Managing the Delaware River

The 1954 Supreme Court Decree, the Good Faith Agreement, and the Flexible Flow Management Program

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The New Jersey Perspective

Part 2: "Once In A Lifetime"

September 19, 2014
Water Supply Advisory Council

Three-Part Presentation to WSAC

1) History: Part 1 (8/22/14)
   - Background, 1954 Decree and 1960's Drought

2) History: Part 2 (9/19/14)
   - Drought response, Good Faith Agreement, and Flexible Flow Management Program

3) Core Issues and Status of Negotiations
   - Unresolved/ongoing issues and options for resolution

Goals: Educate NJ stakeholders

Gain support for NJDEP position and actions

History - Part 2

- Why this issue is important
- Highlights from Part 1
- Response to Drought
  - Engineering Studies
  - DRBC and Decree Party Actions
- Good Faith Negotiations and Recommendations
- Flexible Flow Management Programs

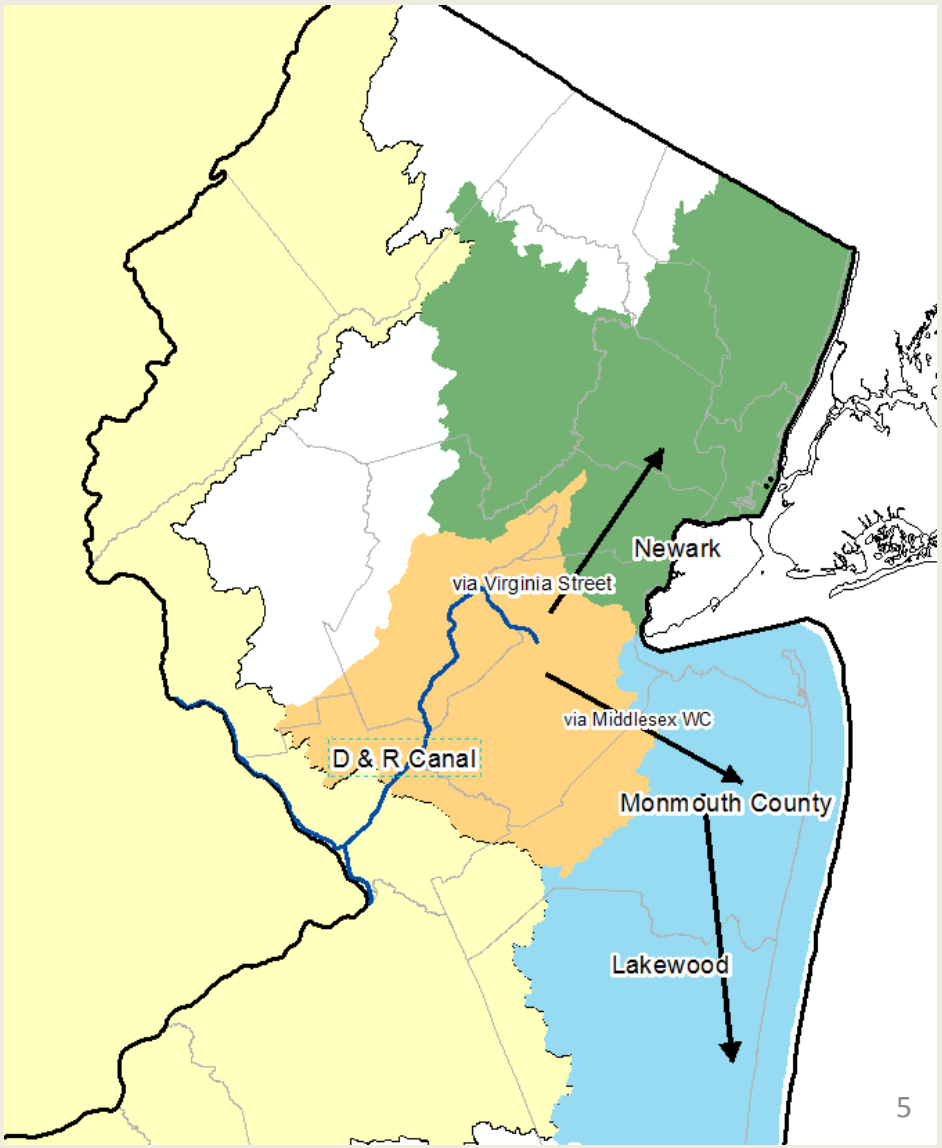
Why This Is Important

- At Minimum:
  - 20 mgd restoration of NJWSA's safe yield from the D&R Canal at NO COST, just sign it!
  - Comparisons:
    - Confluence pump station with 46 mgd safe yield at $150 million plus annual O&M
    - Equivalent to a new Spruce Run Reservoir

