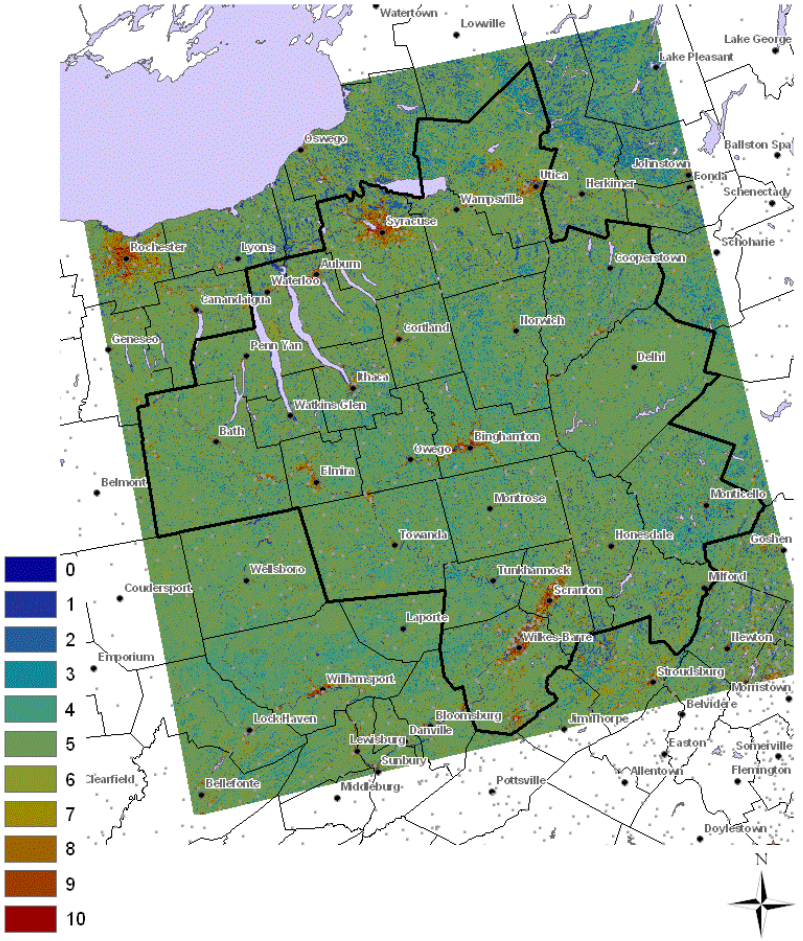
Indexed Slope Grid



Indexed Land Use/Land Cover

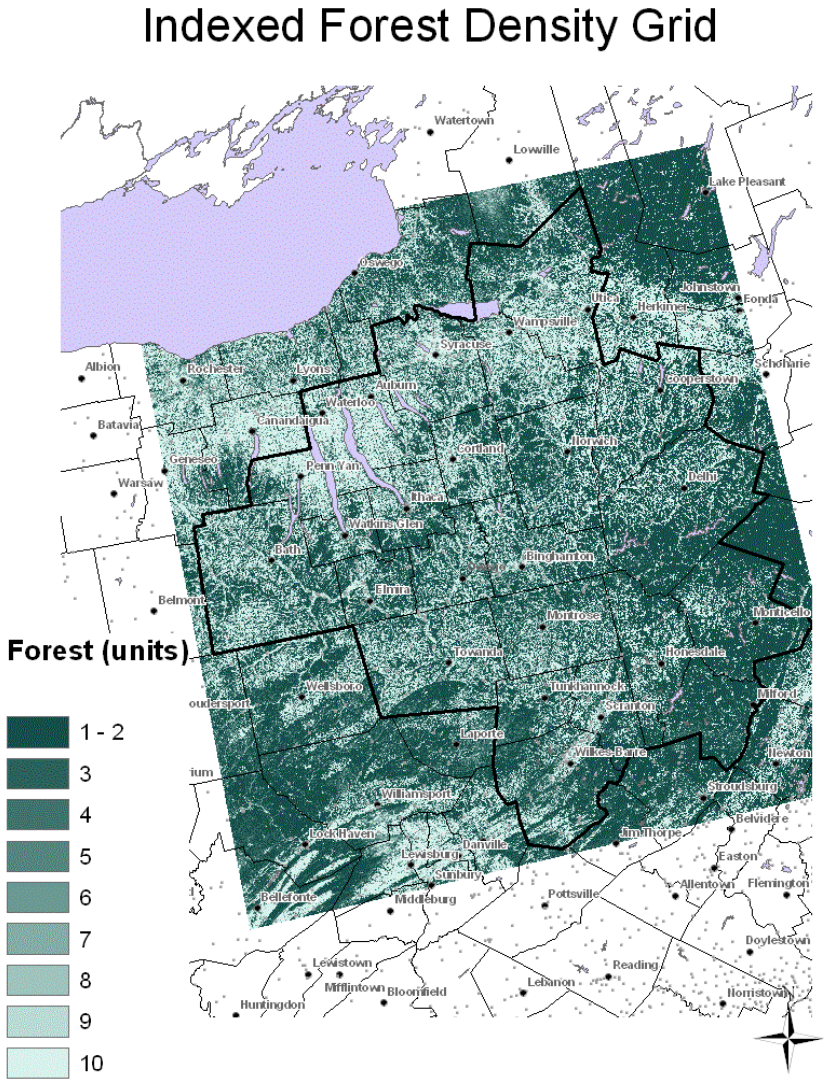
- Much of region shares a similar index
- Mixed forest & grassland.
  - Mild-Moderate effect on hydrology
- Swamp/water 1-2
- Urban areas 8-10

