

NJDEP Drought Management Overview

October 27, 2016

*Presented to an advisory committee of the DRBC.
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Committee.*



Drinking Water Supply Indicators

- Developed following the 1999 drought event
- NJDEP wanted a better way to summarize regional hydrologic conditions as they relate to drinking water supply
- Created six (6) drought regions along natural hydrologic boundaries
- Concisely convey information to decision-makers and the public
- Designed to be updated quickly and periodically using real-time data
- Indicators **to inform DEP decisions**, not triggers
- Reports:
 - *Development of Streamflow and Groundwater Drought Indicators for New Jersey* online at: <http://www.njgeology.org/pricelst/ofreport/ofr04-2.pdf>
 - *Development of New Jersey Drought Regions* online at: <http://www.njgeology.org/pricelst/tmemo/tm01-1.pdf>

Drinking Water Supply Indicators con't.

- Apply to drinking water supply conditions
 - Do not apply to agricultural, ecologic or other types of drought
 - Causes confusion between US Drought Monitor, State Climatologist and DEP drought actions
 - DWSG regularly consults with other DEP programs, agencies and departments
- Indicators include:
 - Precipitation
 - Reservoirs: NJ and DRBC (NY/PA); where applicable
 - Unconfined Groundwater levels
 - Stream flows
- Indicators are “weighted” based upon their relative significance as a drinking water source to the region
 - Local conditions within region may be different than regional ones

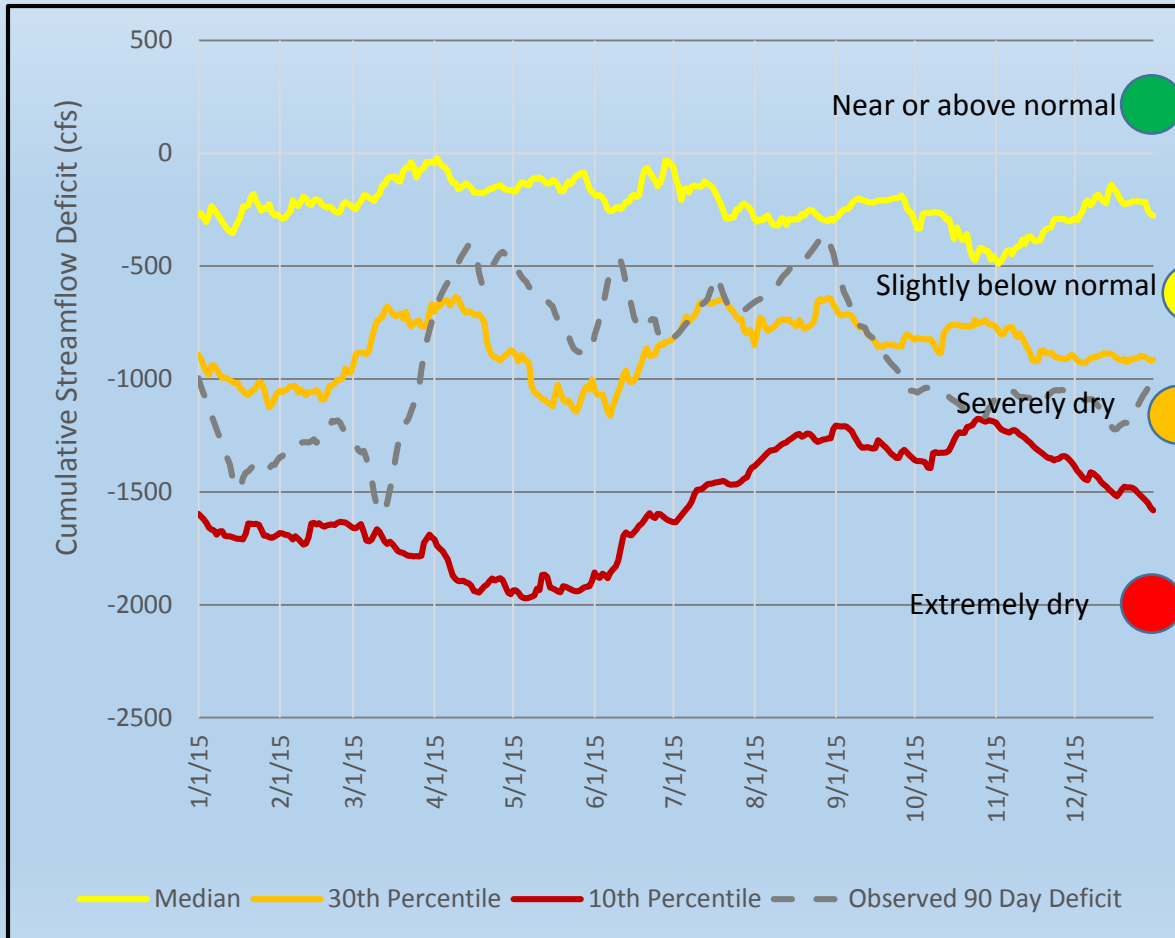
Overall Approach

- Precipitation, streamflow and unconfined groundwater indicators
 - Analyses determined that the 90-day median, 30th percentile and 10th percentile cumulative departures from average synced with progressive water supply condition impacts
 - Generally, a comparison of long-term average vs current/observed
 - Larger deficits represent dry periods and smaller or negative deficits reflect wetter periods
 - As deficit gets larger, indicator conditions worsen
- Reservoirs
 - Compare to long-term averages and model simulations

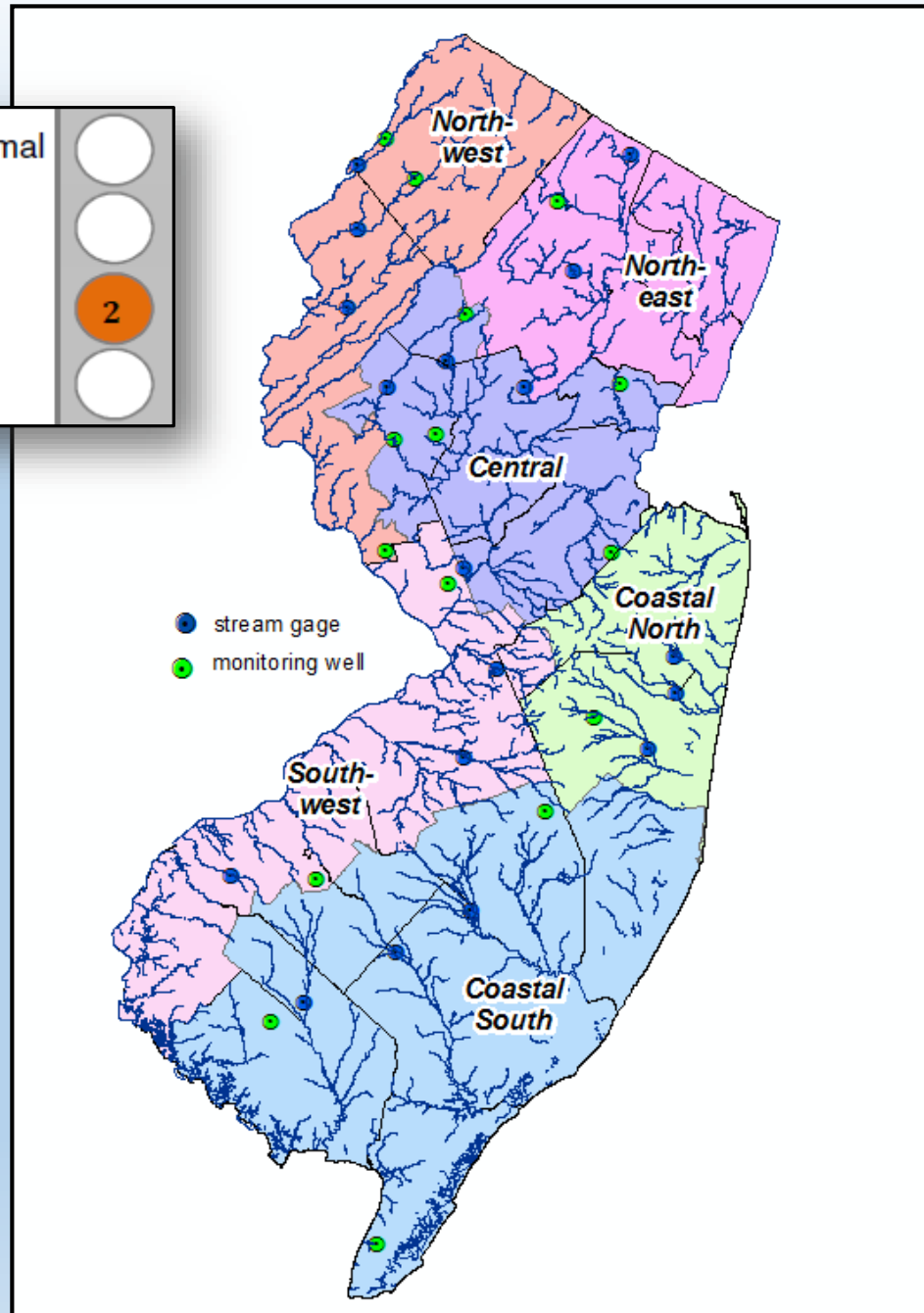
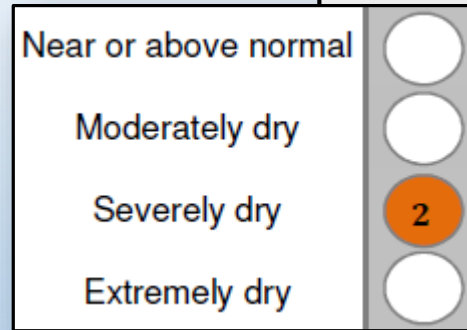
Ranked as:

- Normal or above normal = **Green**
- Moderately dry = **Yellow**
- Severely dry = **Orange**
- Extremely dry = **Red**

