Consumptive Use Replacement Program for Power Facilities in the Delaware River Basin

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Session 42 / Stadium 2 Delaware River – Part 1



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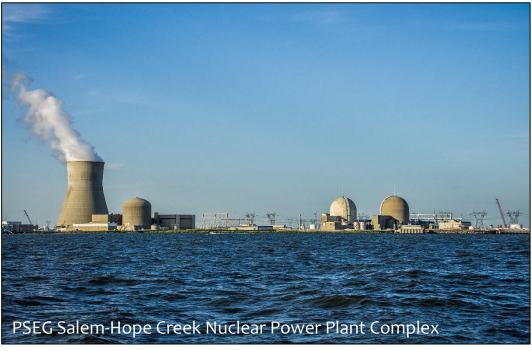


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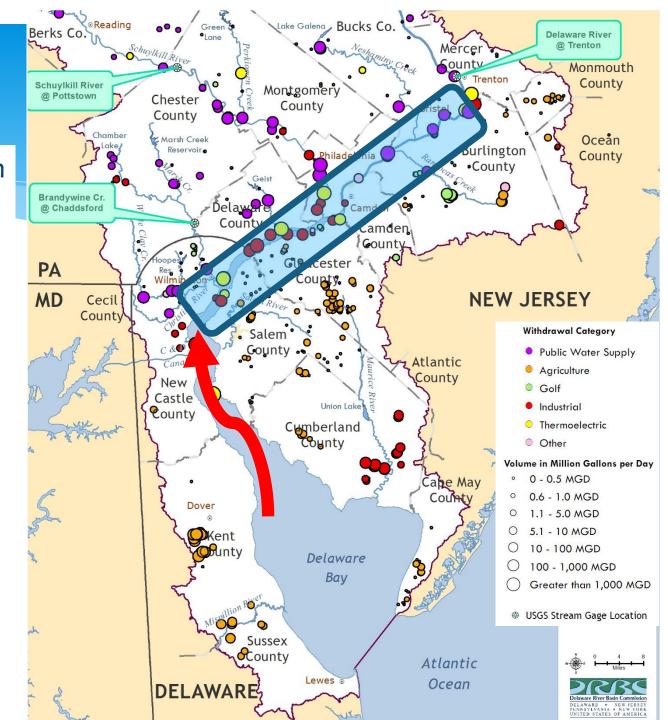
Agenda

- * Program Goals & Development
- * Overview of power providers in the Delaware River Basin
- * Review definition of Critical Hydrologic Condition
- * Consumptive Use Replacement Plan & Implementation



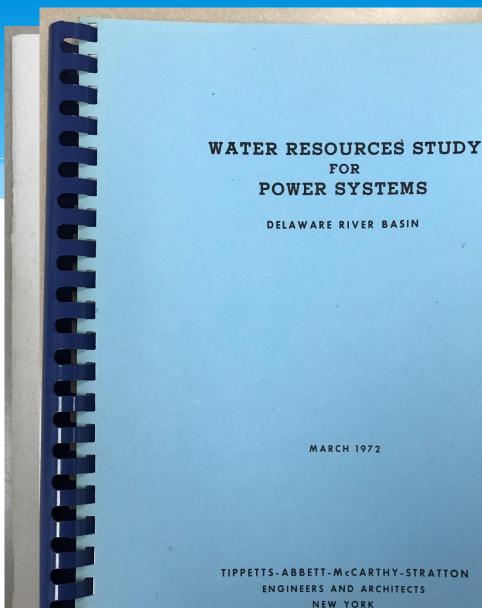
Program Goals

- Protect municipal and industrial intakes in the Delaware Estuary from salinity encroachment during droughts.
- Power generation will not exacerbate drought conditions.
- Establish a policy that enables <u>C.U.</u>
 <u>replacement</u> so that power generators are not curtailed during droughts.
- Improve public water supply and economic resiliency during droughts.



Program Development

- DRBC has regulatory powers to allocate the waters of the Basin.
- 1970's studies projected large & rapid increases in consumptive use from power generation.
- In the early 1970's, several DRBC
 approvals for proposed nuclear
 power plants required the
 permittees to provide offsite
 storage capable of replacing
 consumptive use during low flows.