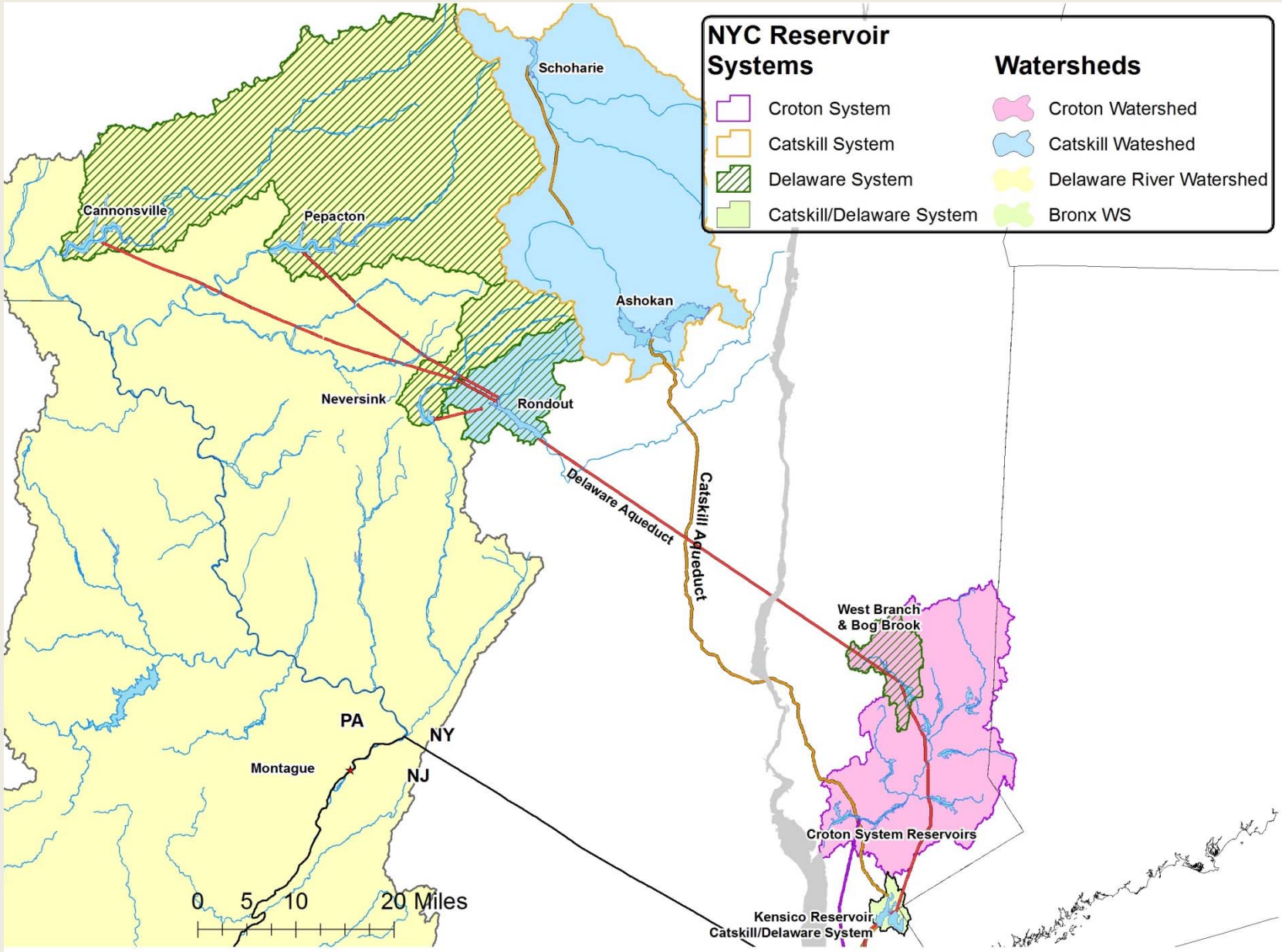
- At Maximum:
  - 35 mgd restoration of NJWSA's safe yield from the D&R Canal at No Cost
  - More water for the lower basin states of NJ, PA, and DE during drought
  - Enhanced flood mitigation protections on the Delaware River
  - Benefits to PA and NY:
    - Increased fisheries flows and thermal protections
    - Enhanced ecologic flows
    - Expanded tributary flood mitigation protections

