



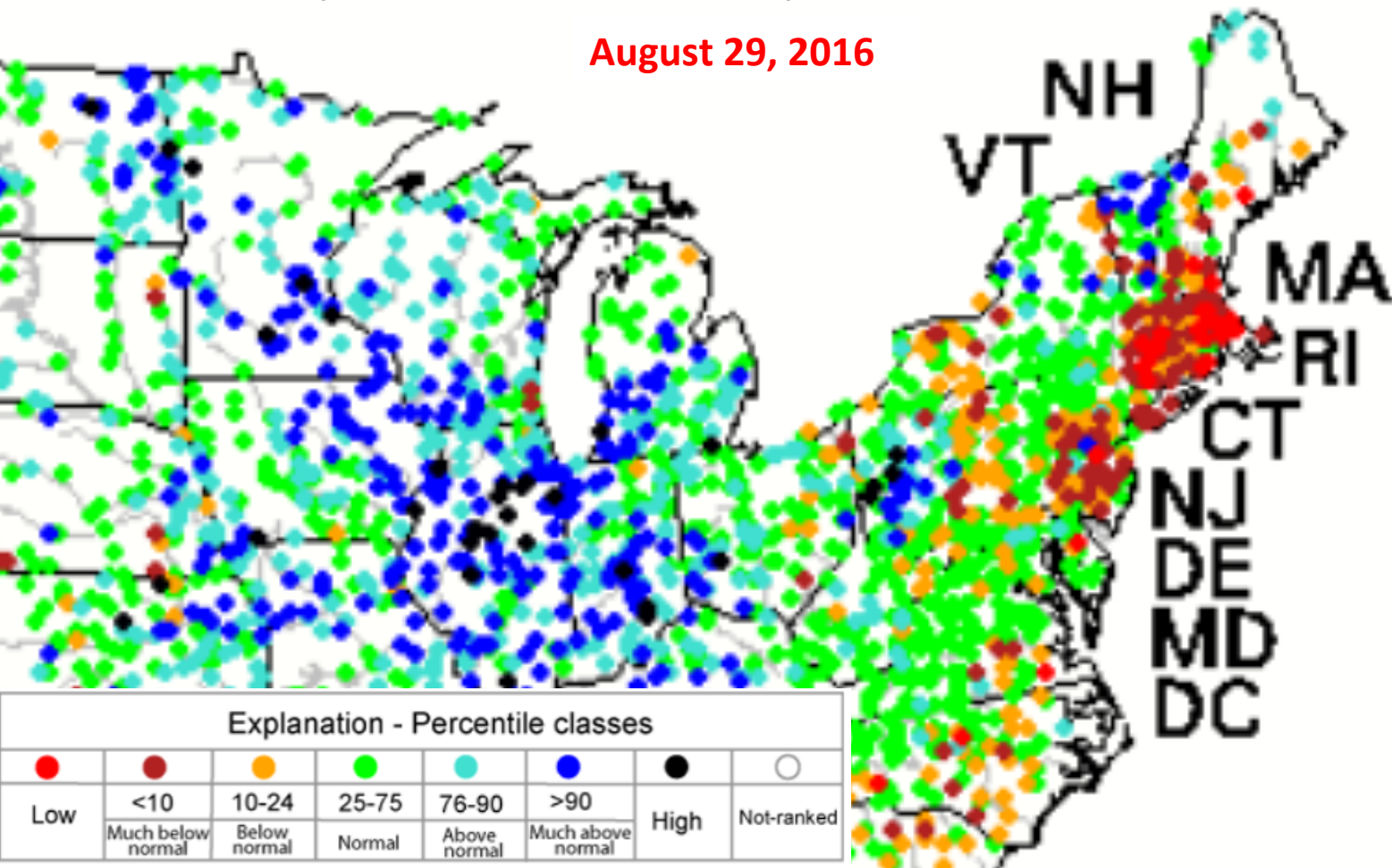
**Northeast U.S.
Drought Conditions
September 29, 2016**

**Streamflow and
Groundwater Levels**

William Coon, Hydrologist

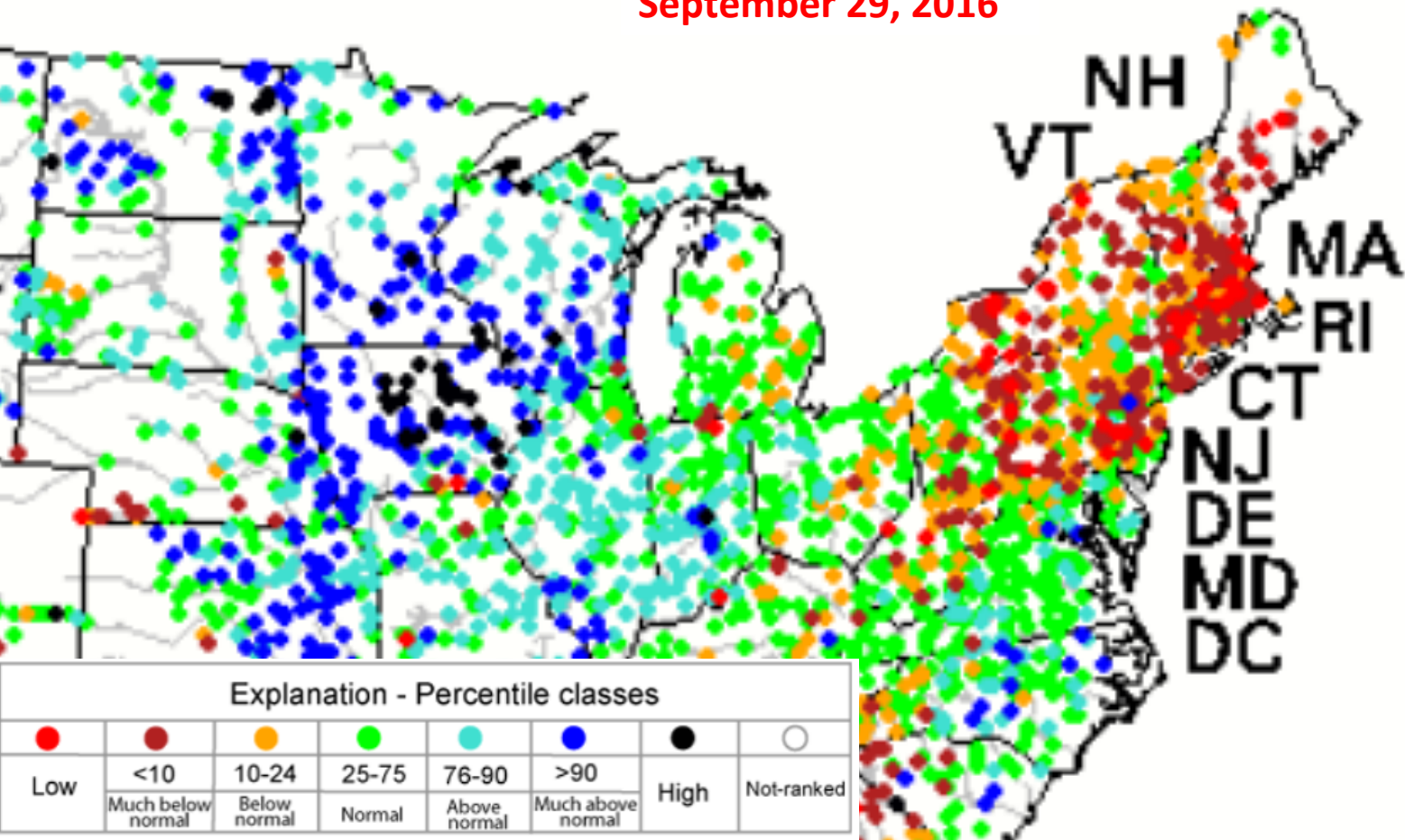
Daily Streamflow – Compared to Historical Streamflow