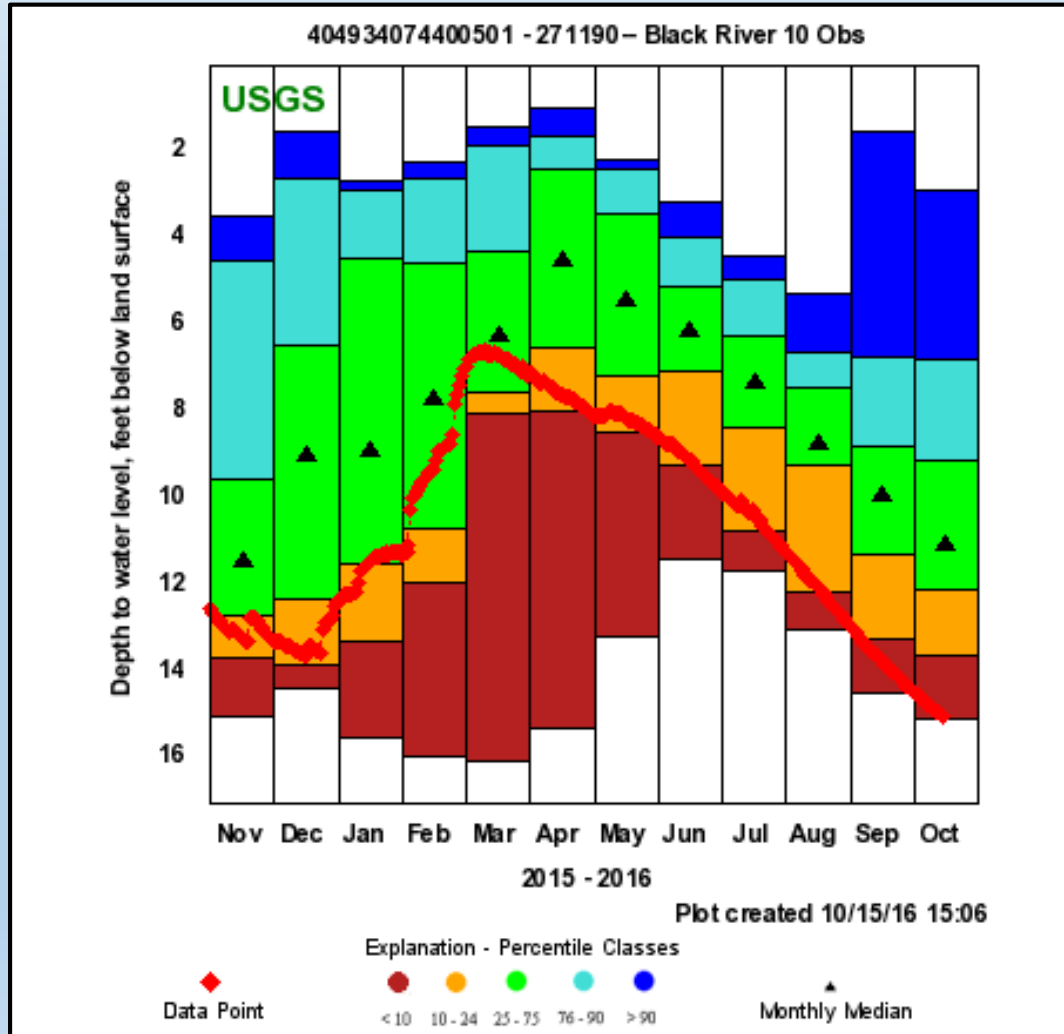
Example Streamflow Indicator



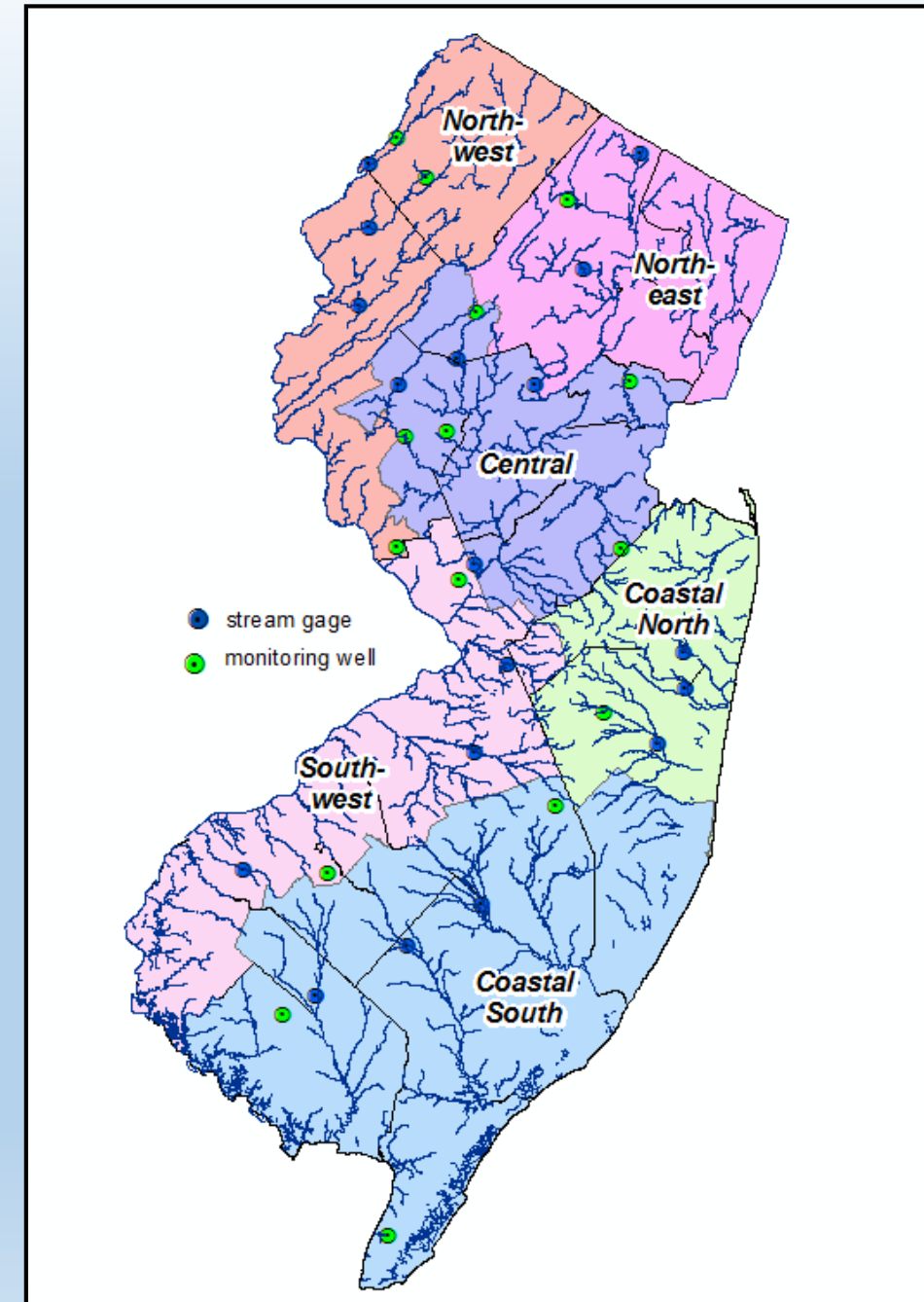
Use average of 3 stream gages per region to set indicator status