Why This Is Important to NJ

- D&R canal water can be wheeled to NJ's development and demand regions to meet current needs
- No State $ needed, opportunity for private investment
- Provides resiliency to population centers along Atlantic Coast and Hudson River



NYC Reservoir Systems



Conjunctive Safe Yield

The whole is greater than the sum of its parts

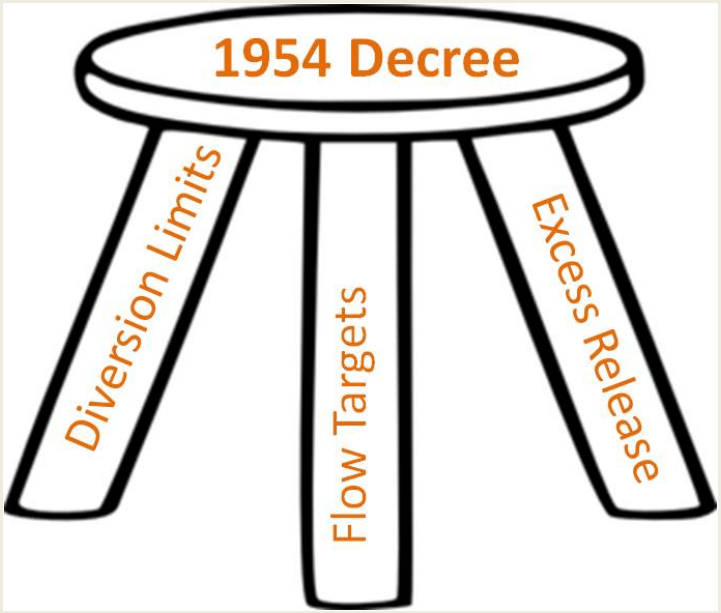
> *"The total firm yield from a group of reservoirs operated conjunctively to serve a large area exceeds the sum of the individual firm yields with each reservoir's serving its own smaller area."* Douglas and Lee, 1971, The Economics of Water Resources Planning

> *"The Catskill aqueduct has interlinked the earlier systems of water supply … since the Catskill, the Croton and the Ridgewood systems can now be operated in conjunction, the effective safe capacity of the combined systems is greater than the sum of the several capacities of the three if wholly disconnected. "* NYC Board of Water Supply, 1917