August 29, 2016



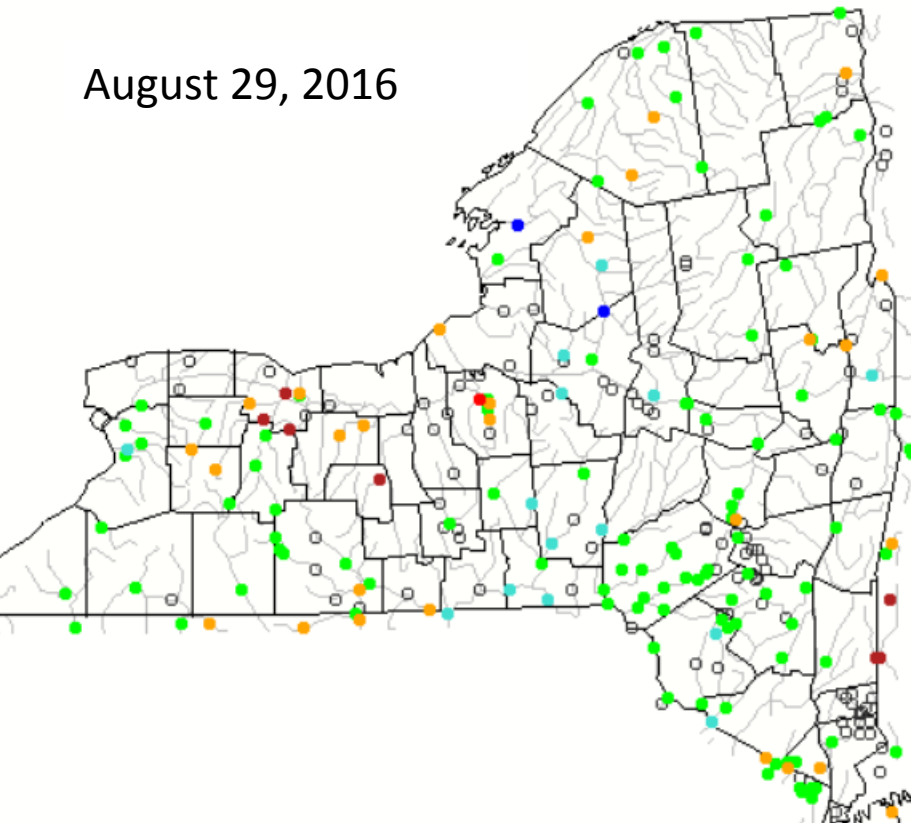
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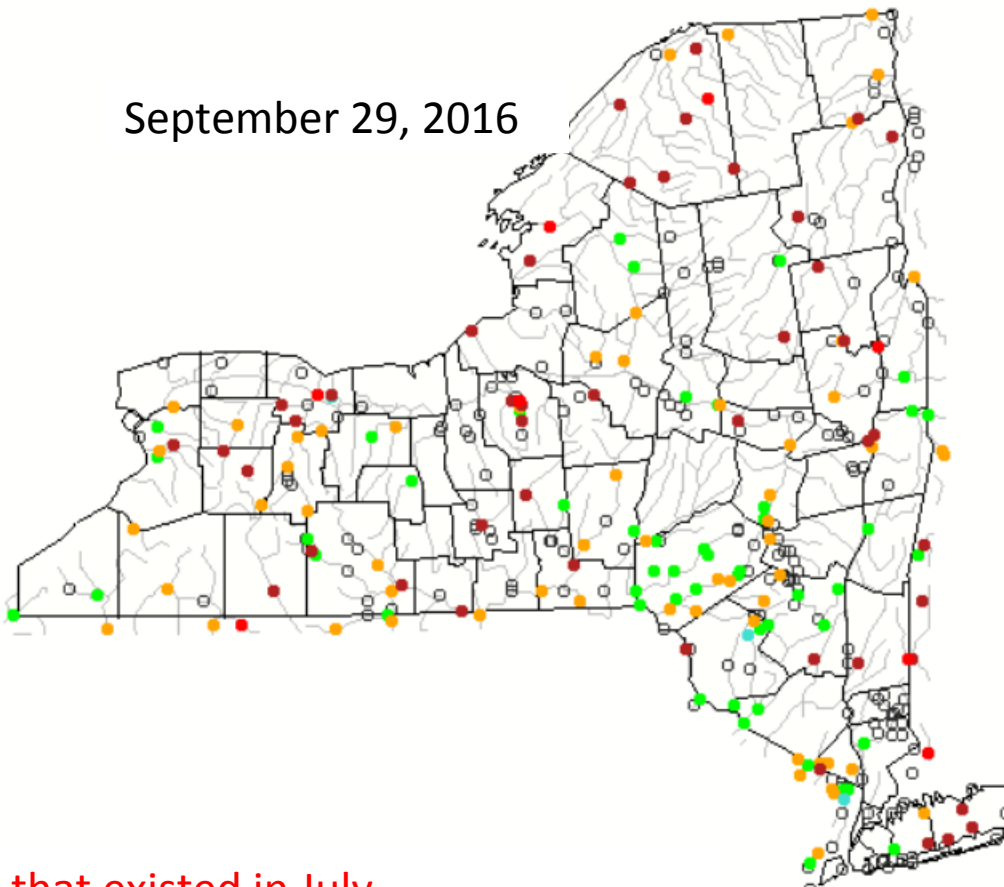