Example Groundwater Indicator

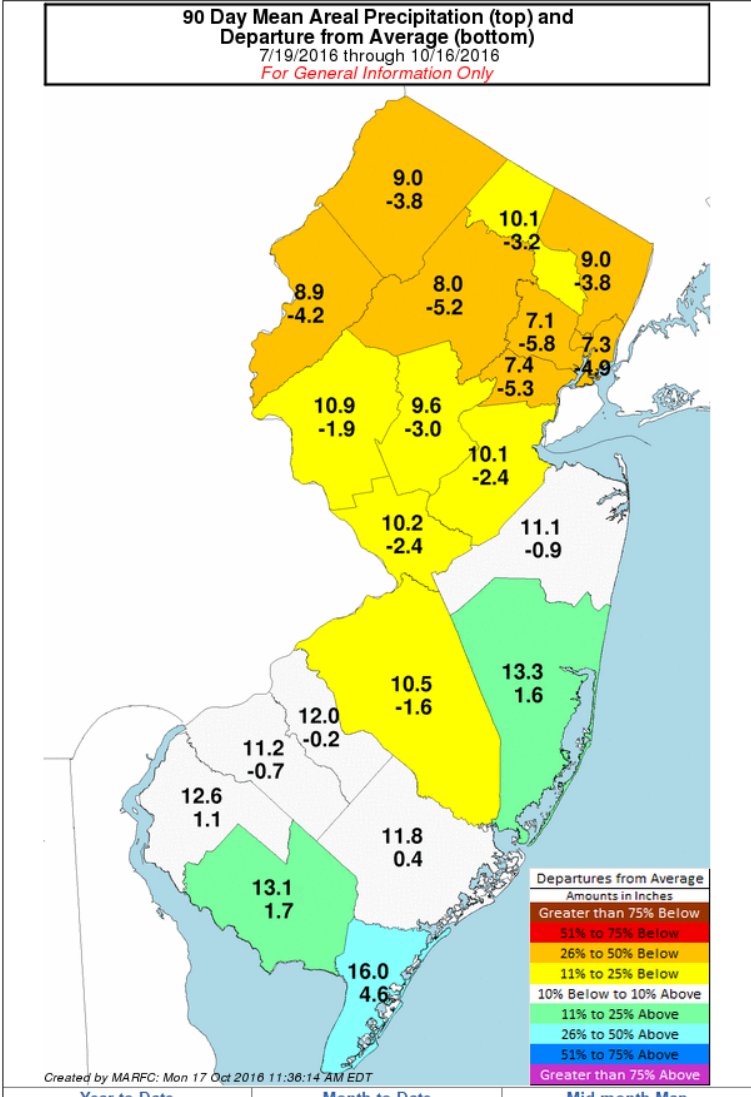


Use average of 3 unconfined aquifer wells per region to set indicator status

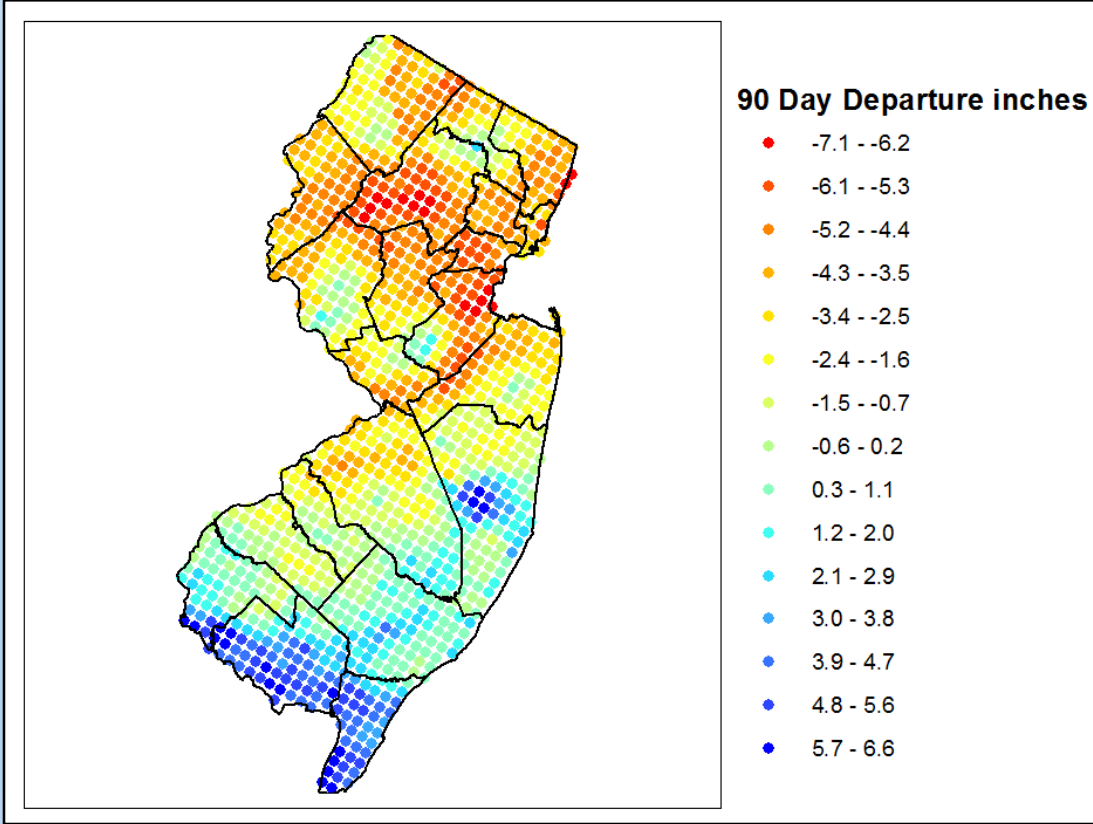


Example Precipitation Indicator







County-based NWS data



GIS-based NWS GIS



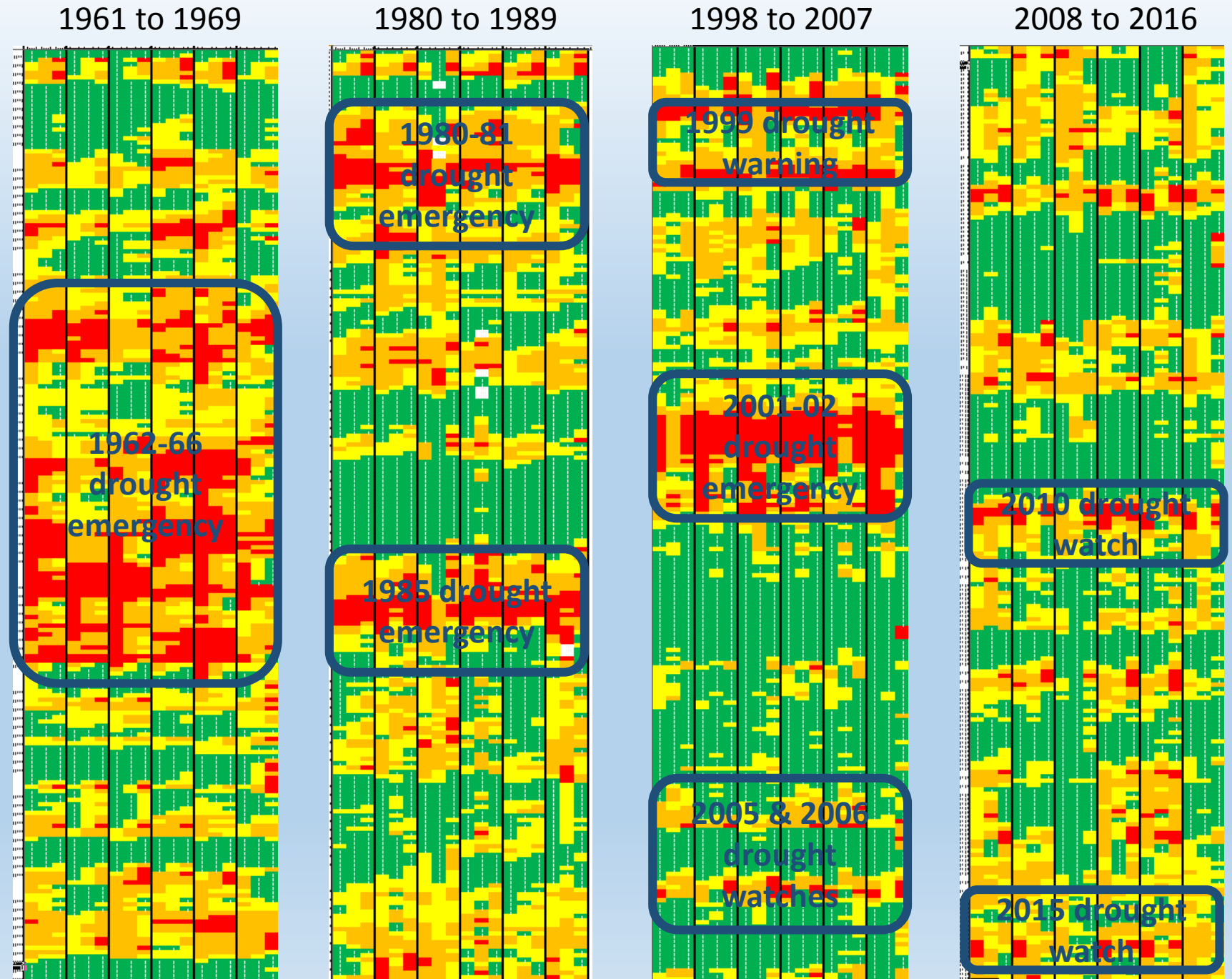
October 23, 2016 Drinking Water Supply Indicators

		NEW JERSEY Regional Drinking-Water-Supply Indicators & Declared Water-Supply Status					October 23, 2016			
Region		Drinking-Water-Supply Indicator					Water-Supply Status			
		Status	90-day precipitation	90-day stream-flow	N.J. reser-voirs	Del. R. reser-voirs			Unconf. ground water	
North-west		Near or above normal	○	○	Not a significant region-wide water resource.	●	○	Normal	○	
		Moderately dry	● ⁰	○		○	○	○	Watch	○
		Severely dry	○	● ¹³		○	○	○	Warning	● ¹
		Extremely dry	○	○		○	○	● ¹	Emergency	○
Central		Near or above normal	○	○	Not a significant region-wide water resource.	●	○	Normal	○	
		Moderately dry	○	○		● ¹³	○	○	Watch	○
		Severely dry	● ³	● ¹³		○	○	○	Warning	● ¹
		Extremely dry	○	○		○	○	● ¹	Emergency	○
North-east		Near or above normal	○	○	Not a significant region-wide water resource.	○	○	Normal	○	
		Moderately dry	○	○		● ¹³	○	○	Watch	○
		Severely dry	● ¹	● ¹⁴		○	○	● ¹	Warning	● ¹
		Extremely dry	○	○		○	○	○	Emergency	○
South-west		Near or above normal	○	○	Not a significant region-wide water resource.	●	○	Normal	○	
		Moderately dry	● ⁴	○		○	○	○	Watch	● ³
		Severely dry	○	● ¹⁶		○	○	● ⁸	Warning	○
		Extremely dry	○	○		○	○	○	Emergency	○
Coastal North		Near or above normal	○	○	Not a significant region-wide water resource.	○	○	Normal	○	
		Moderately dry	● ⁰	○		● ⁶	○	○	Watch	○
		Severely dry	○	● ¹²		○	○	○	Warning	● ¹
		Extremely dry	○	○		○	○	● ⁵	Emergency	○
Coastal South		Near or above normal	● ¹⁶	○	Not a significant region-wide water resource.	○	○	Normal	●	
		Moderately dry	○	● ¹⁵		○	○	○	Watch	○
		Severely dry	○	○		○	○	○	Warning	○
		Extremely dry	○	○		○	○	○	Emergency	○