Indexed Land Use/Land Cover Grid



Indexed Forest Density

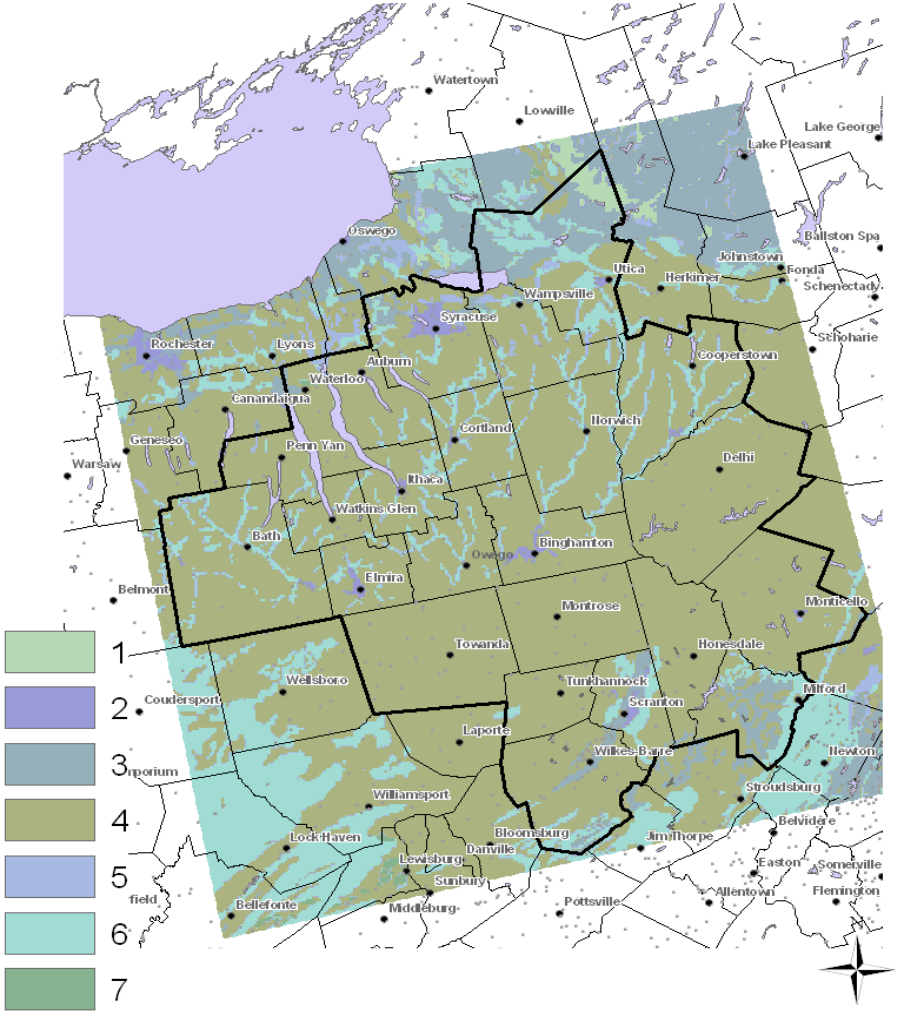
- High density forest areas are given a low potential flood index.
- Low density areas are given high potential index.