Core Equity Principles of the Decree

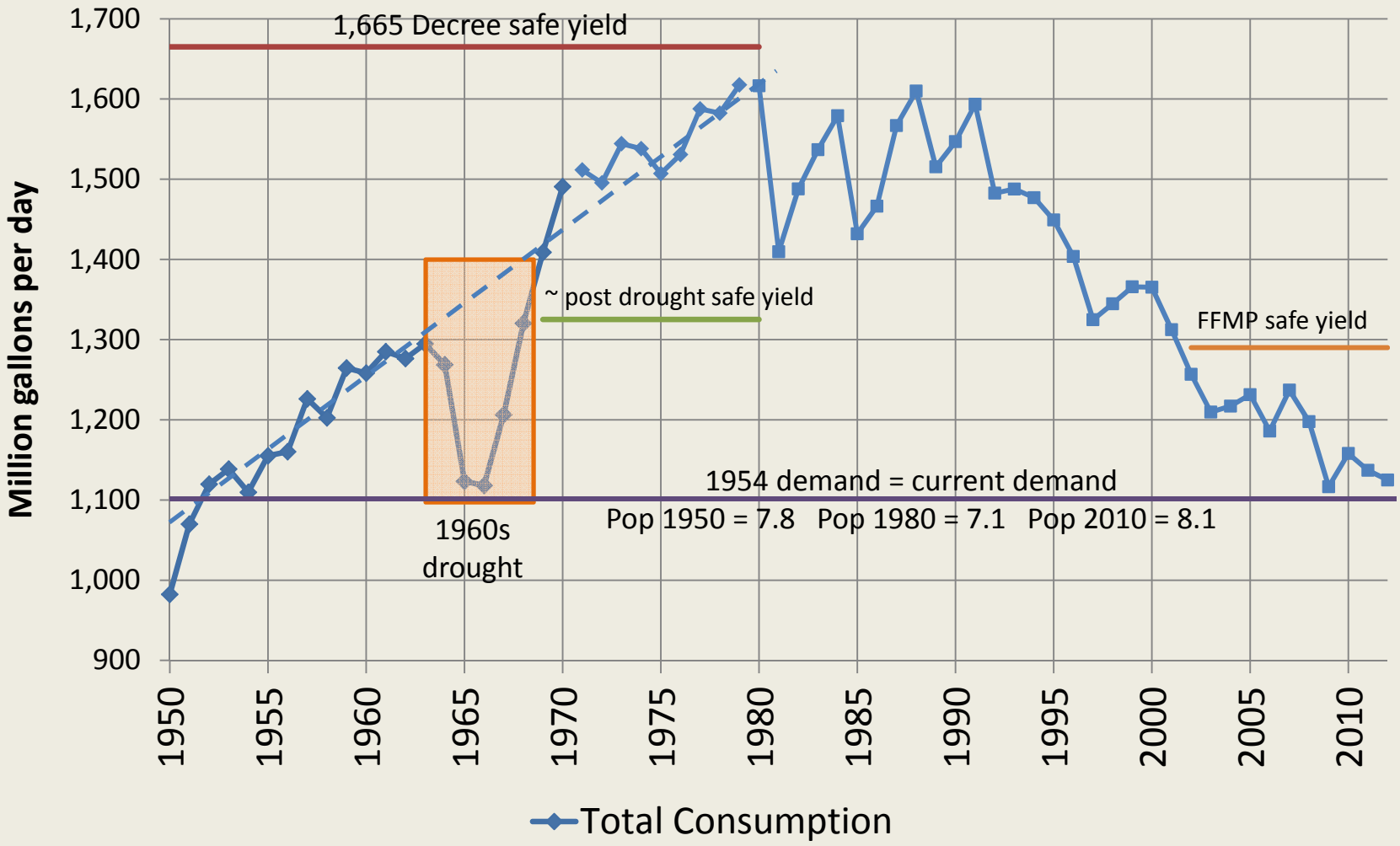
1. Out of Basin Diversion Limits
   - NYC at 800 mgd and NJ at 100 mgd
2. Instream flow requirement
   - NYC maintains 1,750 cfs in Delaware River at Montague NJ
3. Excess Release Quantity
   - NYC system-wide safe yield