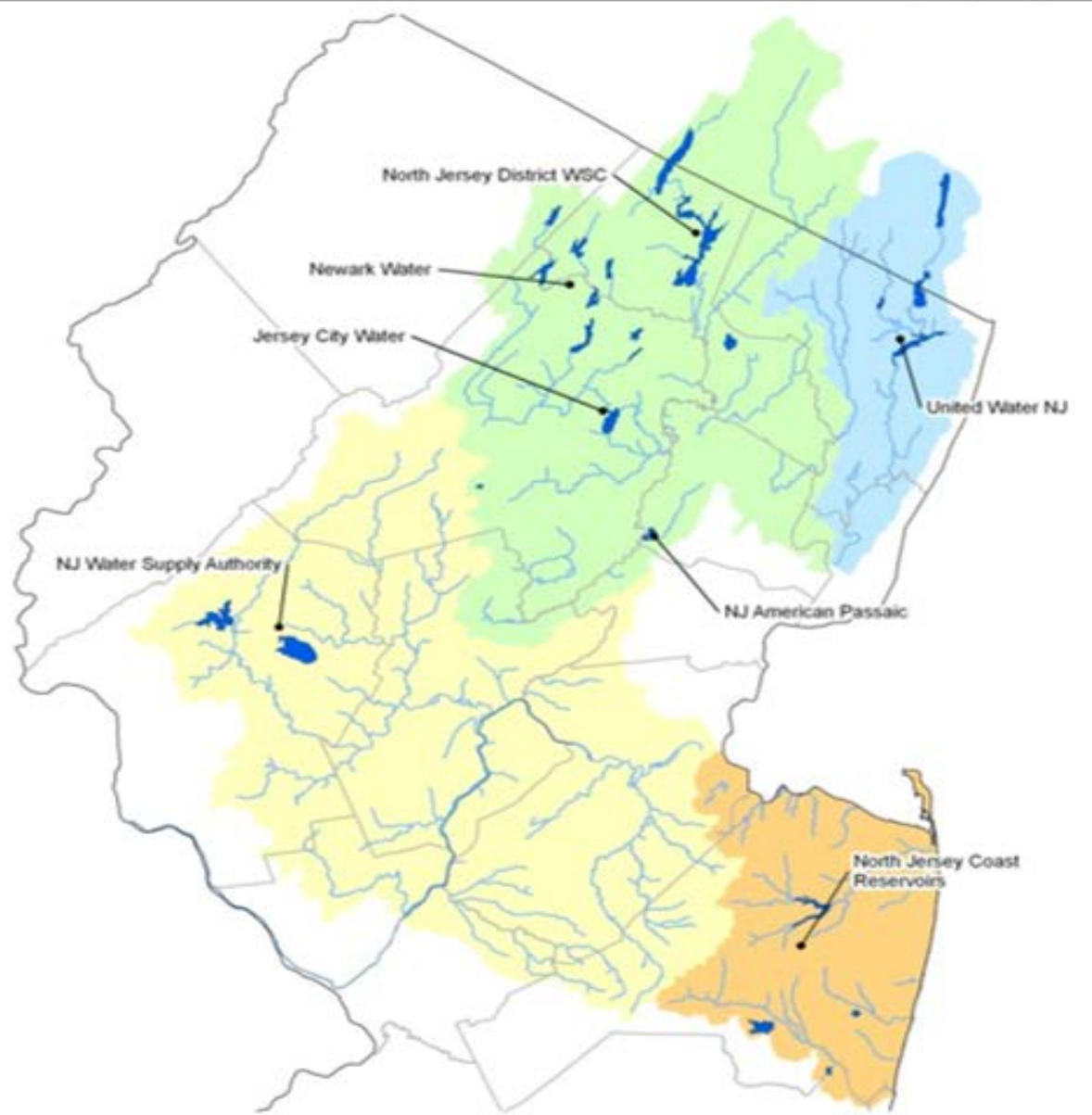
The number in each colored dot is the number of weeks the specific indicator in that region has been in that status. For indicators which changed status this evaluation cycle the arrow indicates the direction of change; it points from the previous status to the current. A water drop (●) means the indicator has been green for more than a year.

Simulated Historic Indicators vs. “Witnessed” Droughts

Note: The tables show the streamflow, groundwater and precip indicators for the Cen, CN, CS, NE, NW, SW regions, respectively.



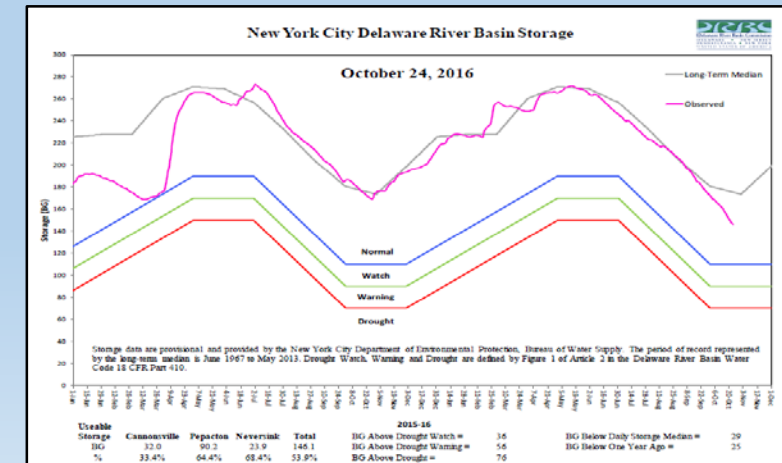
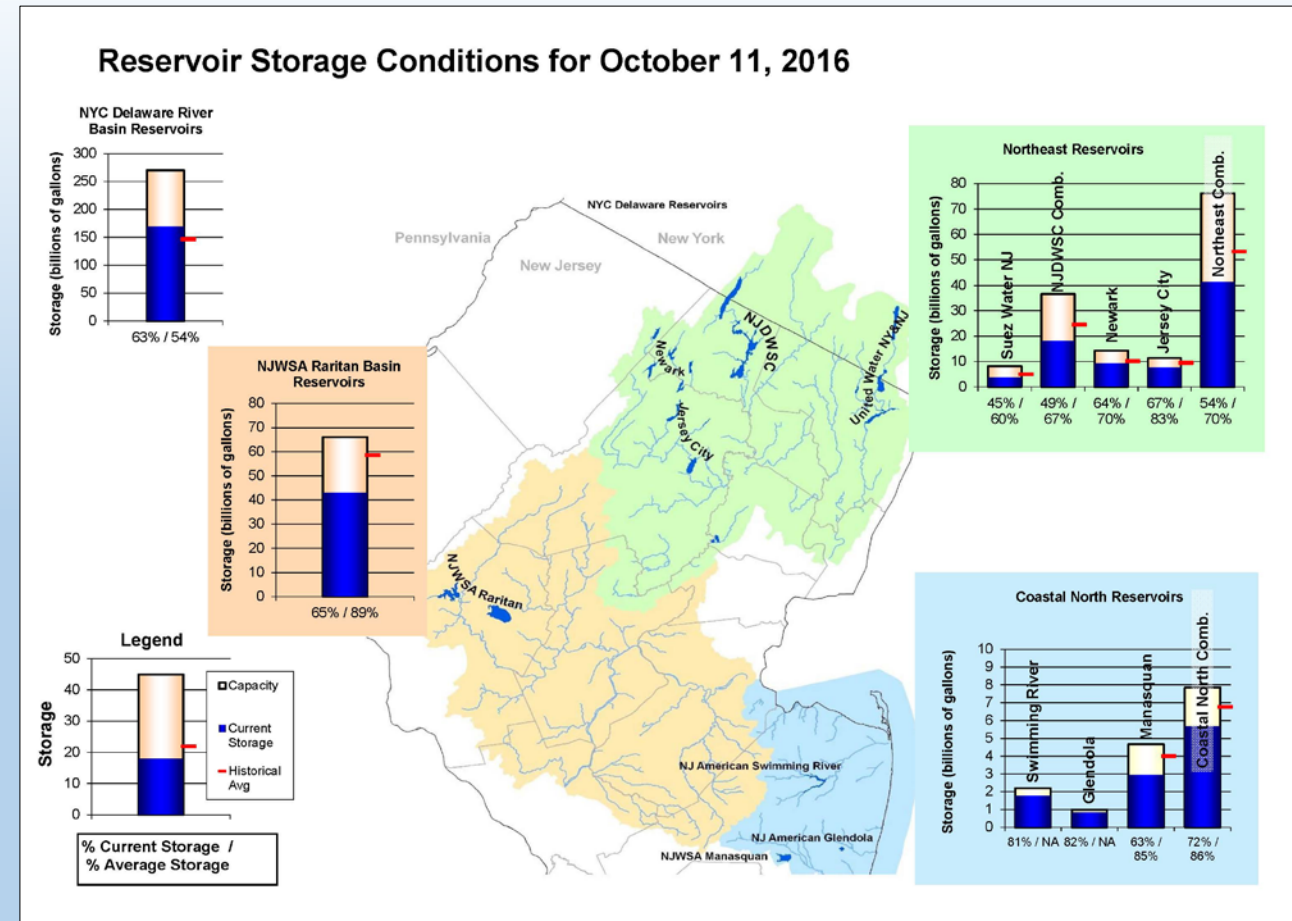
Reservoir Storage in the Regions



Map ID	Reservoir Name	Owner	Usable Storage (bg)	Water Source
Passaic Basin				
1	Greenwood Lake	NJDEP	6.86	Wanaque River
2	Monksville	NJDWSC	7.00	Wanaque River; pumping from Pompton River
3	Wanaque		29.6	
4	Canistear	City of Newark	2.41	Pascack Brook/Pequannock River
5	Clinton		3.5	Clinton Brook
6	Oak Ridge		3.91	Pequannock River
7	Charlottesburg		2.41	Pequannock River
8	Echo Lake		2.0	Macopin River
11	Split Rock	Jersey City	3.14	Beaver Creek
12	Boonton		8.16	Rockaway River
14	Canoe Brook #1 & 2 Cedar Ridge	New Jersey American (NJAW)	2.9	Canoe Brook/Passaic River
15	Point View	Passaic Valley Water Comm.	2.2	Pumping from Pompton River
Hackensack Basin				
16	Lake DeForest	United Water NY	5.7	Hackensack River
17	Lake Tappan	United Water New Jersey	2.0	Hackensack River
18	Woodcliff Lake		0.9	Pascack Brook
19	Oradell Reservoir		3.5	Hackensack River
Raritan Basin				
20	Spruce Run	NJ Water Supply Authority (NWSA)	11.0	Spruce Run
21	Round Valley		55.0	Pumping from Raritan, South Branch
Northeast Coastal Plain				
22	Swimming River	NJAW	1.8	Swimming River
23	Glendola		0.9	Shark River/Jumping Brook
24	Manasquan	NJWSA	4.7	Manasquan River/Timber Swamp Brook
25	Brick	Brick Twp. MUA	1.0	Metedeconk River
27	Delaware & Raritan Canal	NJWSA	n/a	Delaware River