Daily Streamflow

August 29, 2016



September 29, 2016



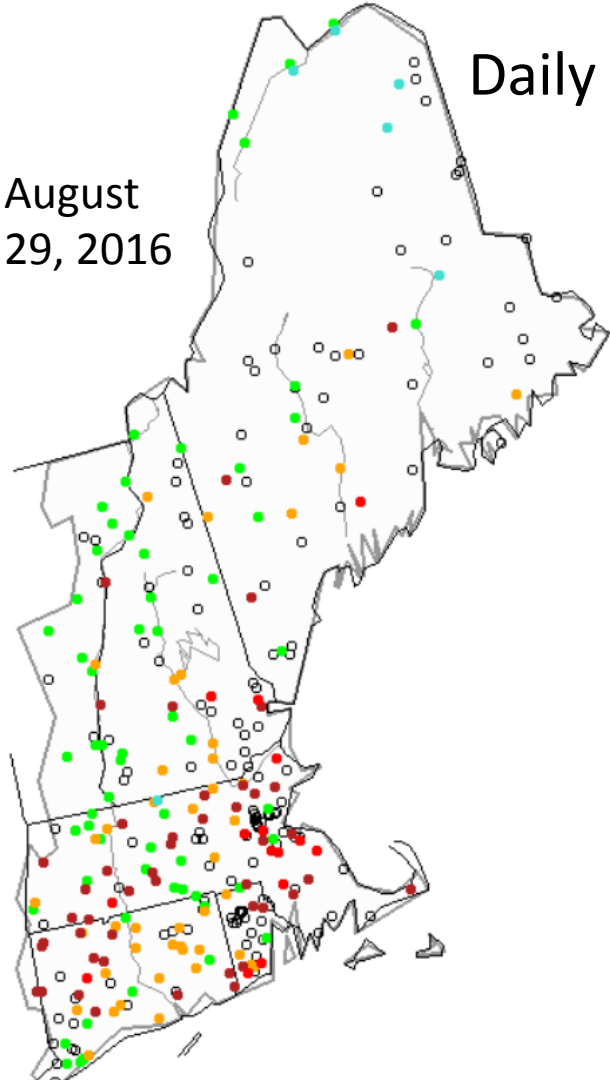
Conditions at end of Sept. are similar to those that existed in July.

Rain that increased flows in some streams during August, has not been sustained.