Consumptive Use Replacement Permit Condition (updated in 2018)

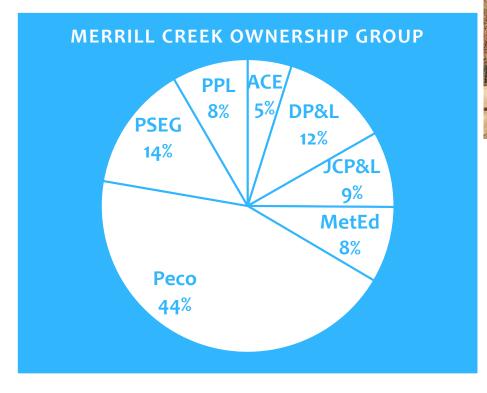
For the duration of a critical hydrologic condition as announced by the Commission, on a daily basis the docket holder shall cause to be released from a replacement water source approved by the Commission an amount of water equal to the amount consumptively used by the docketed facility, multiplied by the applicable relative effect factor, if assigned. For the duration of such critical hydrologic condition, the docket holder shall operate its facility only at a level commensurate with the amount of replacement water it is capable of causing to be released.

Program Development (con't)

- In 1976 DRBC adopted Resolution No. 76-13, which directed permittees to "proceed to develop...... required supplemental storage."
- In 1984 a power utility consortium received DRBC approval to construct pump storage reservoir project to offset consumptive use.
- In **2018** DRBC adopted Resolution No. 2018-5, which clarified and restated the policy for the replacement of water consumptively used by power generating facilities.

Merrill Creek Reservoir

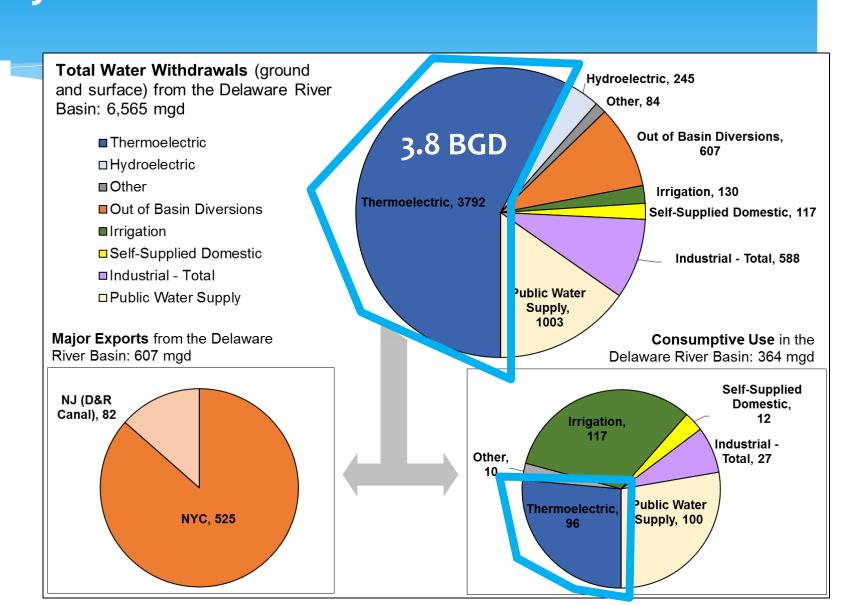
- * D-1977-110 CP-19 Merrill Creek Ownership Group
- * Constructed 1984-87, Operational 1988
- * 15 Billion Gallon Reservoir in Warren County, NJ
- * Pump from Delaware River
- ~60 miles upstream of Trenton, NJ