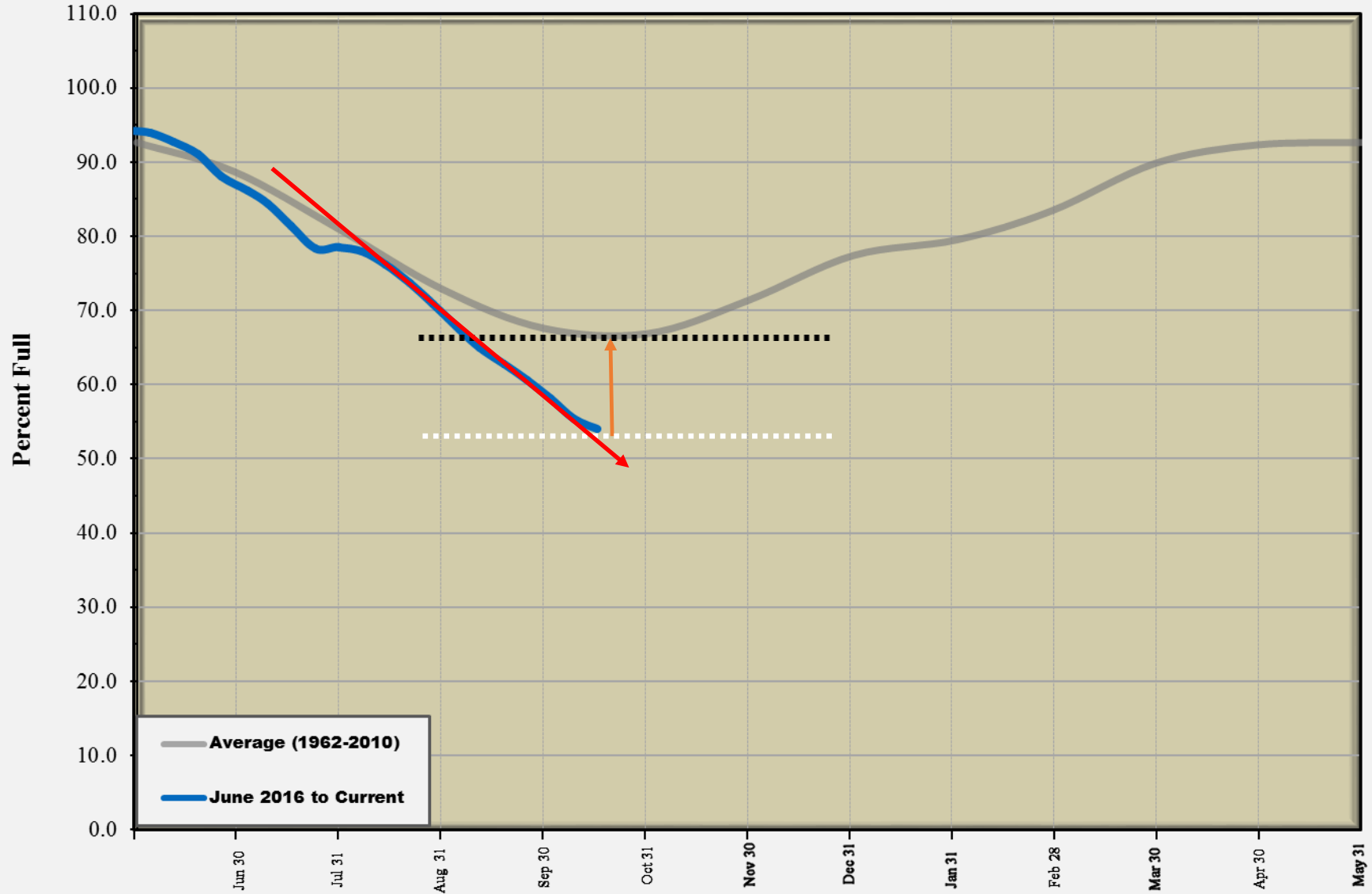
Reservoir Indicators

- Northeast: 6 major surface water purveyors, ~72 BG
- Central: 1 major surface water purveyor, ~66 BG
- Coastal North: 4 major surface water purveyors, ~8.5 BG
- Northwest & Southwest: PA & NYC DRBC reservoirs
- Several other “smaller” sources