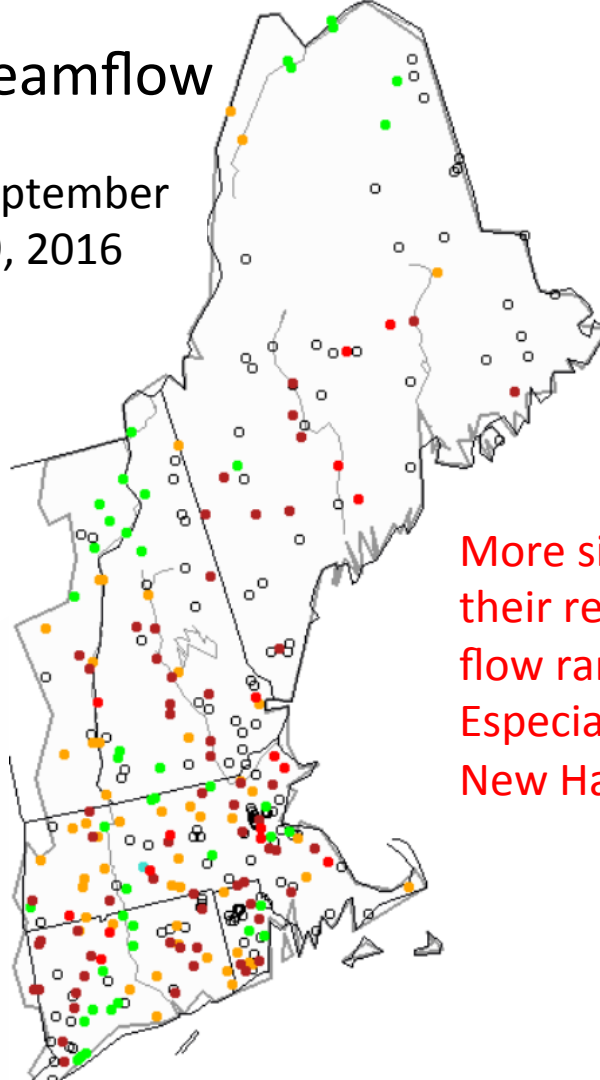
USGS

Daily Streamflow

August
29, 2016



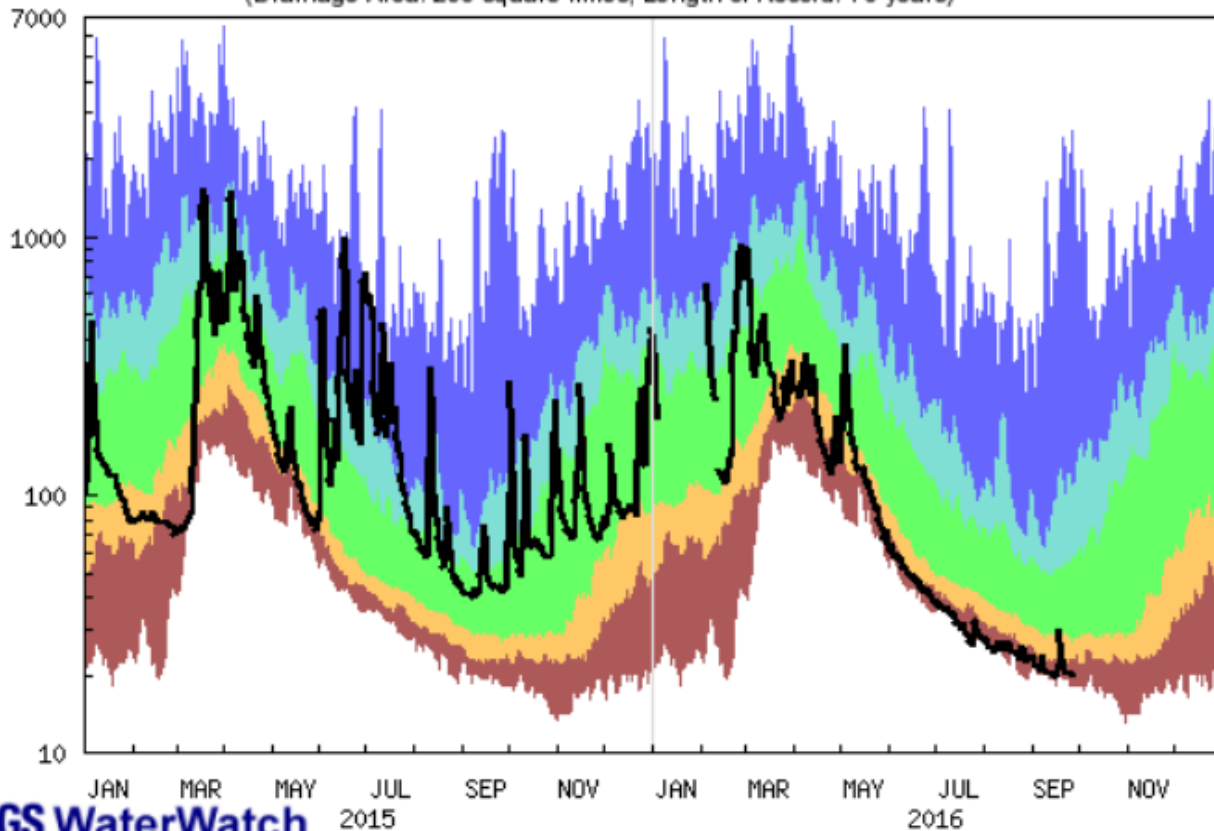
September
29, 2016



More sites have fallen into
their respective below-normal
flow ranges.
Especially in Vermont,
New Hampshire, and Maine.

Oatka Creek at Garbutt, NY – 70 years of record

USGS 04230500 OATKA CREEK AT GARBUTT NY
(Drainage Area: 200 square miles, Length of Record: 70 years)

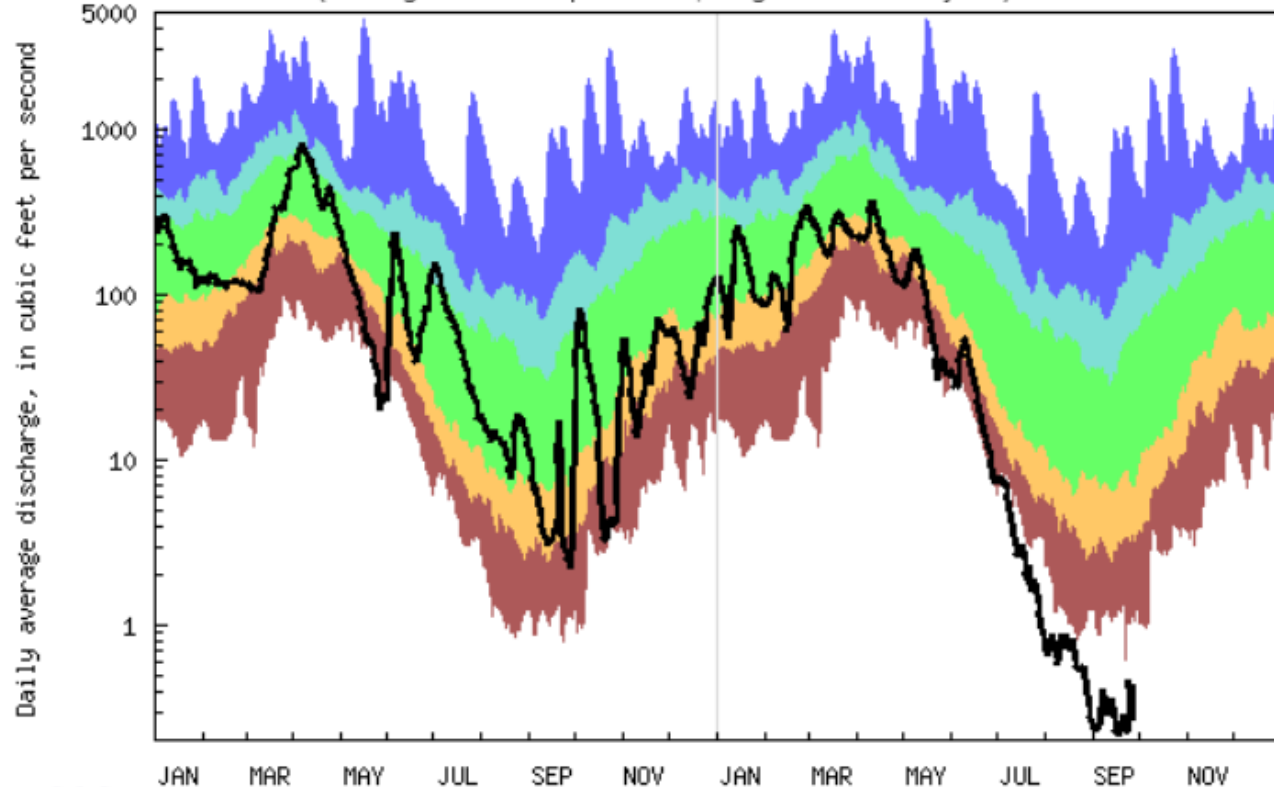


Explanation - Percentile classes

lowest-5th percentile	10-24	25-75	76-90	90th percentile-highest	Flow
much below normal	Below normal	Normal	Above normal	Much above normal	