All three required to maintain equity between Parties



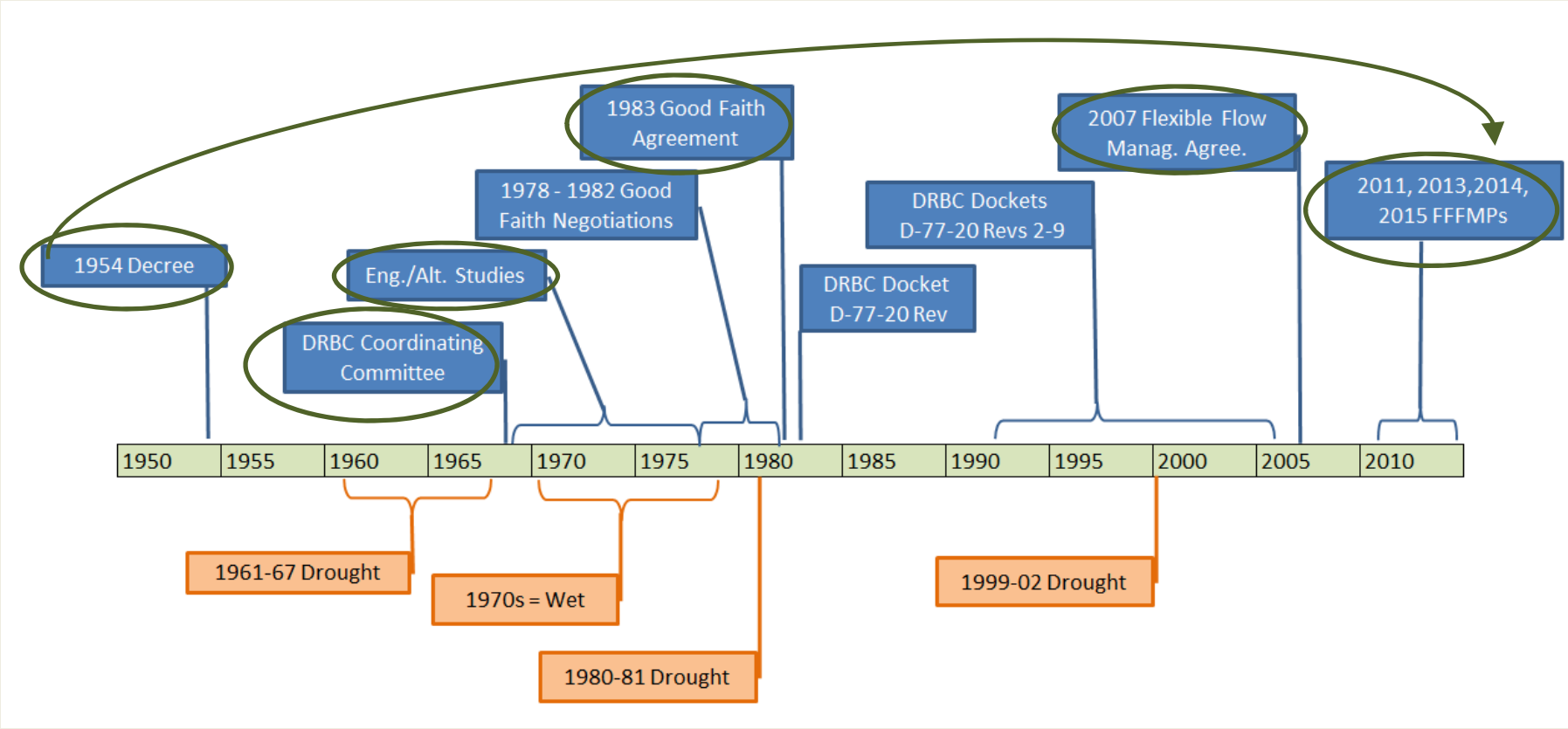
NYC Consumption and Supply

Under the rocks and stones, there is water underground



Decree → FFMP Timeline

And you may ask yourself, Well… How did we get here?



DRBC Resolution 67-4

So far, so good

- Established the *Coordinating Committee for the Reappraisal of Water Resources of the Delaware Basin and Service Area*
- Included DRBC, Decree Parties, River Master, ACOE, and Philadelphia
- Tasked with:
  - Reevaluating safe yields: including Croton and Catskill
  - Determining future demands of basin and service area
  - Reconciling future demands and supply
- Partial draft report in 1969
- Reference in D-77-20 Task Group Report
- Never heard from again…

Coordinating Committee Findings

Science consistent with Decree

NYC Systems Safe Yield (mgd)				
System	**Drought of 1930's**	**Drought of 1960's**	**Critical Period**	
Catskill [1]	555	470	5/3/64 to 11/1/66	Start drawdown to 75% depletion of total storage
Croton [1] w/pumping	325	240	5/23/64 to 12/27/66	
w/o pumping	175	165		
Rondout	120	100	5/9/62 to 6/1/68	Start drawdown to point of refill
Delaware [2]	800	480	5/17/64 to11/8/65	Start drawdown to 100% depletion of usable storage
Total	1800	1290		
1 Yields shown for Catskill-Croton Systems based on combined operation				
2 Based on maintaining design rate of flow of Delaware River at Montague of 1750 cfs				

Table II-2 from Draft Report of Chapters I-IV Coordinating Committee
Source: PA State Archives, Harrisburg

Engineering Studies

And you may ask yourself, how do I work this?