Indexed Soil Class

Class	FFPI
1 – Sand	2
2 – Loamy Sand	4
3 – Sandy Loam	3
4 - Silty Loam	4
5 – Silt	5
6 – Loam	6
7 – Sandy Clay Loam	7
8 – Silty Clay Loam	7
9 – Clay Loam	8
10 – Sandy Clay	7
11 – Silty Clay	8
12 – Clay	9
13 – Organic Matter	5
14 – Bedrock	10

Indexed Soil Grid



Binghamton, NY

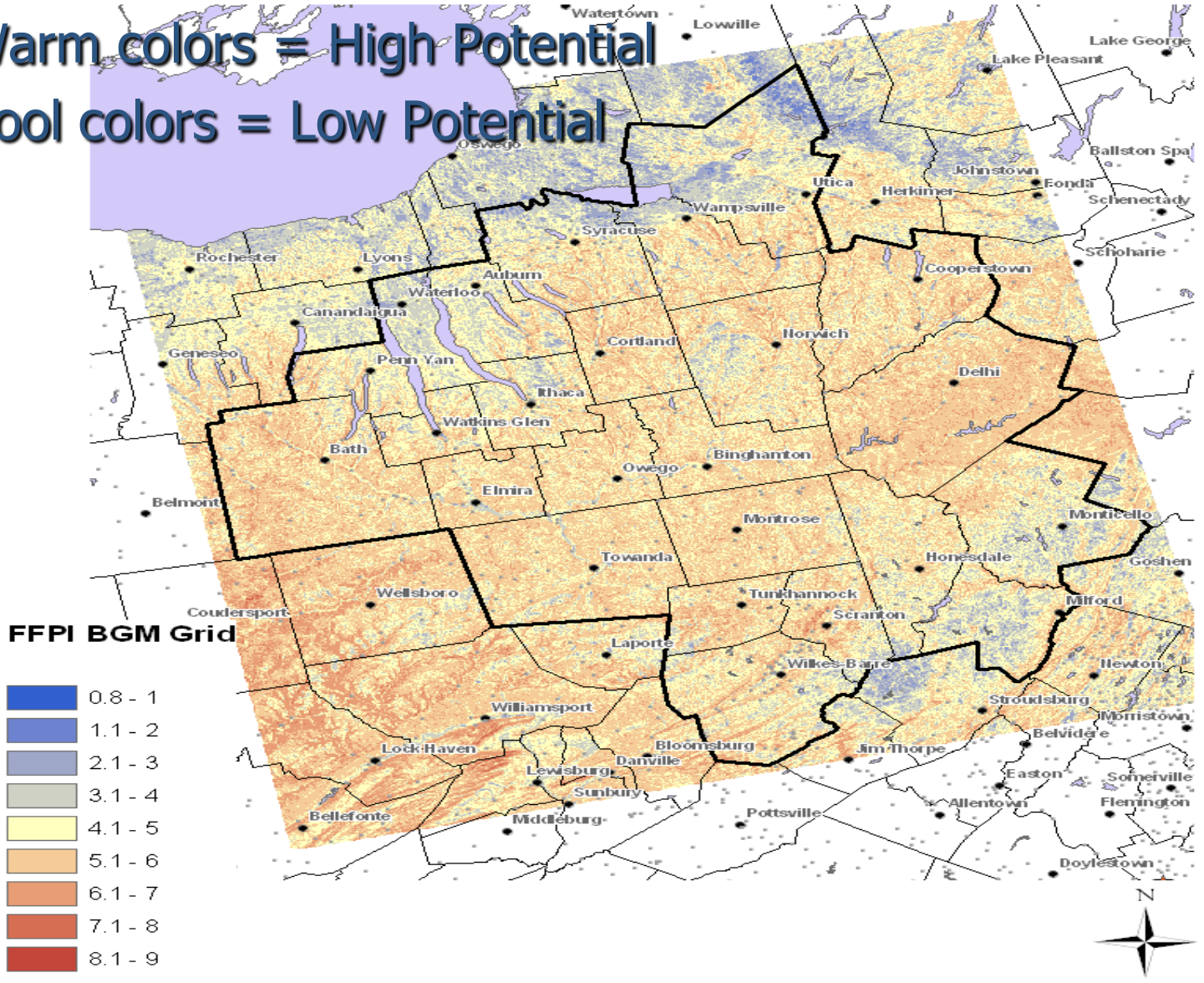
- Central NY and Northeast PA have highly variable geography, land cover and use.
  - Steep, rocky terrain along with flatter sandy plains
  - Areas of urbanization
  - Wide range of forest cover
  - Similar soil types

Methodology Review

- Weight average the geographic layers.
  - FFPI = (1.5*Slope + LC + Soils + Forest)/N
- Local adjustment to calculation
    - Reviewed against historical events
    - Does Flash flooding occurs in our forested areas?
    - Is that element really much of an influence here?
- FFPI = (1.5*Slope + LC + Soils + 0.5*Forest)/N
- Grid is then averaged to individual basins.