Ipswich River near Ipswich, MA – 85 years of record (affected by withdrawals and regulation)

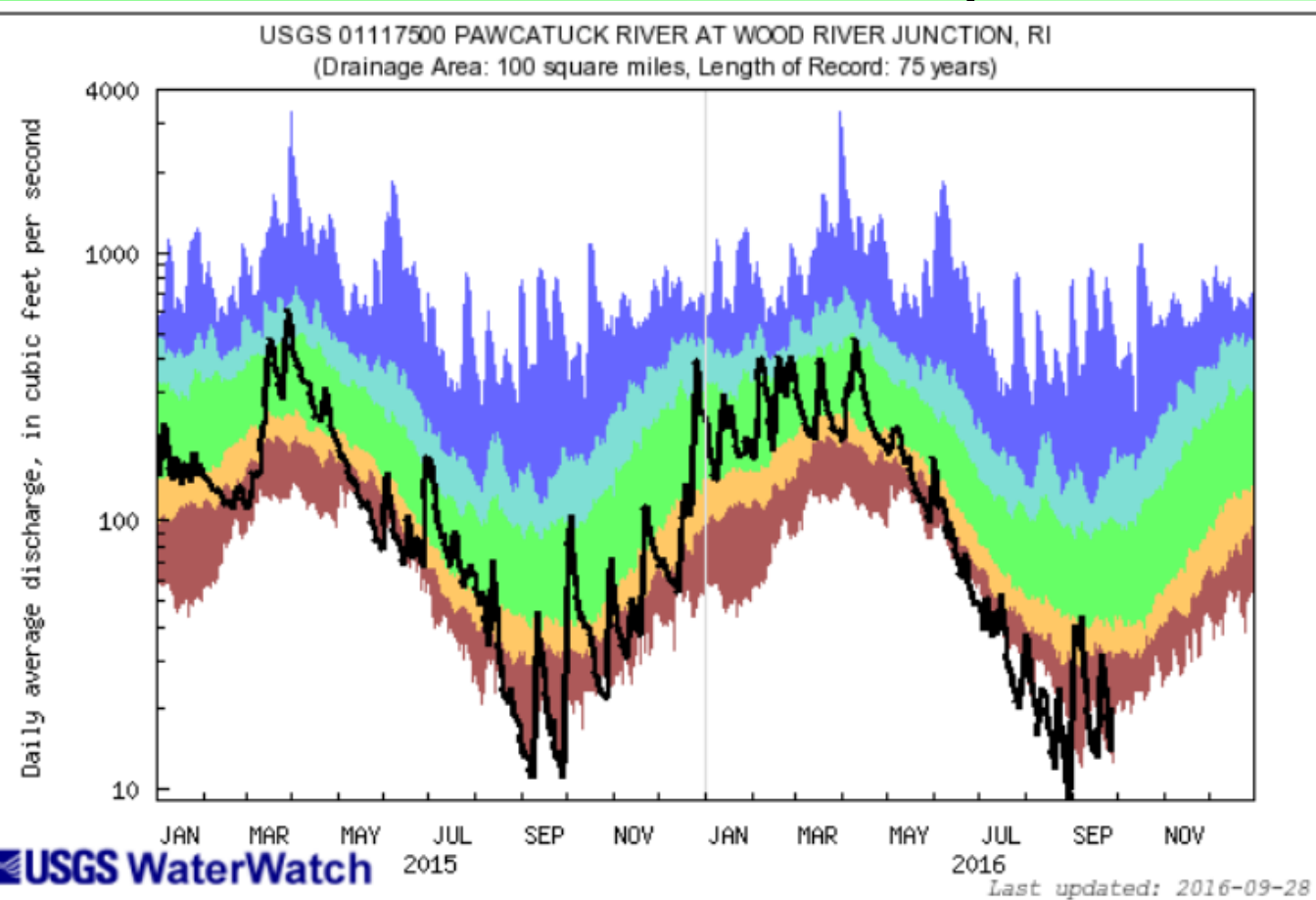
USGS 01102000 IPSWICH RIVER NEAR IPSWICH, MA
(Drainage Area: 125 square miles, Length of Record: 85 years)



Explanation - Percentile classes

lowest-10th percentile	10-24	25-75	76-90	90th percentile-highest	Flow
much below normal	Below normal	Normal	Above normal	Much above normal	