- Reasonable technical response to drought
  - Some on par with the Decree, others not
- Engineering alternatives (1967-1970s)
  - Federal *Northeast United States Water Supply Study*
  - Imports from the Susquehanna River Basin
  - Aqueduct/tunnel hydraulic restrictions
  - New reservoirs and expansions
  - Tocks Island
  - Water conservation
- Conducted by ACOE, states, USGS, academics, and contractors

Selected Studies

- 1976 NYS DOH Study
  - Acknowledged ERQ and its role in preventing overdrafting by NYC
- Re-evaluation of NYC Safe Yield
  - Multiple NYC System-wide safe yield re-estimates:
    - 1,225 to 1,430 mgd and above
    - Most omit conjunctive safe yield and assume 0%/25% reserve
  - USGS Delaware Basin only safe yield of 482 mgd (Hardison, 1968)
    - Agent of River Master but only evaluates Delaware Basin

1974 & 1976 Alternative Release Reports

- Fisheries flow concerns arise as major issue during/after 1960s drought
- Two reports by NYC DEC on Alternative Releases Programs from New York City Reservoirs developed
  - '76 report included significant inputs from NYC
- Modeled interruptible releases above conservation rates and effects on delivery of NYC supply
- Introduced drought rule curves based on overdraft
- Assumed Montague flow maintained at 1,750 cfs
- Only Delaware Basin modeled
- Failed to recognize or evaluate impacts to safe yield
- Formed conceptual basis for GFA reservoir operations
- Shifted focus away from water supply safe yield and towards interruptable fishery releases

1978 to 1982 Good Faith Negotiations

And you may find yourself in another part of the world

- DRBC invited Parties to "Good Faith" negotiations

- Good Faith legal definition:

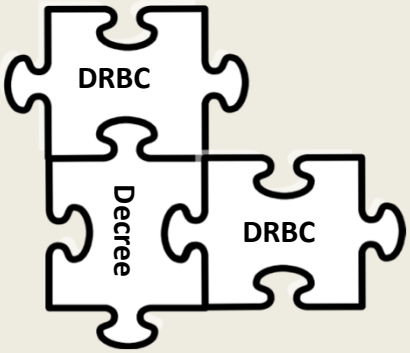
  "the **implied covenant of good faith and fair dealing** is a general presumption that the parties to a contract will deal with each other honestly, fairly, and in good faith, so as to not destroy the right of the other party or parties to receive the benefits of the contract"

  Source: Wikipedia

What is the Good Faith Agreement?