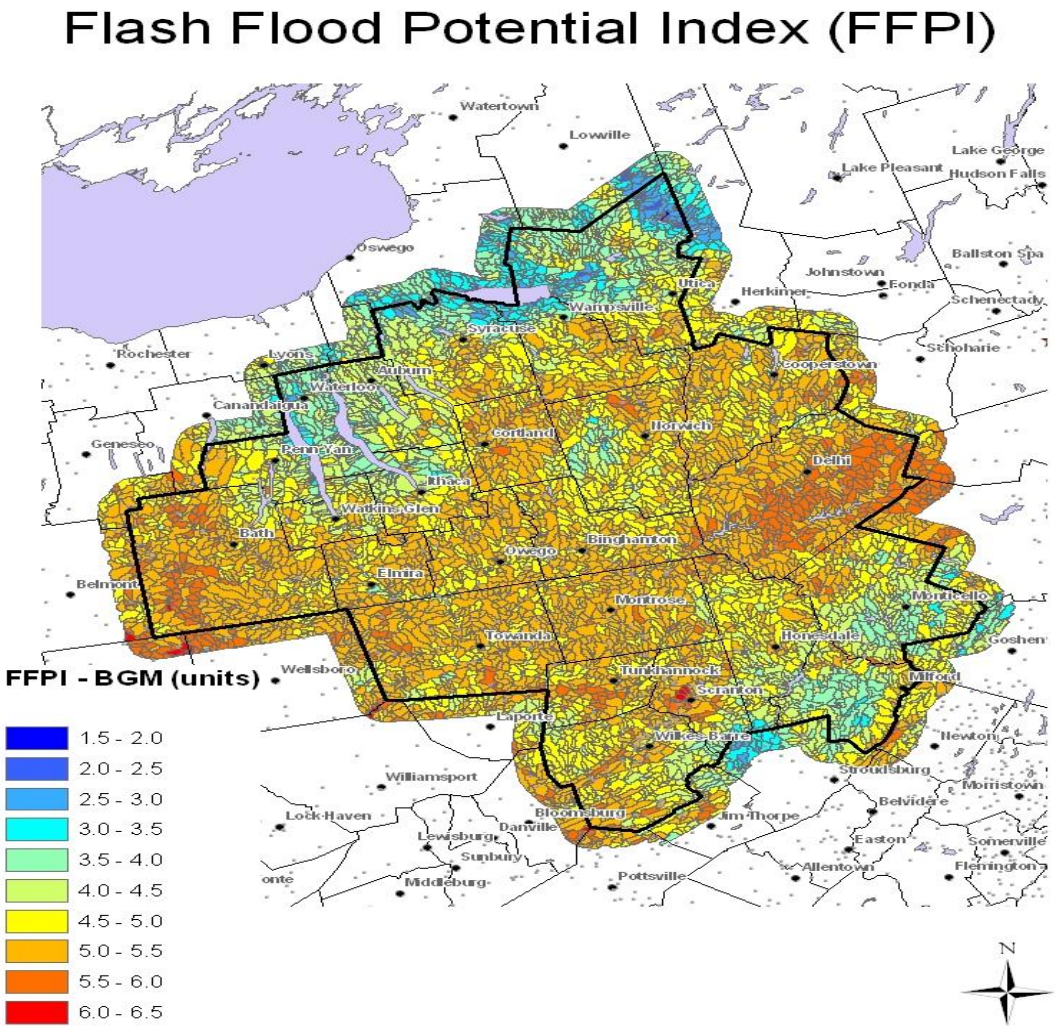
Flash Flood Potential Index Grid

- 90 Meter Resolution
- Warm colors = High Potential
- Cool colors = Low Potential