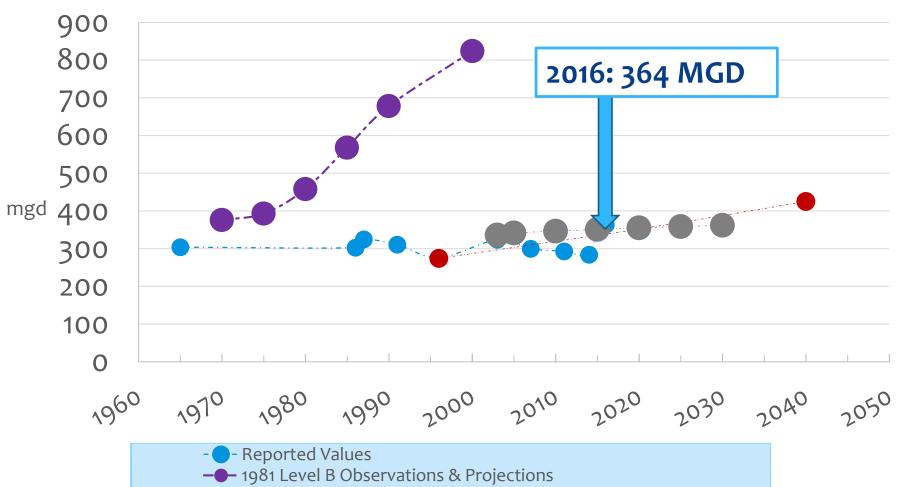
Water Use by Sector in the DRB: CY2016

- Power is among the DRB's largest consumptive use (~35% of in-basin use, ~100 mgd).
- Section 3.8 Review: Electric generating or cogenerating facilities designed to consumptively use in excess of 100,000 gpd of water during any thirty-day period.
- Most power generating dockets require the replacement of consumptive use during low flows.



Consumptive Use over time

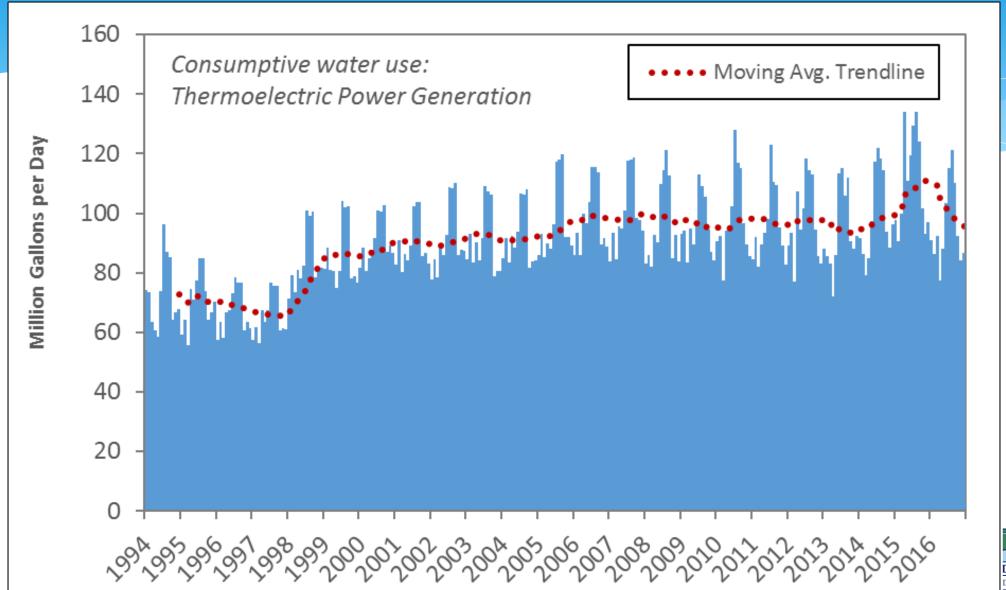
DRBC Consumptive Use Projections vs. Reported Values



- 2000 Consumptive Use Report Observations & Projections
- 2008 Multi-Jurisdictional Study



Consumptive Use over time: Thermoelectric





Power Generators in the DRB

42 Power 36 Subject to C.U. Generating Replacement ~ 44 Power Facilities in Generating the DRB have Facilities in the >100,000 gpd DRB of C.U. 6 Exempt 2 Hydropower

Types of generation:

- 3 Nuclear Sites with 5 units
- Natural Gas
- Coal
- Waste Incinerators
- Oil

Types of cooling:

- Once-through
- Evaporative

Types of water sources:

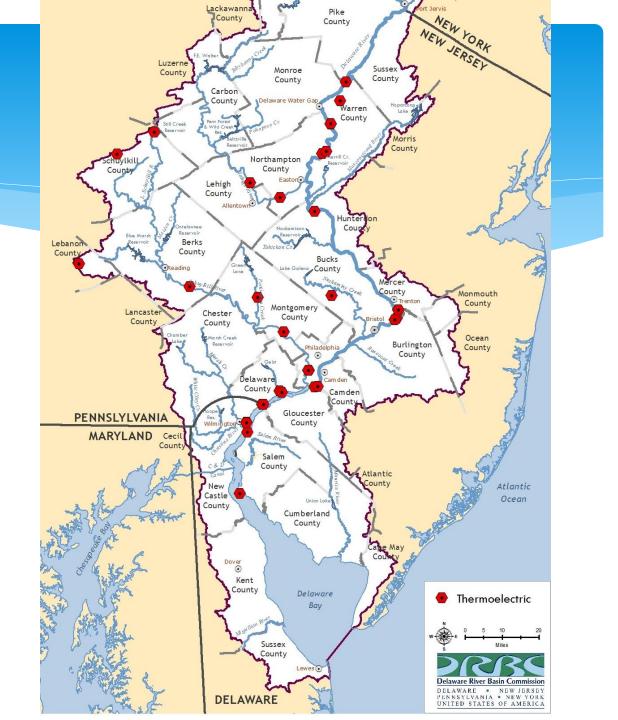
- Surface water
- Groundwater
- Mine pools
- Imported water
- Public water