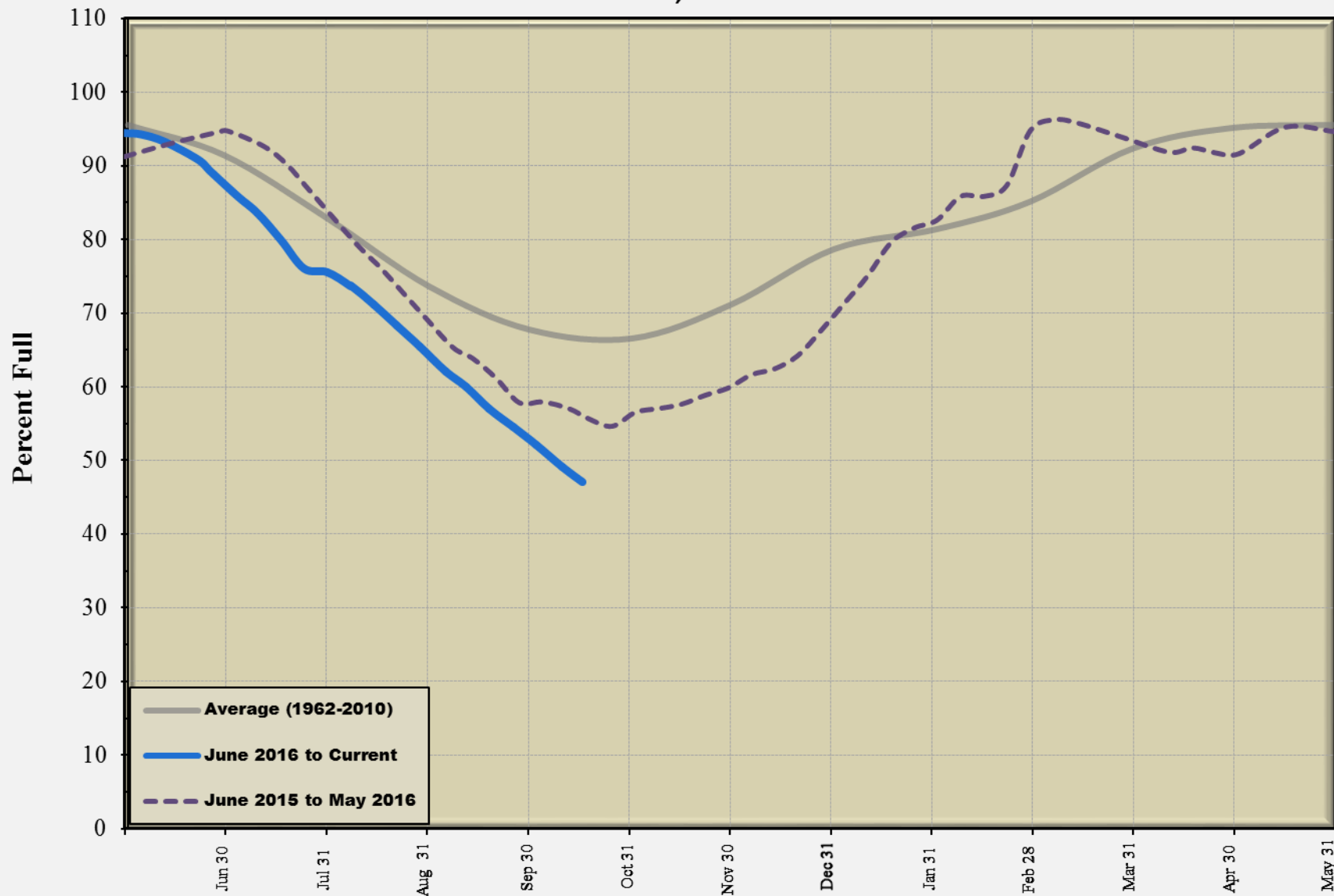
Combined Northeast Reservoir Storage

October 17, 2016



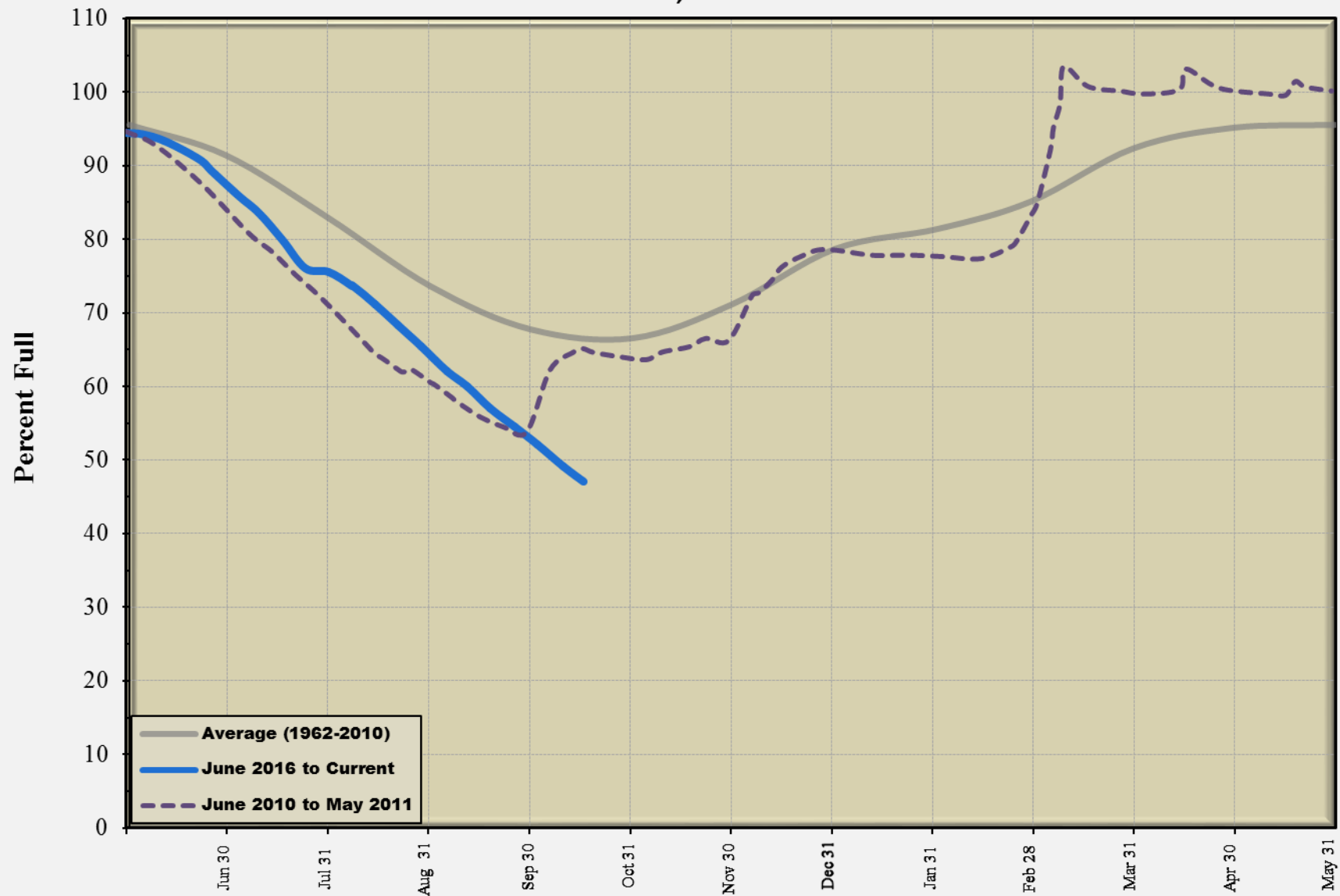
North Jersey District Reservoirs

October 17, 2016



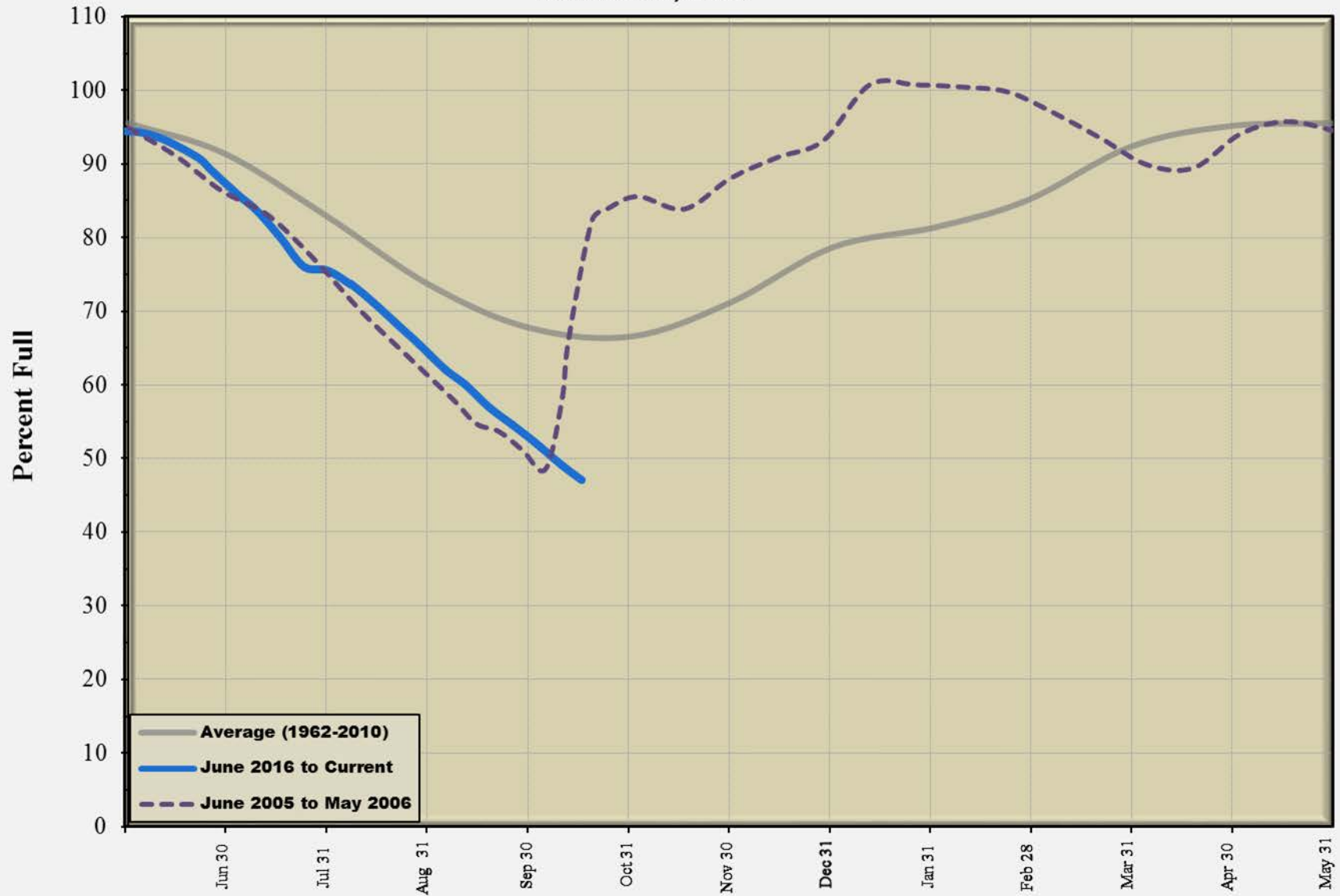
North Jersey District Reservoirs

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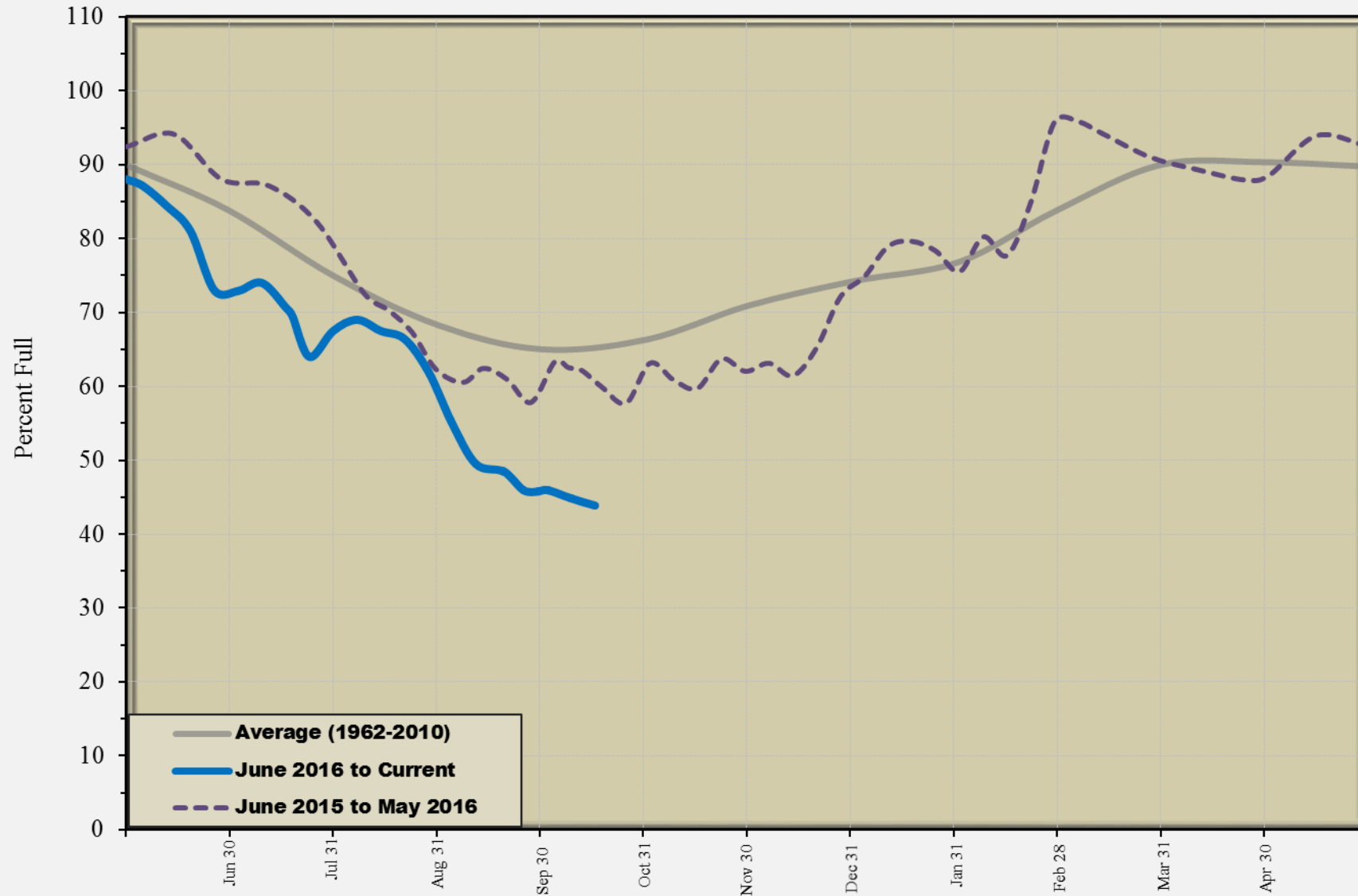
North Jersey District Reservoirs