And you may tell yourself this in not my beautiful house

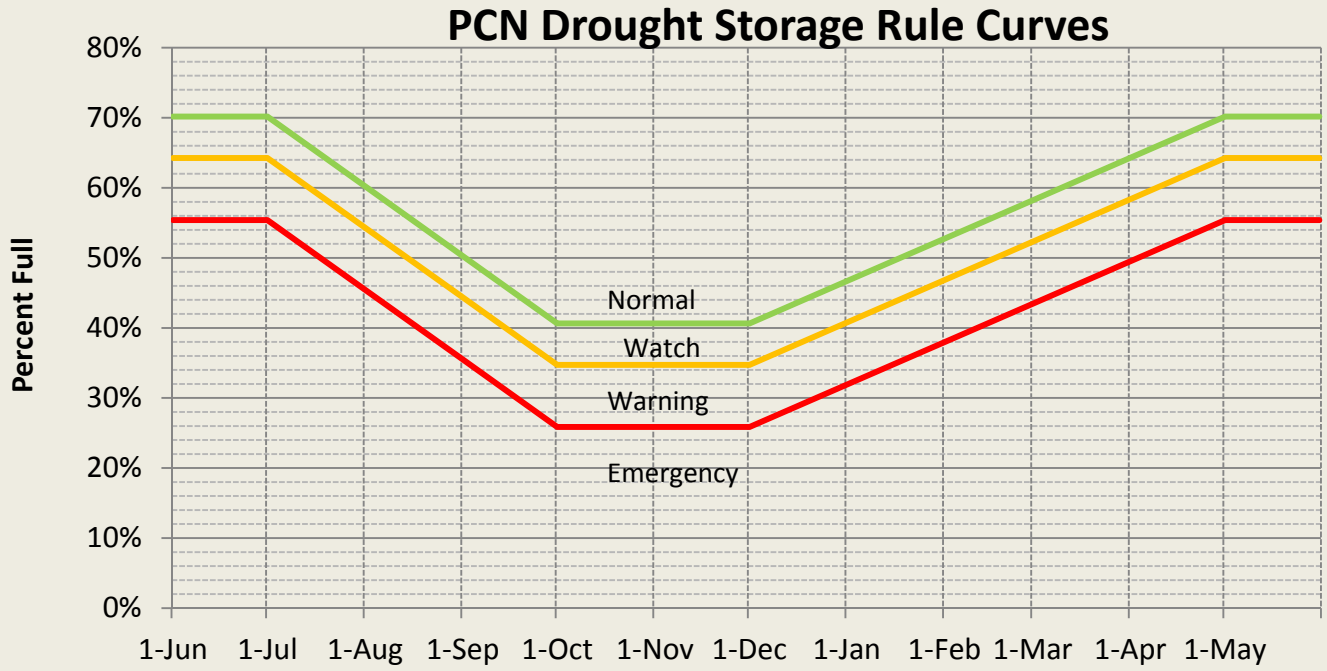
- Set of interrelated management steps from the Decree Parties to the DRBC
- Contained 14 Recommendations and signed by Decree Parties (unanimous consent)
- Established current water supply management paradigm for the Delaware basin only
- Modified over time, but its core water supply provisions remain unchanged since 1983
- DRBC via GFA, Water Code and Dockets increasingly “tied” to Decree Parties



GFA Water Supply Provisions

And you my find yourself living in a shotgun shack

- Introduced drought operating rules and curves
- PCN storage based, triggered, and phased drought restrictions
- PCN reservoir storage condition effects entire basin



GFA Water Supply Provisions

- NYC PCN diversion cutbacks:
  Normal → Watch→ Warning→ Emergency
  800 → 680 → 560 → 520 mgd

- NJ D&R Canal cutbacks:
  100→ 85→ 70→ 65 mgd

- Montague flow target cutbacks:
  1,750→ 1,650 → 1,550→ 1,100 cfs

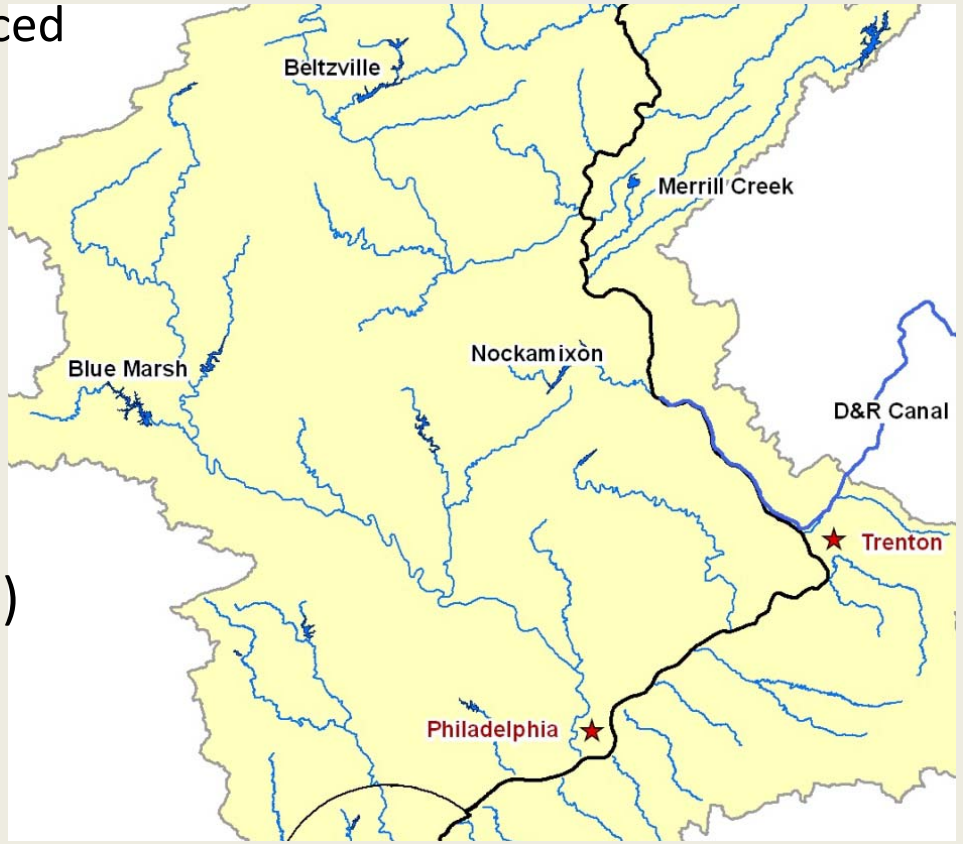
- Added Trenton flow target w/ cutbacks:
  3,000→ 2,700 → 2,700→ 2,500 cfs