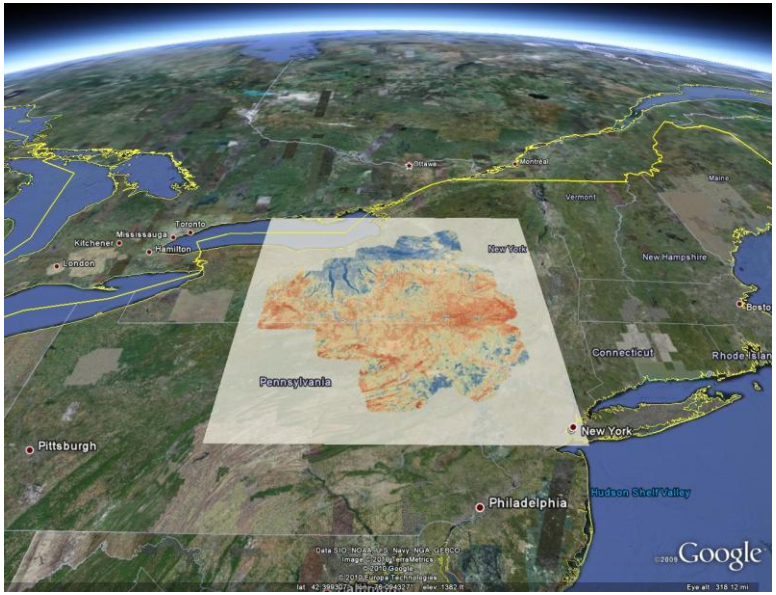


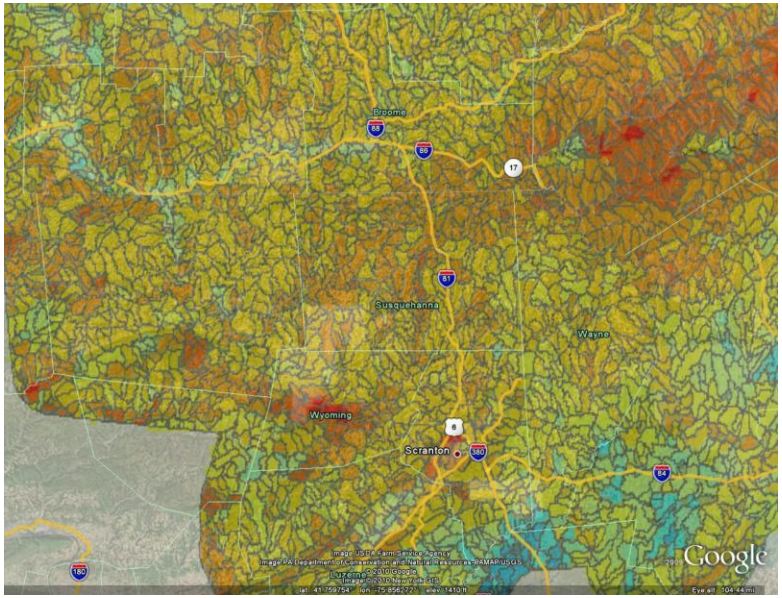
FFPI mapped to FFMP Basins

- Fit our historical events
- New realizations, especially the low FF potential areas.
- Differentiates the "best of the worst" basins in an area generally known for high flash flood potential.