Pawcatuck River at Wood River Junction, RI – 75 years of



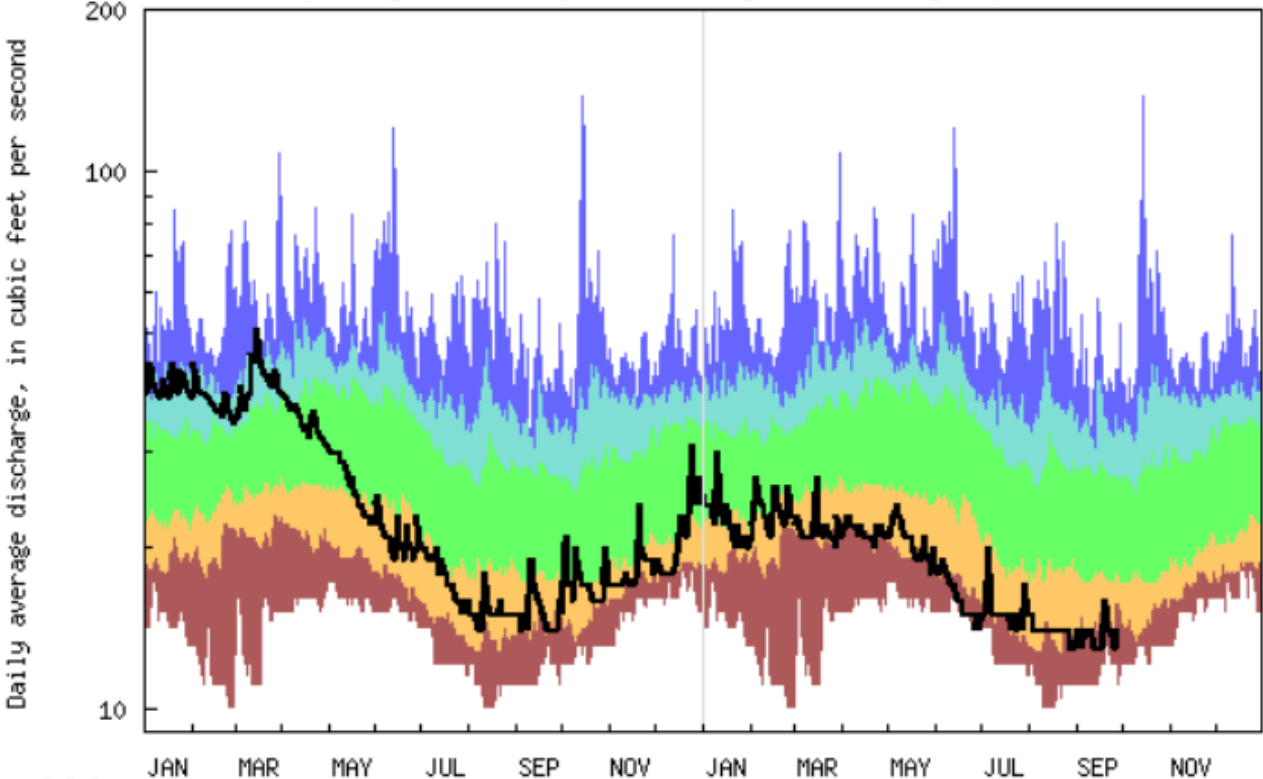
Explanation - Percentile classes

lowest-20th percentile	10-24	25-75	76-90	90th percentile-highest	FLOW
Much below normal	Below normal	Normal	Above normal	Much above normal	



Connetquot Brook near Central Islip, NY – 36 years of record

USGS 01306460 CONNETQUOT BK NR CENTRAL ISLIP NY
 (Drainage Area: 21.9 square miles, Length of Record: 36 years)



Explanation - Percentile classes					Flow
lowest-3th percentile	10-24	25-75	76-90	90th percentile - highest	
Much below normal	Below normal	Normal	Above normal	Much above normal	

Massachusetts Reservoirs

(September 1, 2016)

Quabbin Reservoir

– 85.1% of capacity

Wachusett Reservoir

– 91.0 % of capacity

“Normal”



<http://geology.com/state-map/maps/massachusetts-rivers-map.gif>

Source: Massachusetts Water Resources Authority

New York City Reservoirs

(September 28, 2016)



West of Hudson Reservoirs
(collectively)

Current storage – 70.7%

Normal storage – 76.0%

Source: New York City Environmental Protection

<http://www.dos.ny.gov/watershed/images/lgmap.jpg>

Groundwater Climate Response Network

Includes wells:

- Located in aquifers that respond to climatic fluctuations
- Minimally affected by pumpage
- Essentially unaffected by sources of artificial recharge (from irrigation, canals, etc.)
- Have never gone dry or are not susceptible to going dry

Groundwater Climate Response Network

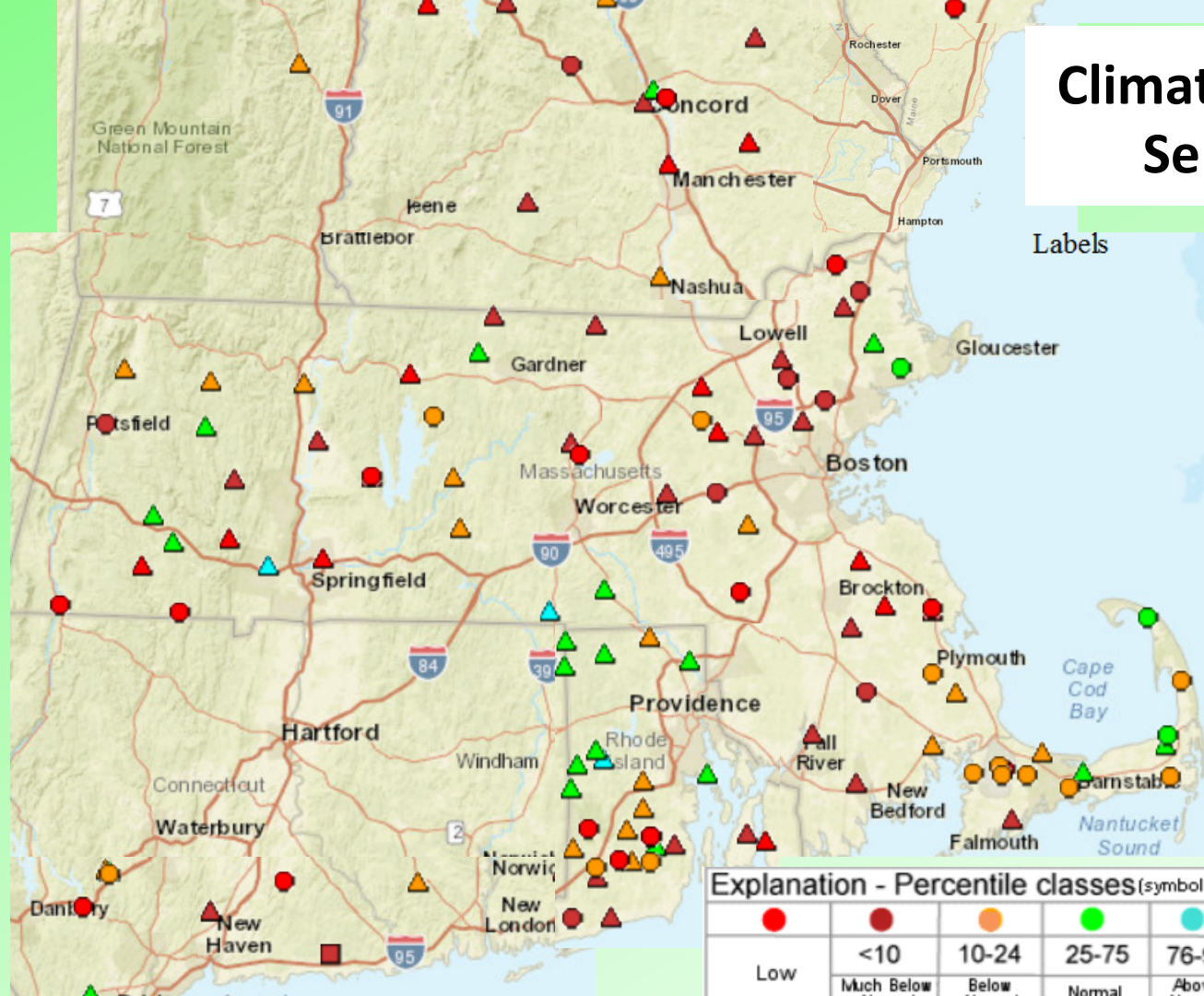
Response to rainfall depends on:

- Type of aquifer – sand-gravel, bedrock
- Depth to water table – increases with ET and lack of rain
- Density of fractures to convey water in bedrock

Apparent response depends on:

- Length of period of record
- Does well record extend back to 1960s drought?

Climate Response Network September 28, 2016



Labels

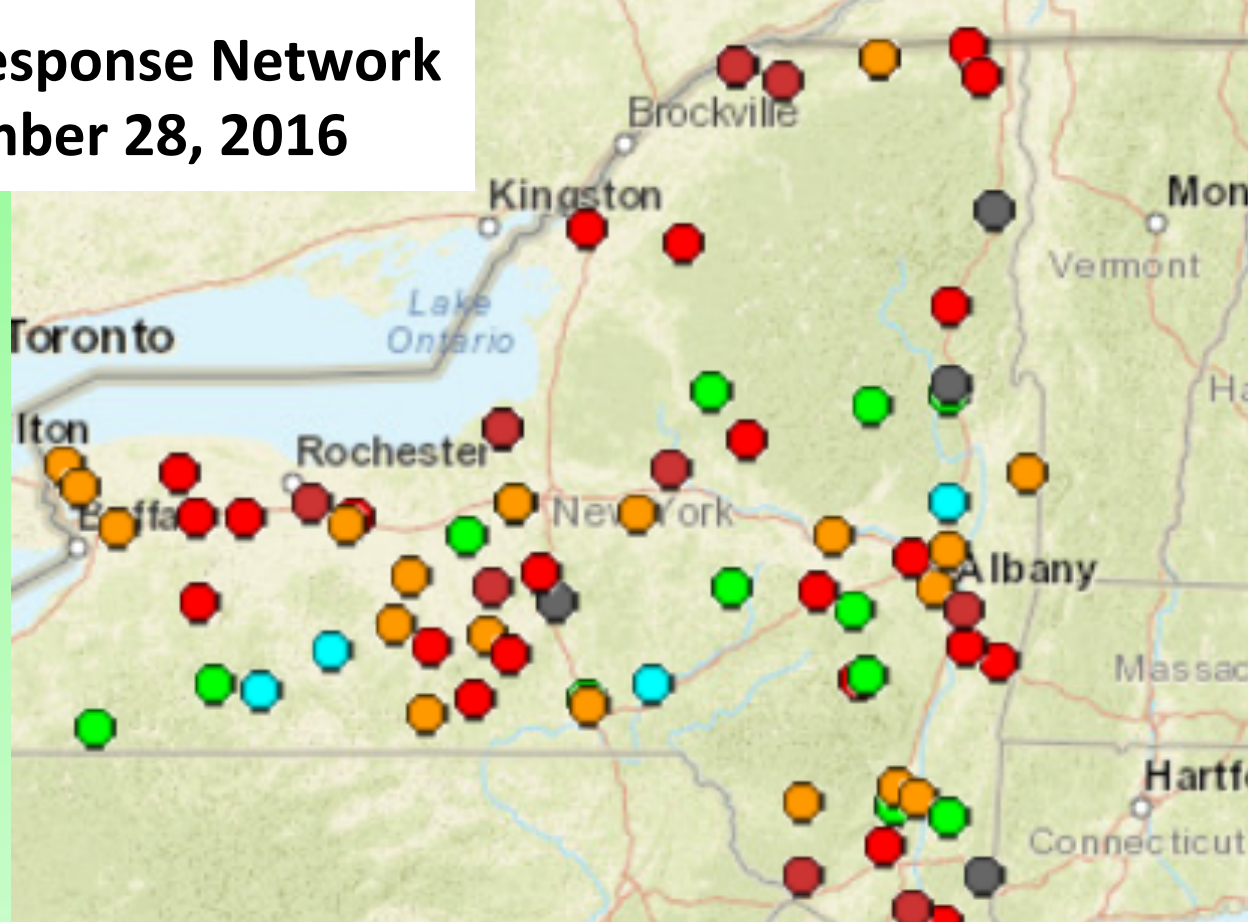
Explanation - Percentile classes (symbol color based on most recent measurement)

Low	<10	10-24	25-75	76-90	>90	High	Not Ranked
	Much Below	Below	Normal	Above	Much Above		