Power Generators in the DRB

~44 Generating Facilities in DRB

Most utilize surface water

Most are located on the major rivers
Delaware River (tidal)
Delaware River (non-tidal)
Schuylkill River
Lehigh River

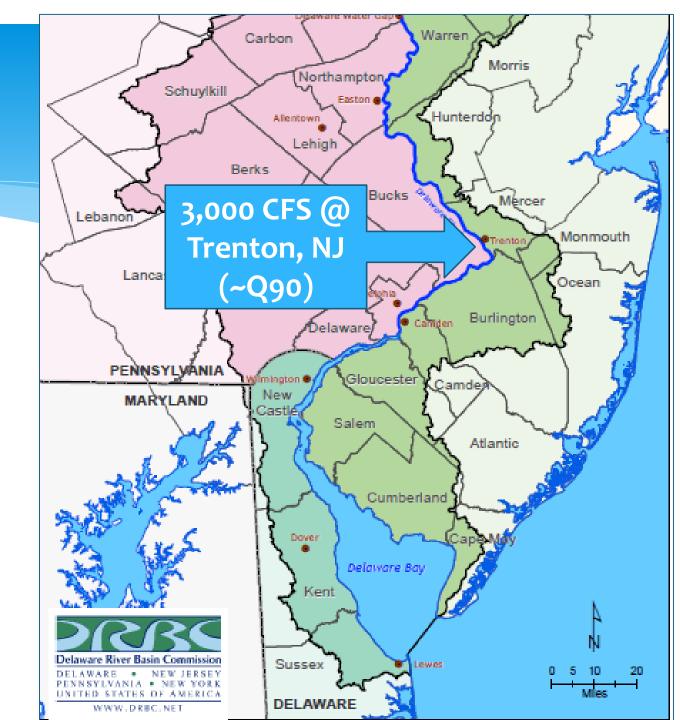


Critical Hydrologic Condition

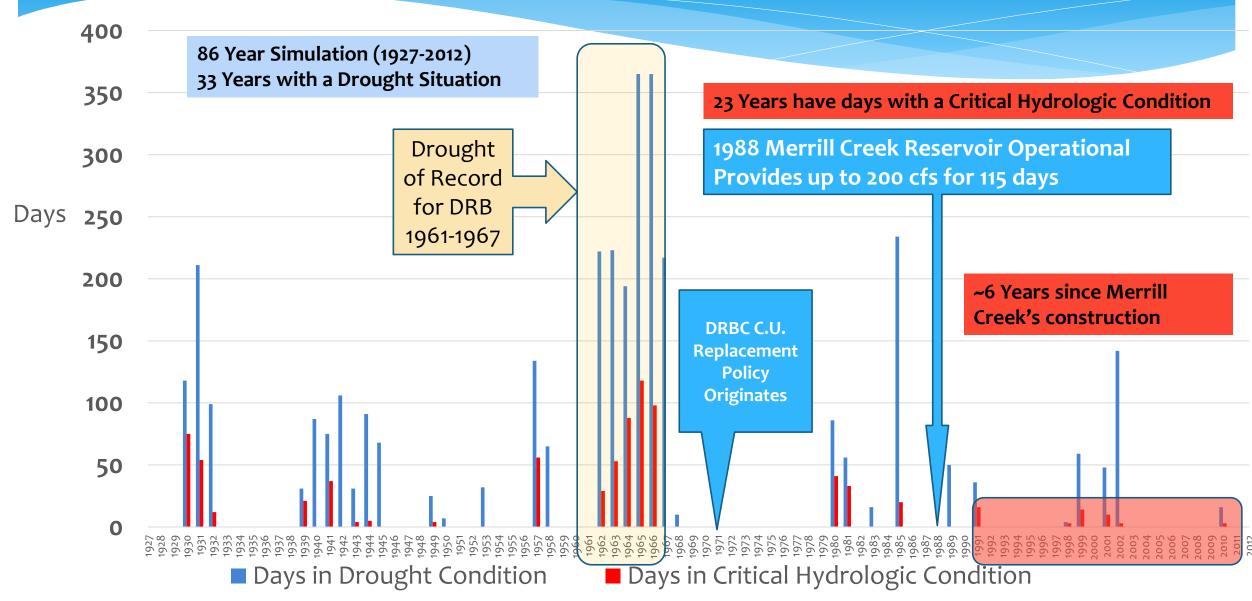
A critical hydrologic condition is deemed to exist whenever the following conditions are satisfied:

- 1. the Flow Objective at the <u>USGS</u>

 <u>Trenton gage</u> is reduced to a level below <u>3,000 cfs</u> in accordance with the Delaware River Basin Water Code; and
- 2. the sum of the following flows and releases remains below 3,000 cfs:
 - a) the flow measured at the USGS Trenton gage at approximately 8:00 am; plus
 - b) average daily releases from Blue Marsh Reservoir in excess of the minimum conservation release rate; plus
 - c) an amount of water as determined by the Commission to account for flows withdrawn above and returned below the USGS Trenton gage; less
 - d) the average daily release of Compensation releases from Merrill Creek Reservoir for the previous day.







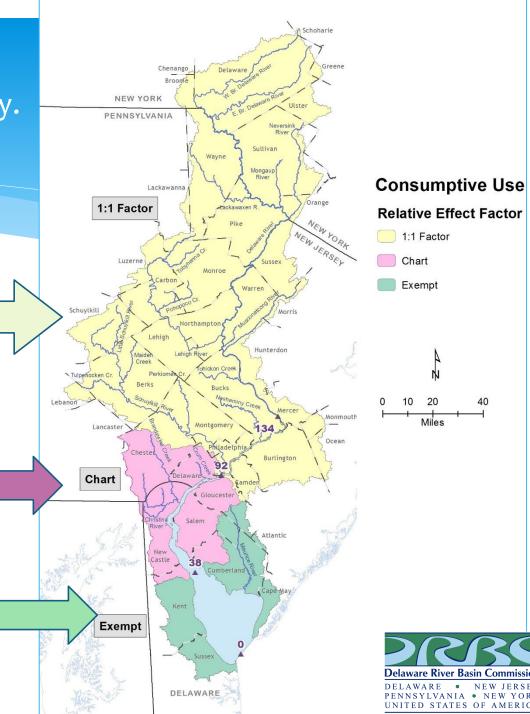
Relative Effect Factor

- Not all water is equal in terms of repelling salinity.
- Policy accounts for geography.

Above R.M. 92.4: 1:1 Gallon Replacement

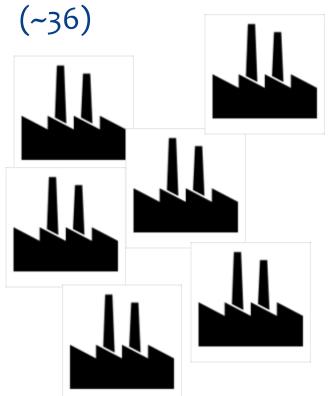
Above R.M. 38 & Below R.M. 92.4: Partial Replacement

Below R.M. 38: Exempt



Implementation – Consumptive Use Replacement Plan (CURP)