FFPI Versatility

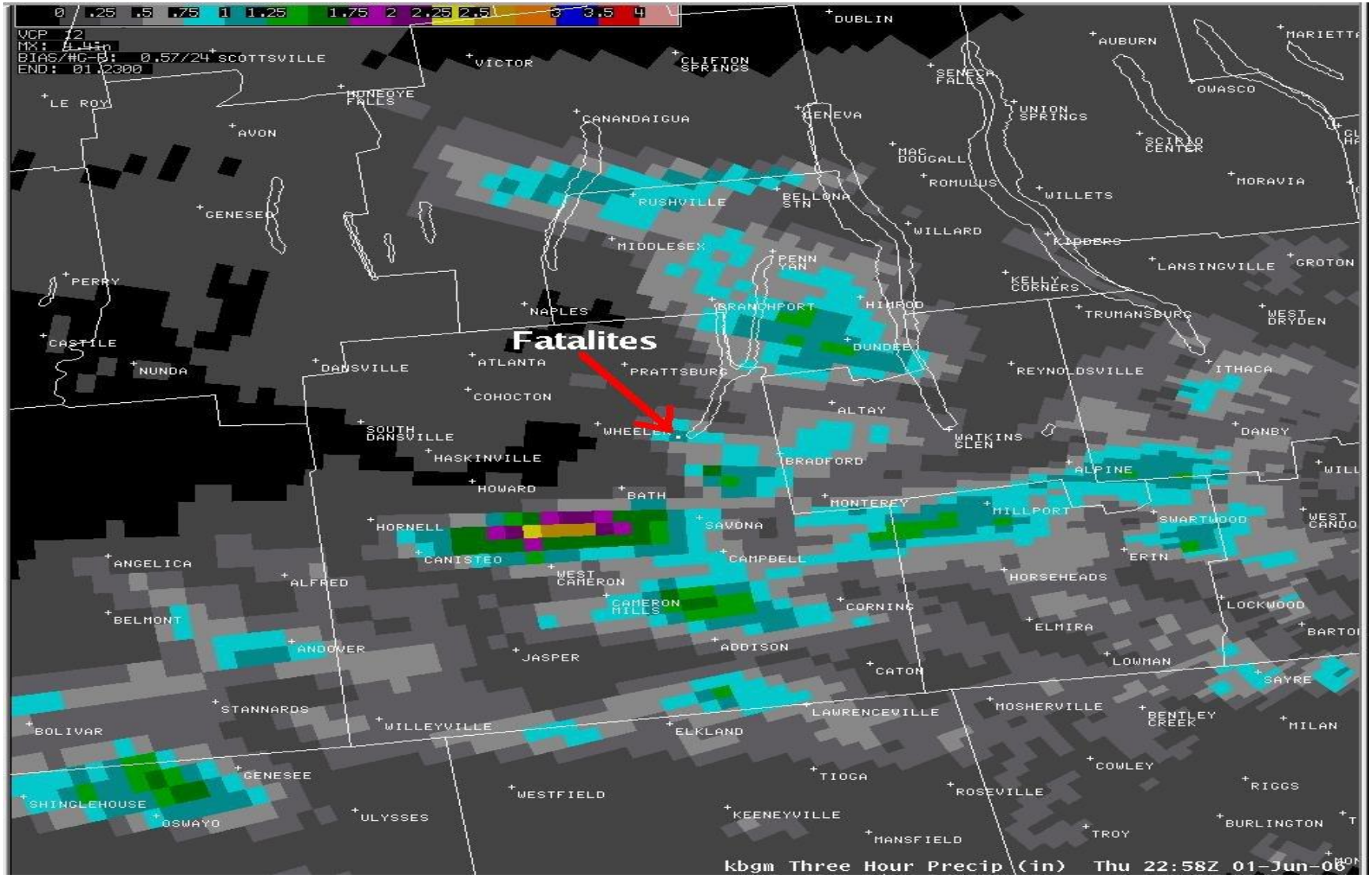




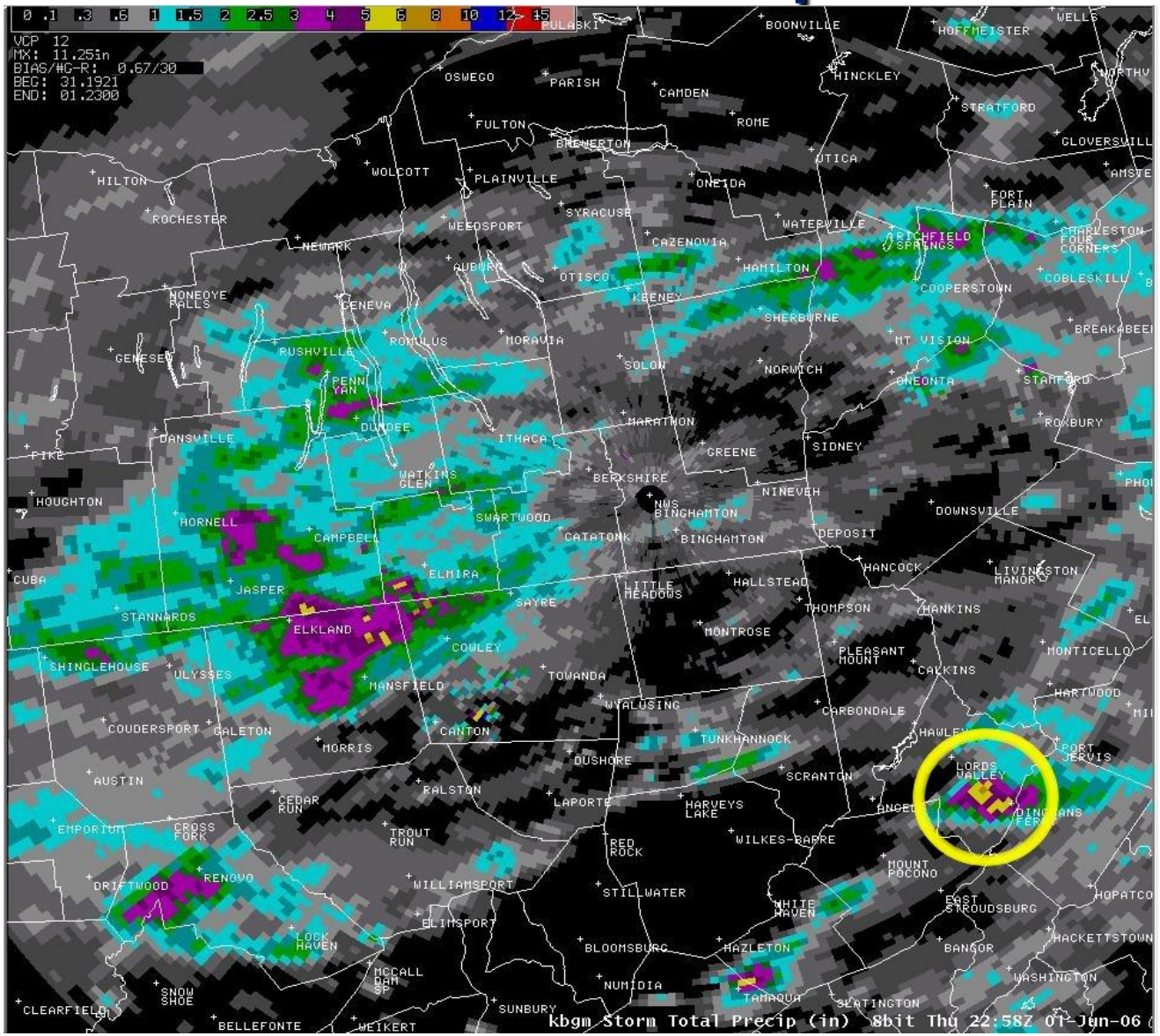
- Exportable to other platforms
- KML/KMZ
- GeoTiff
  - Google Earth
- ESRI shape file