Wells	Springs
Real-Time	Continuous
Periodic	Measurements

Climate Response Network

September 28, 2016



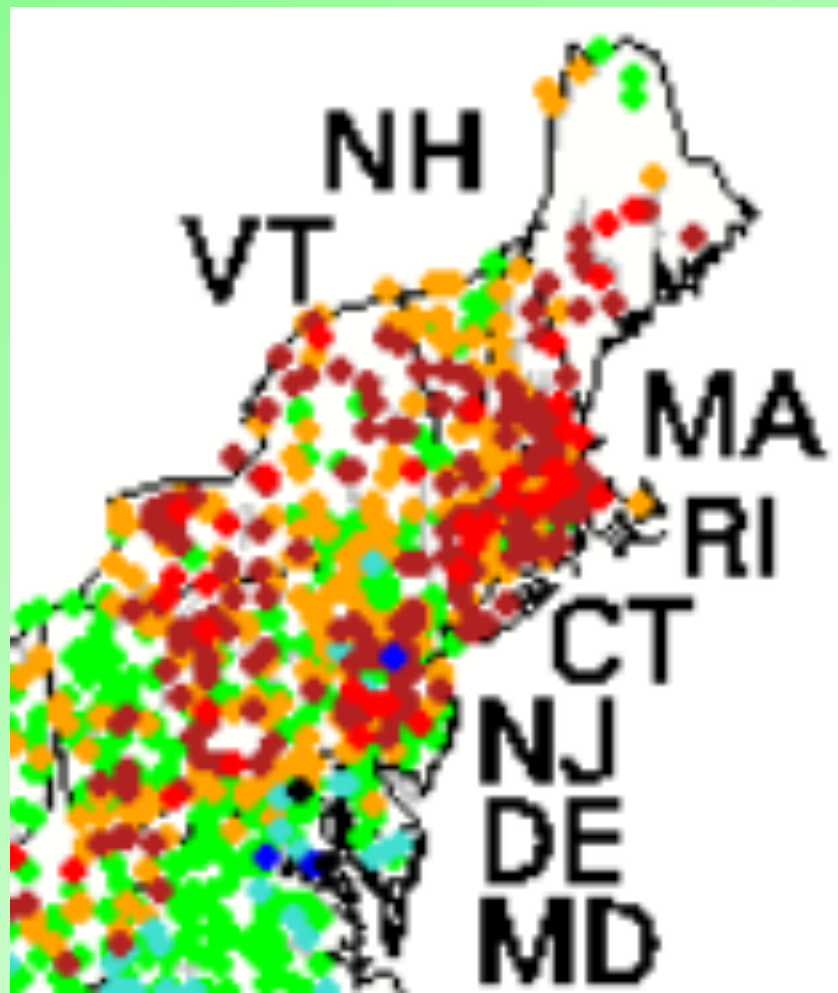
Explanation - Percentile classes (symbol color based on most recent measurement)

Low	<10	10-24	25-75	76-90	>90	High	Not Ranked
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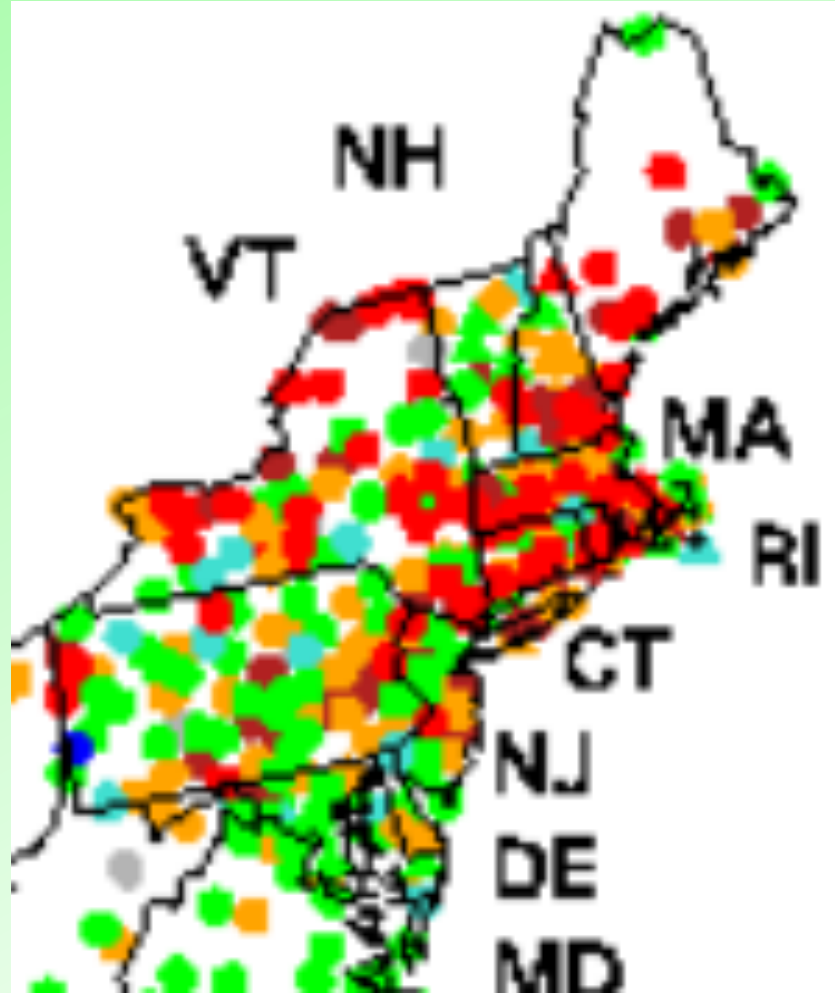
Wells Springs

	Real-Time		Real-Time
	Continuous		Continuous
	Periodic Measurements		Periodic Measurements

Streamflow



Groundwater Levels



Hydrologic Response to Predicted Rainfall

Low-intensity, long-duration rainfall

- Low amounts of runoff
- Rain will soak into dry ground
- Infiltrated water will wet soil particles before reaching water table
- ET will continue until leaf-off

Effects on Streamflow – Probably negligible

Groundwater levels – Likely increase, but dependent on aquifer characteristics

Hydrologic Response to Predicted Rainfall

High-intensity, short-duration rainfall

- Larger percentage of rain will run off
- Less infiltration

Effect on Streamflow

- Flash flood potential in small steep basins & urban areas.
- Large streams may rise but unlikely to flood.

Effect on Groundwater levels

- Small, if any, increase; dependent on aquifer characteristics
- ET will continue until leaf-off

Hydrologic Response to Predicted Rainfall

Best Scenario to End Drought

Medium-intensity, long-duration rainfall

- Some run off
- Large amount of infiltration

Effect on Streamflow

- Flows will increase; flooding is unlikely.

Effect on Groundwater levels

- Gradual increase



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