October 17, 2016



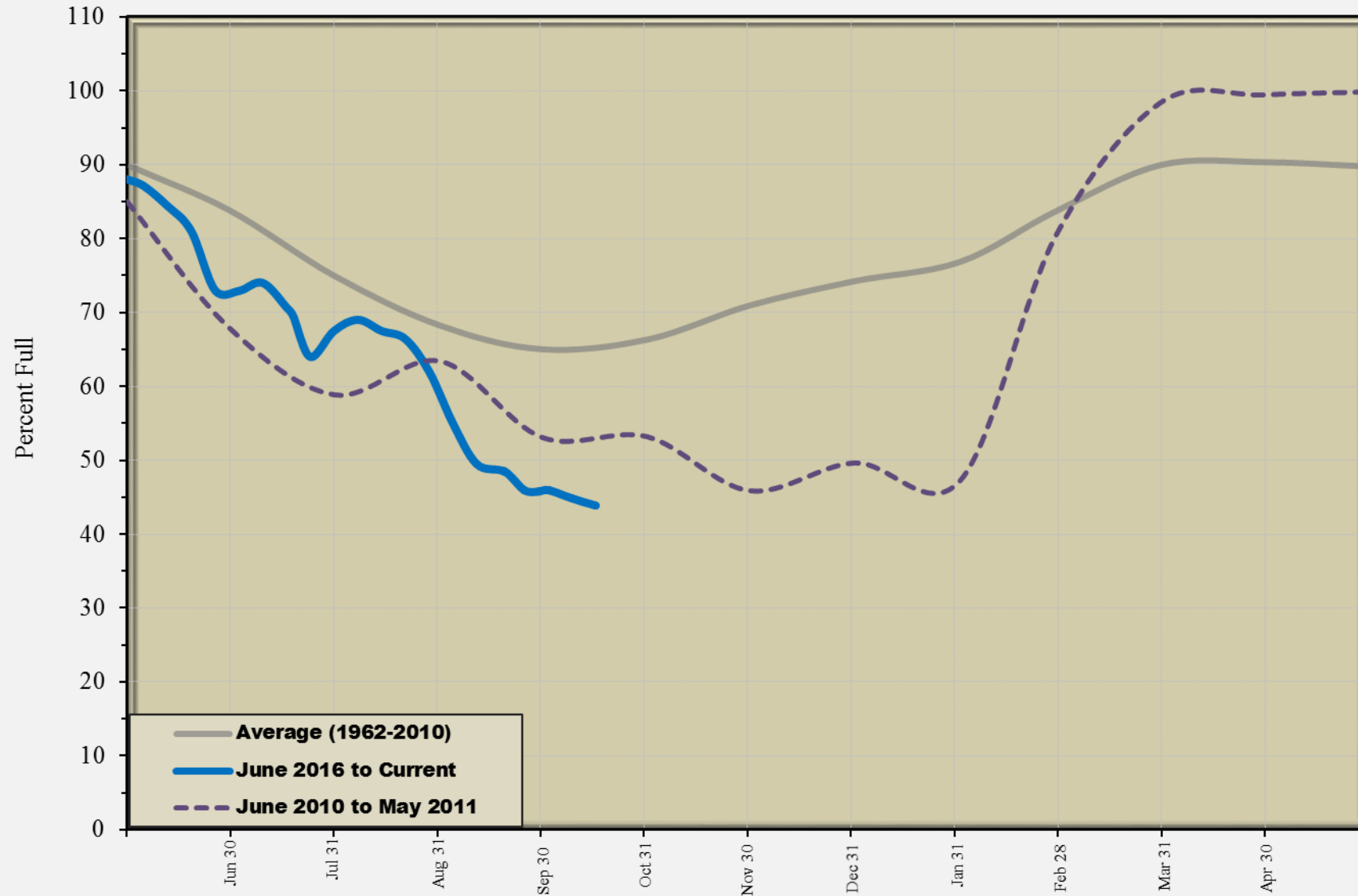
Suez-NJ Reservoir Storage

October 17, 2016

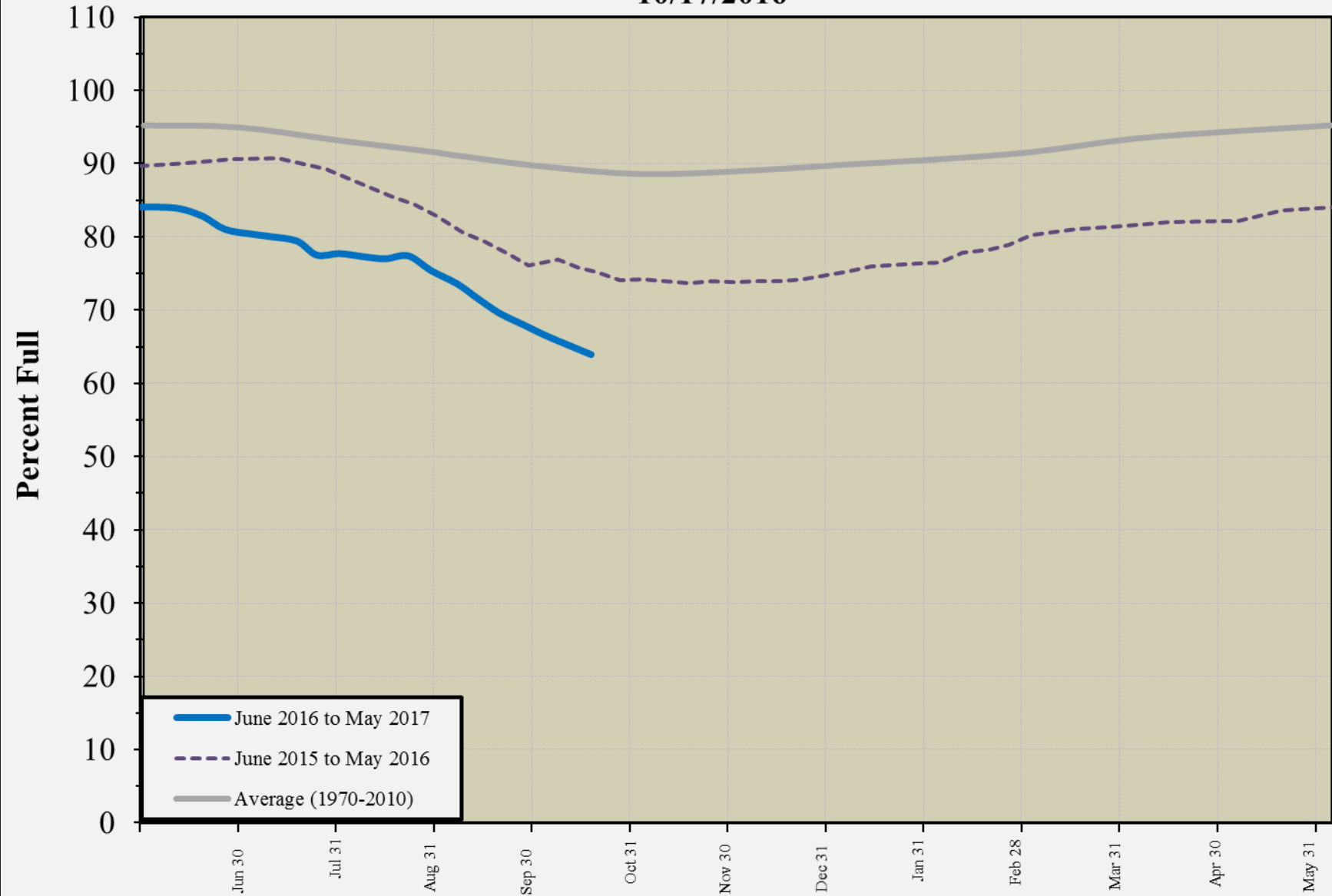


Suez-NJ Reservoir Storage

October 17, 2016

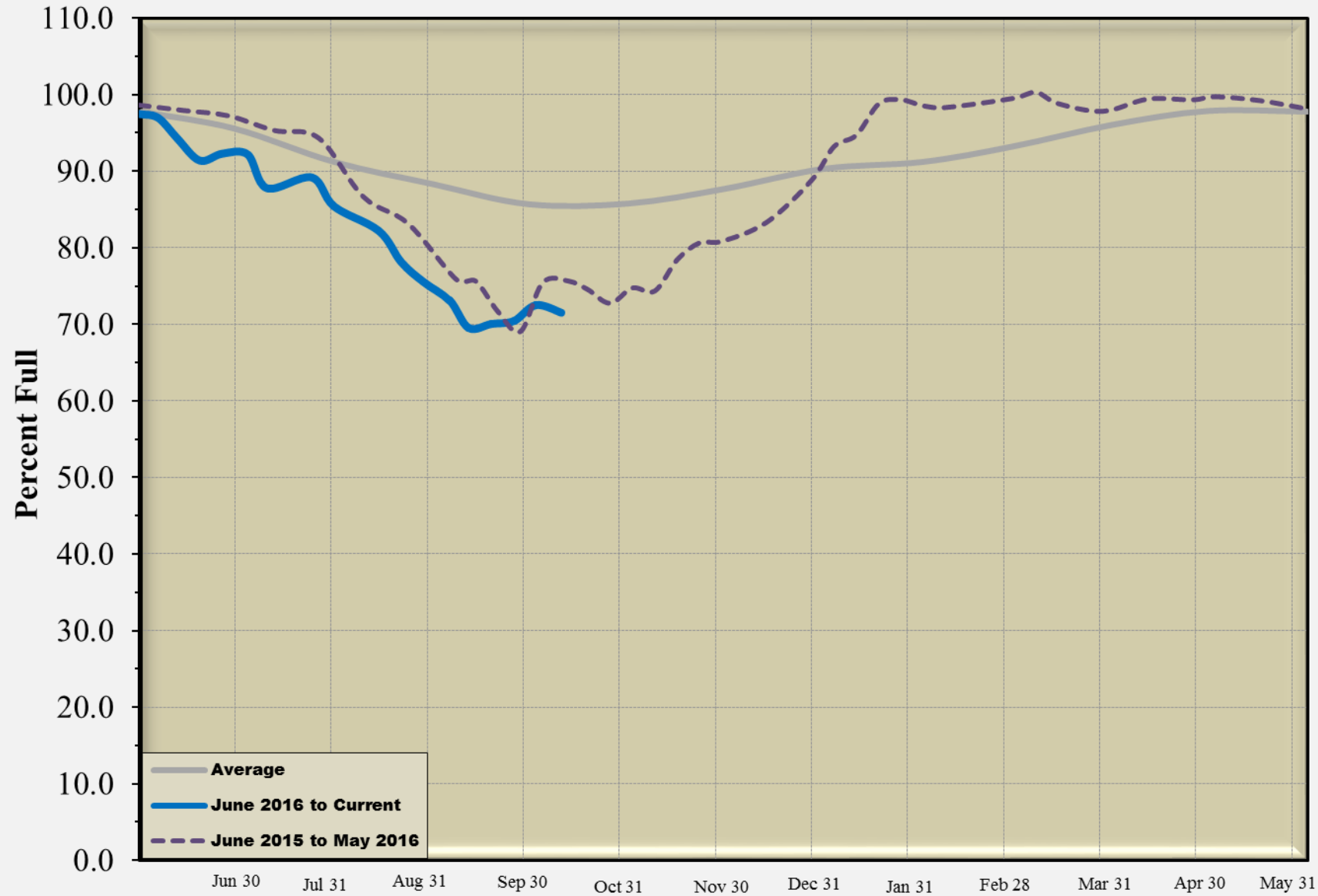


Combined Round Valley-Spruce Run Reservoirs as of 10/17/2016



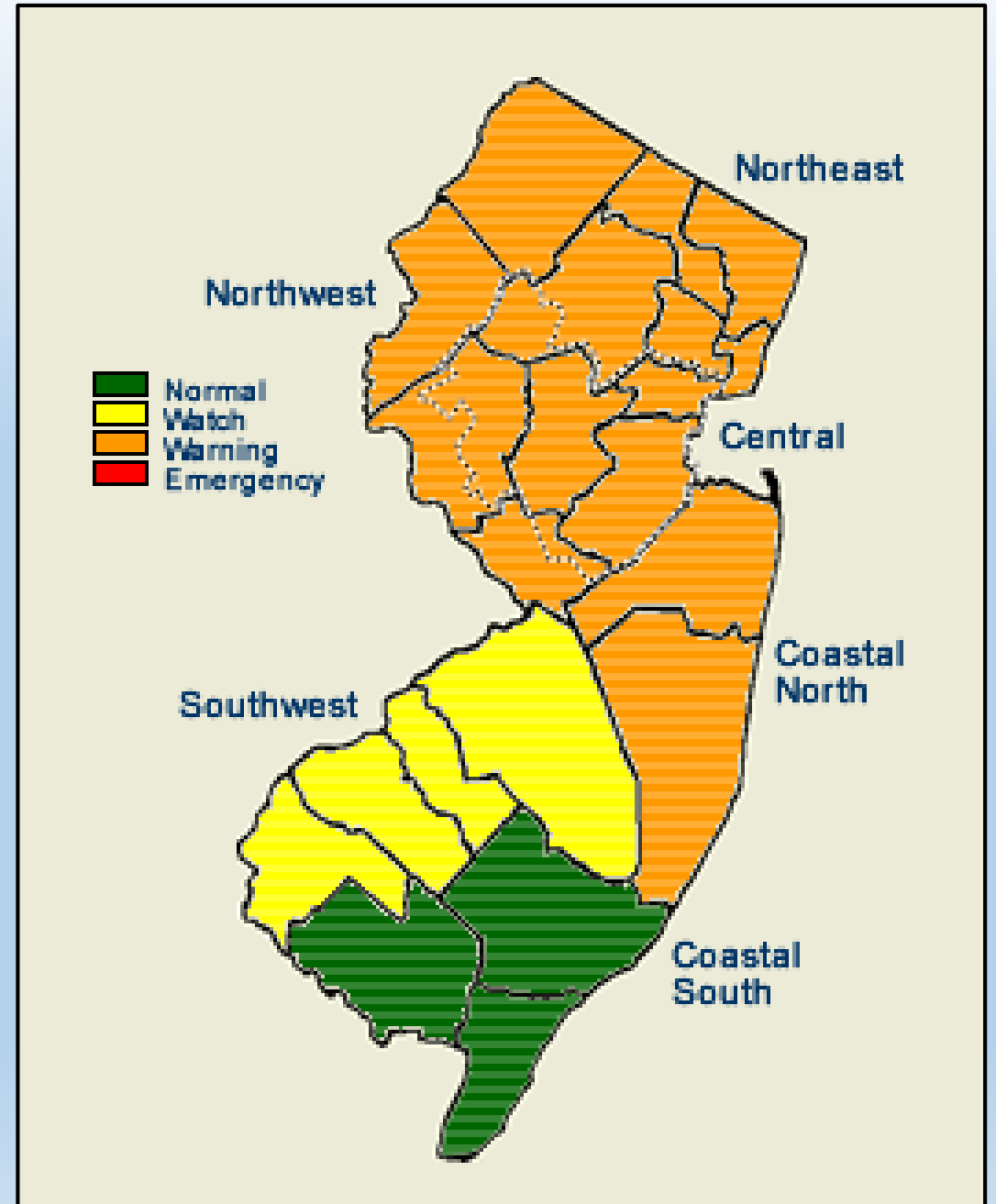
Combined Coastal North Reservoirs

10/17/2016



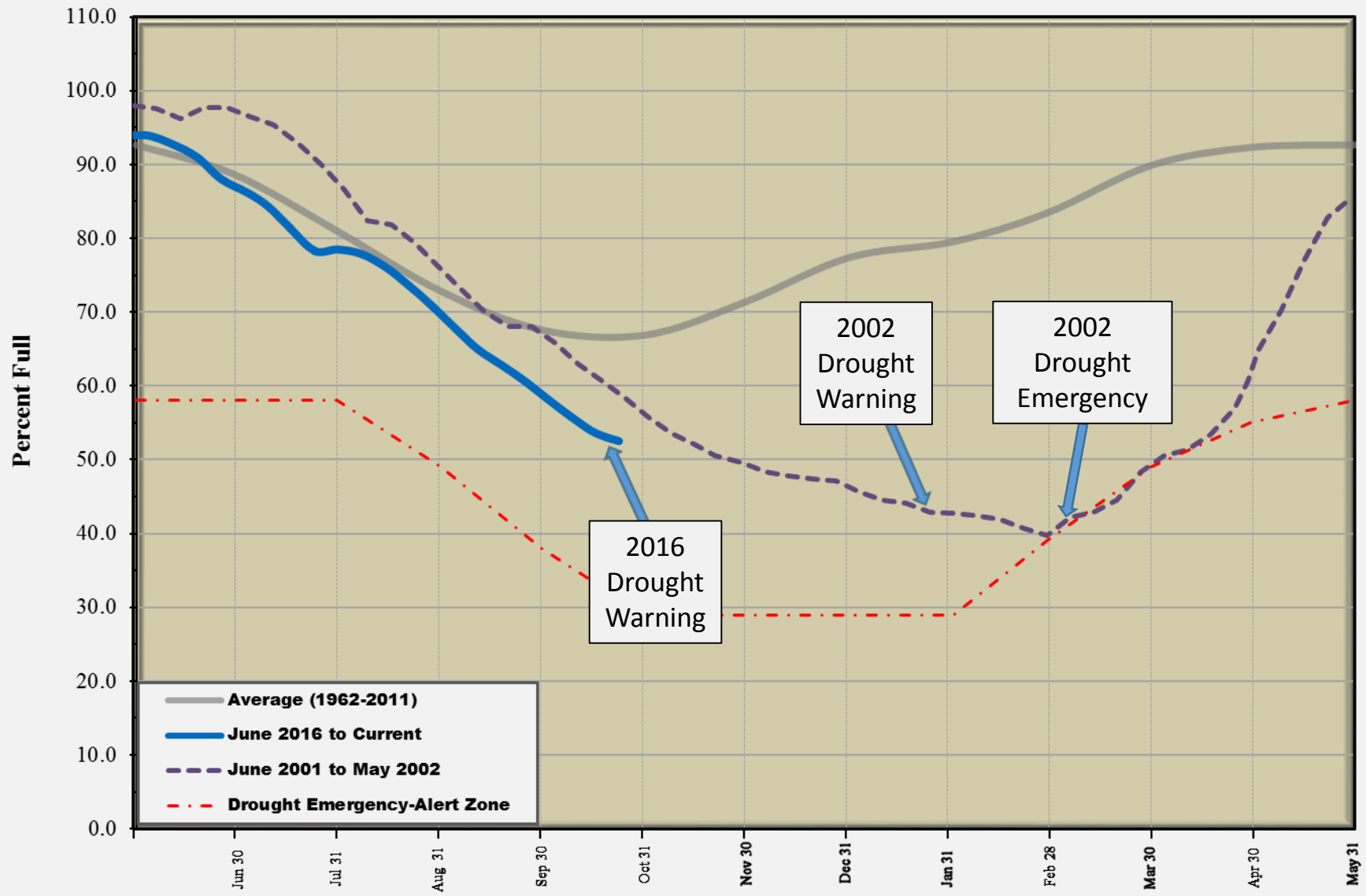
Declared Water Supply Status

- Determined using all available data
 - Status and Trend of indicators
 - Time of year
 - Precipitation/Temperature forecasts
 - Water demands
 - Water Supplier input
 - Other agencies, states
 - Best Professional Judgement



Combined Northeast Reservoir Storage

October 24, 2016





Normal

Non-Emergency



Emergency



Mandatory Demand-side
Actions



Watch

Voluntary Demand-side
Measures



Warning

Mandatory Supply-side
Measures



Phases I-IV

So, what is a Drought Warning anyway?

- Drought Warning is a non-emergency phase of managing available water supplies as drought conditions persist
- The aim of Drought Warning is to reduce the likelihood of a more serious water shortage, which in turn could lead to a Water Emergency
- Under Drought Warning, the DEP may direct any of the following types of actions:
 - Develop alternative sources of water
 - Complete interconnections between systems
 - Transfer water between systems or regions of the State
 - Other modifications or measures to ensure an adequate water supply
 - Mandatory water use restrictions are not imposed under a Warning; however, the public is urged to use water sparingly in the affected areas
- A Water Emergency includes:
 - Mandatory water use restrictions – residential, commercial/industrial
 - Water use rationing
 - Selective Curtailment - potentially drastic measures (to preserve public health and safety)

Drought Warning Measures

- Primary goal is to preserve storage and balance supplies within the affected region(s)
- Objective is to achieve parity among supply sources so that they are drawn down uniformly until normal rainfall resumes
- Specific types of measures –
 - Transfers of water between individual systems
 - Water transfers between regions (e.g. Central to Northeast)
 - Water service substitutions
 - Temporary modifications of reservoir releases and regulated stream passing flows
 - Coordinated with other DEP programs (DWQ and Fish & Wildlife) to ensure no adverse impacts occur
- DEP is only able to limit water demands under a Water Emergency declared by the governor



www.njdrought.org