Example

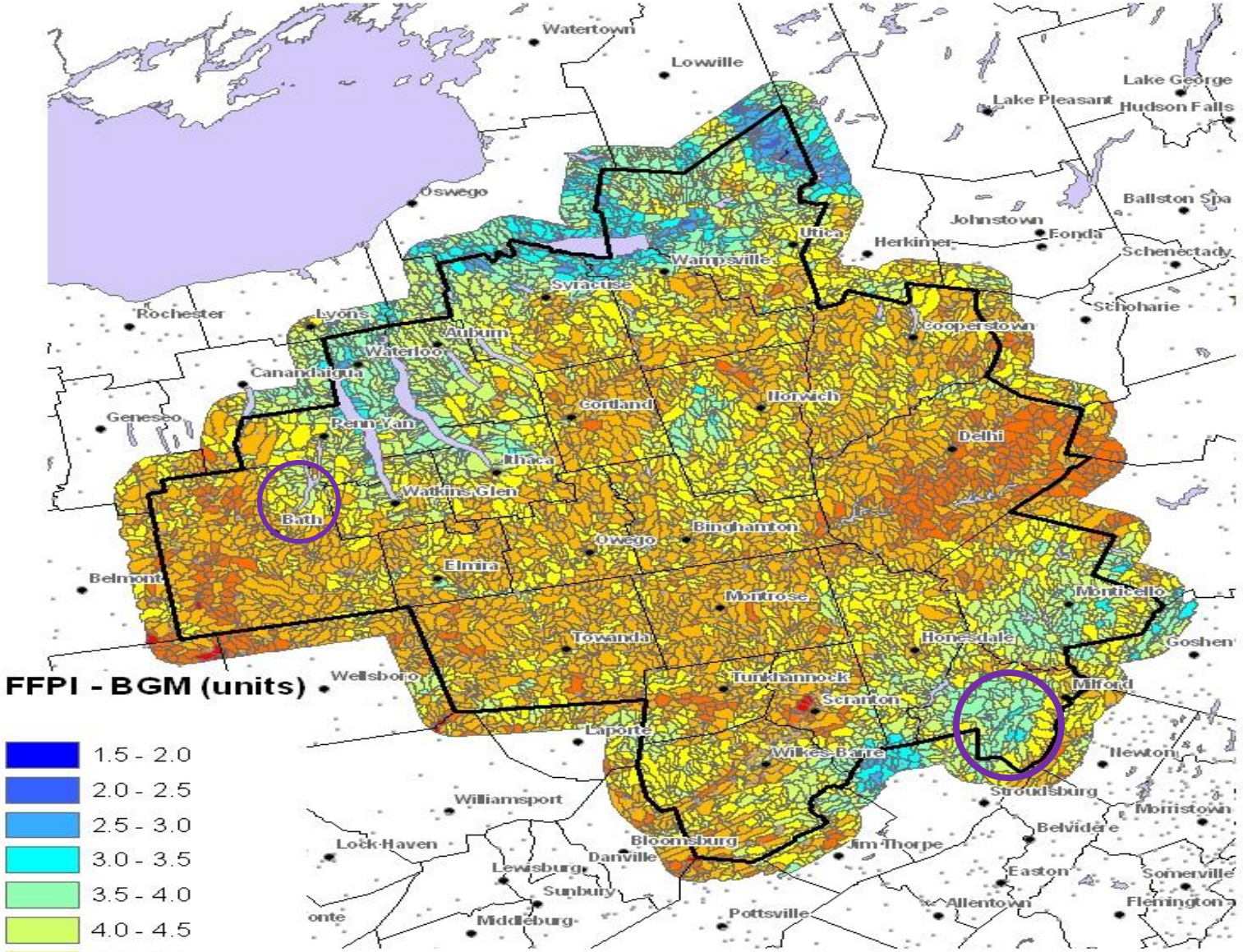
Fatal Gorge Flood



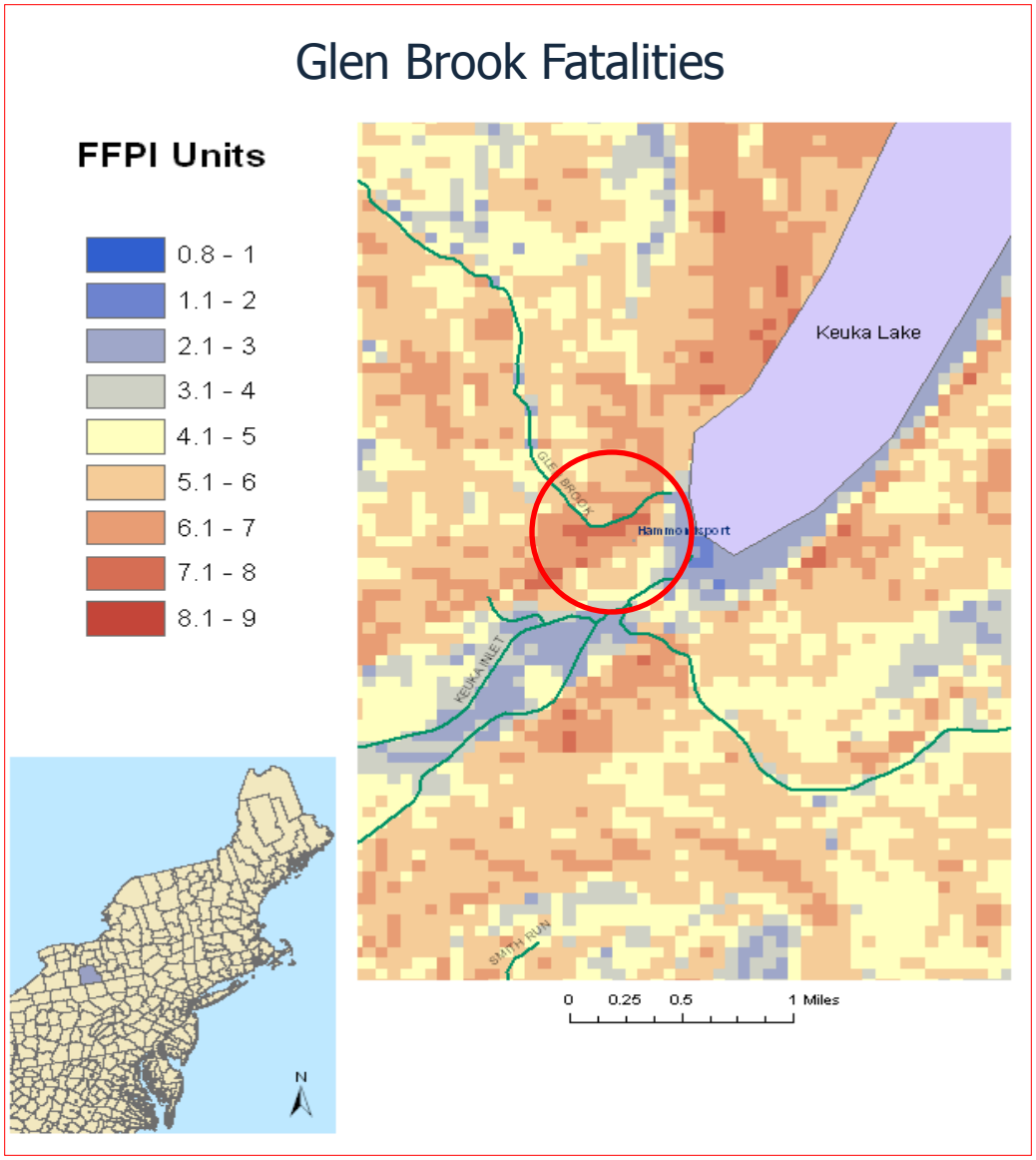
Storm Total Precipitation



Flash Flood Potential Index (FFPI)



90 m - High Resolution



Use of high resolution FFPI in a GIS environment can benefit emergency managers, planning boards, town highway departments, and other local officials and groups.

Summary

- The FFPI was developed in Binghamton due to the important need to have a static geophysical reference grid which better illustrates how local earth system features contribute to flash flooding.
- The FFPI is best used in flood operations when mapped to the AWIPS FFMP basins for comparison with other flash flood tools and techniques.
- Through GIS technology, the index can be exported to many formats for use by other government agencies, customers and partners for planning and mitigation.

First Year Performance

- Reduced false alarms
  - Two warnings - Pike County, PA and Oneida County, NY were not issued. Follow-up confirmed no flooding
- Increased Lead Time
  - Boosted forecaster confidence that additional rain would lead to flash flooding (Warn on Forecast) – Major flash flooding resulted in Delaware County, NY

Questions ?