Individual docket condition for each DRBC approval



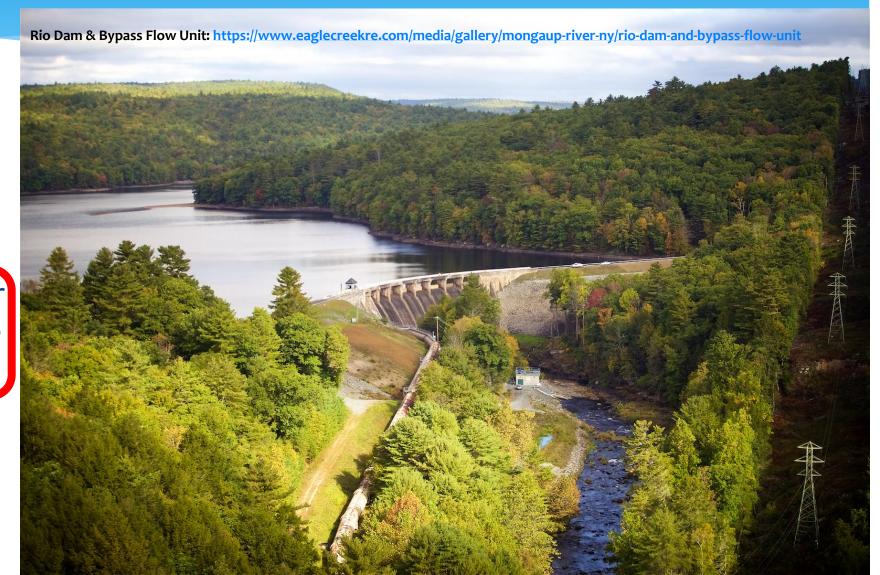
CURP – describes how a facility will implement its consumptive use replacement

- Description of replacement water source
- Volume of water secured
- Terms of use of replacement source
- Duration of use agreement
- Primary point of contact



CURP - Replacement Sources

- * groundwater that is not under direct influence of surface water
- * imported water
- reservoir storage other than Beltzville and Blue Marsh





CURP - Replacement Volumes

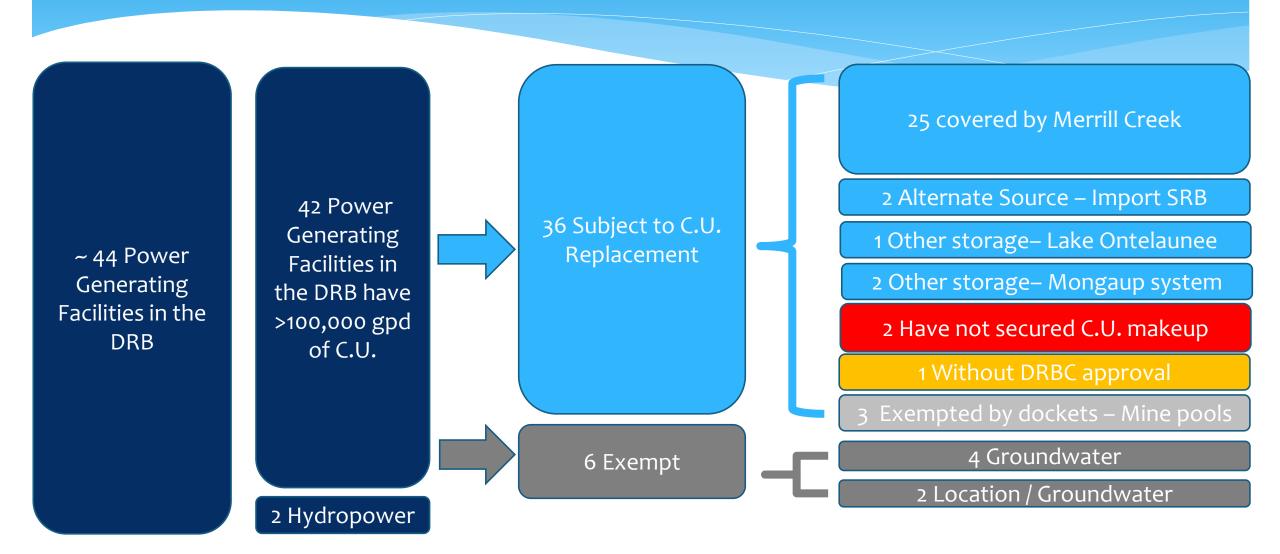
Recommended to secure an amount sufficient to supply the docket holder's projected consumptive use (multiplied by the Relative Effect Factor) experienced over a period of 120 days.

Recognizes the differences between baseload generators vs. peaking facilities.

120 days = normal dry season (June – September)



Power Generators in the DRB



Results

The vast majority of the Basin's power producers are able to avoid curtailment during a Critical Hydrologic Condition.

~100 MGD (~155 cfs) of consumptive use can be replaced during a CHC.

- 1. Primarily through in-basin reservoir releases
 - * Mostly from Merrill Creek Reservoir
 - * Some from the Mongaup Reservoir System
- 2. Some by shifting to imported water (from the Susquehanna River Basin)

The Delaware River Basin has a more resilient public water supply and economy (power production, refining, manufacturing) during drought periods.

Additional ecological and recreational benefits from releases.









