Drought Management and Hydrologic Conditions

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Manager, Water Resource Operations

Public Hearing – November 9, 2016
DRB Drought Conditions

STATE INDICATORS

* Groundwater levels
* Precipitation
* Streamflow trends
* Water supplies
* Palmer Index
The Commission’s drought **planning and response** actions:

- Complement the states’ drought actions
- Address the **essential conservation of regional reservoir storage** for purposes of water supply and flow augmentation for the Delaware River
- Control salinity in the Delaware Estuary.
Commission Authorities

- Emergency Declarations under Sections 3.3(a) and 10.4 of the Compact
- Drought Operations of Major Reservoirs
- Direction of Storage for Emergencies
- Consumptive Use Replacement
- Drought Management and Contingency Plans
- Voluntary Conservation
- Coordinated Actions with the Signatory States
DRBC Actions

- Pre-emptive
  - Comprehensive Plan/Project Review
  - Water Conservation
  - Water Audits
  - SE PA Groundwater Protected Area

- Responsive
  - Drought Operating Plans
  - Consumptive Use Replacement
  - Low Flow Augmentation
**Basinwide**
- Reduced conservation releases
- Reduced flow objectives
- Reduced out-of-basin diversions
- Consumptive Use Replacement
- Use of additional reservoirs

**Lower Basin** (below intersection of PA, NJ and NY borders)
- Similar to basinwide, except Montague, NYC Diversion and Releases
- Reduced Trenton Flow Objective – based on salt front location
- Choice of six operating plans
Area affected by Lower Basin Drought Management Plan
Sources of Water

- ERQ (bank est. by Decree)
- DRBC Storage in USACE Reservoirs
- Emergency
- Consumptive Use Make-Up
Water Management Schematic for the Delaware River Basin

- **Out-of-Basin Diversion**
  - Primarily Water Supply Reservoirs
  - Multi-Purpose (Flood/Power/WS/Recreation) Reservoirs
  - Primarily Flood Control Reservoir
  - Flow Management Objective

- **Cannonsville**
  - Inflow
  - Diversion

- **Pepacton**
  - Inflow
  - Diversion

- **Neversink**
  - Inflow
  - Diversion

- **Jadwin**
  - Outflow or Spill

- **Prompton**
  - Outflow or Spill

- **Beltzville**
  - 22 BG Total
  - 13 BG for Water Supply
  - Outflow or Spill

- **Blue Marsh**
  - 16 BG Total
  - 6.5 BG for Water Supply
  - Outflow or Spill

- **F.E. Walter**
  - 35 BG
  - Release or Spill

- **Montague**
  - Non Drought Target = 1750 cfs (1130 MGD)

- **DELAWARE RIVER**
  - To New Jersey Water Supply
  - Up to 100 MGD

- **LEHIGH RIVER**
  - Merrill Creek Consumptive Use Replacement

- **SCHUYLKILL RIVER**
  - ESTUARY and “Salt Line”

- **To NYC Water Supply**
  - Up to 800 MGD

- **USACE Owned and Operated Reservoirs**

- **Note:** Not all reservoirs, tributaries, and diversions are shown.
<table>
<thead>
<tr>
<th>Location</th>
<th>2014</th>
<th>2015</th>
<th>January-November 6, 2016</th>
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<tbody>
<tr>
<td>Above Montague</td>
<td>42.40”</td>
<td>43.34”</td>
<td>32.63”</td>
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<tr>
<td></td>
<td>(-2.89”)</td>
<td>(-1.95”)</td>
<td>(-6.27”)</td>
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<td>Above Trenton</td>
<td>43.20”</td>
<td>44.06”</td>
<td>33.70”</td>
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<td></td>
<td>(-4.79”)</td>
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<td>Wilmington</td>
<td>50.91”</td>
<td>48.74”</td>
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<tr>
<td></td>
<td>(+7.83”)</td>
<td>(+5.66”)</td>
<td>(-0.71”)</td>
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90 Day Precipitation Departures

Source: NWS Mid-Atlantic River Forecast Center
30 Day Precipitation Departures

Source: NWS Mid-Atlantic River Forecast Center
Groundwater

As of November 3, 2016

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>STATE</th>
<th>AGENCY DATA</th>
<th>WELL ID</th>
<th>YEAR RECORD BEGINS</th>
<th>INDICATOR STATUS AS OF OCTOBER 6, 2016</th>
<th>CURRENT STATUS</th>
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<td>LE 644</td>
<td>1971</td>
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Groundwater Levels

Source: U.S. Geological Survey
Source: U.S. Geological Survey
Trenton

USGS 01463500 Delaware River at Trenton NJ

Discharge, cubic feet per second

Aug 20 2016
Sep 03 2016
Sep 17 2016
Oct 01 2016
Oct 15 2016
Oct 29 2016

---- Provisional Data Subject to Revision ----

△ Median daily statistic (103 years) ★ Measured discharge

Discharge

Graph courtesy of the U.S. Geological Survey
NYC Delaware Basin Storage:
- Neversink: 65%
- Pepacton: 59%
- Cannonsville: 27%
- Total: 48%

Lower Basin Storage:
- Beltzville: 68%
- Blue Marsh: 95%
- Merrill Creek: 87%
Lower Basin Storage

Blue Marsh

- Summer Pool = 290'
- Winter Pool = 285'
- Drought Warning = 283'
- Drought Emergency = 273'

Schuylkill

Beltzville

- Normal Pool = 628'
- Warning = 615'
- Emergency = 590'

Lehigh
New York City Delaware River Basin Storage

November 8, 2016

Storage data are provisional and provided by the New York City Department of Environmental Protection, Bureau of Water Supply. The period of record represented by the long-term median is June 1967 to May 2013. Drought Watch, Warning and Drought are defined by Figure 1 of Article 2 in the Delaware River Basin Water Code 18 CFR, Part 410.

<table>
<thead>
<tr>
<th>2015-16</th>
<th>BG Above Drought Watch = 19</th>
<th>BG Above Drought Warning = 39</th>
<th>BG Above Drought = 59</th>
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<tr>
<td>Useable Storage</td>
<td>Cannonasville</td>
<td>Pepacton</td>
<td>Neversink</td>
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<tr>
<td>BG</td>
<td>25.0</td>
<td>81.2</td>
<td>22.5</td>
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<tr>
<td>%</td>
<td>26.1%</td>
<td>57.9%</td>
<td>64.5%</td>
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The Flow Objective at Trenton was designed to repel salinity for the protection of drinking water treatment facilities and industrial intakes.
U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period
Valid for October 20 - January 31, 2017
Released October 20, 2016

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:
Anthony Artusa
NOAA/NWS/NCEP/Climate Prediction Center

http://go.usa.gov/3eZ73
NOAA 3-Month Outlook

Temperature

Precipitation
Next Steps

- Initiation of drought operating plans:
  - Lower basin drought warning (a few days away)
  - Basinwide drought watch (a few weeks away)
- Notification of entities as to actions required under a lower basin drought warning
- Monthly meetings of Commission representatives and Decree Parties (includes all basin States, DRBC and NYC)
- Input from this hearing used for emergency declaration decision (under the Compact this may occur at any time regardless of reservoir levels)
- Coordination with the Basin states to encourage:
  - water use reductions
  - water conservation and
  - water efficiency
Summary

- Complementary to the actions of the states
- Conservation of regional reservoir storage for purposes of flow augmentation and salinity control in the Delaware Estuary
- Operating Plans - phased reductions in flow objectives, out-of-basin diversions and conservation releases (prescribed by regulation)
- Additional storage for Commission use in meeting Trenton flow objective
- Consumptive use replacement