GFA Water Supply Provisions

- Added salt vernier requirements:
  - during drought emergency if salt water moves upriver Montague and Trenton flow targets increase
  - Protects Philly Water and now NJAWC Delran intakes
  - Montague Target increases from 1,100 to 1,650 cfs
  - Trenton Target increases from 2,500 to 2,900 cfs
  - Only safeguard for lower basin against flow target cutbacks
- ERQ equity principle altered:
  - Concept of safe yield diminished
  - No consideration of Hudson Basin sources
  - ERQ not available during drought so NYC not required to balance diversions between Delaware and Hudson sources

GFA Water Supply Provisions

- Added Lower Basin Drought:
  - Beltzville and Blue Marsh storage triggers
  - NYC PCN diversions not reduced
  - NJ diversion cutback
  - Trenton flow target reduced
  - Merrill Creek Releases
- Docket D-77-20 (1977)
  - experimental minimum release program
- Docket D-77-20 Revised (1983)
  - Added definition of drought stages via rule curves
  - 1,750 at Montague
  - No termination date



Flexible Flow Management Program

Same as it ever was… Same as it ever was

- Essentially the same water supply provisions as GFA
  - Initial agreement ran from 2007 to 2011
  - 4 one-year FFMPs: 2012 to 2014

- 2014 to 2015 FFMP:
  - Temporary, not allocable 100, 100, 100, and 85 mgd NJ diversion
  - CSSO discharge mitigation (90% seasonal storage objective)
  - Enhanced fisheries releases (FBAW)
  - Use of NYC's OASIS-OST model
  - Fixed 2002 demand and 1,290 SY to calculate IERQ

Implications of GFA/FFMP Cutbacks

Letting the days go by… Water flowing underground

- NYC storage benefits:
  - Reduced flow target = less releases (up to 420 mgd)
  - Reduced diversions (up to 280 mgd)
  - Both reductions keep more water in reservoirs

- NJ's run-of-river diversion penalties:
  - 35 mgd less contractible/allocable water
  - 35 mgd is significant to NJ's water supply
  - But insignificant when compared to 1,900 mgd flow target at Trenton
    - USGS gage error ± 5% or 95 mgd

Implications of GFA/FFMP

Letting the days go by… Let the water hold me down

Overdrafting now possible:

- Before drought:
  - The 800 mgd diversion limit was a hydraulic limit and less than the PCN safe yield, so even if NYC wanted to it could not divert more water than the safe yield, a.k.a. overdraft, the Delaware basin reservoirs.

- After drought:
  - The 800 mgd diversion was greater than the PCN safe yield (~480 mgd) and since the GFA/FFMP didn't include the previous protection NYC was able to overdraft the Delaware basin reservoirs.

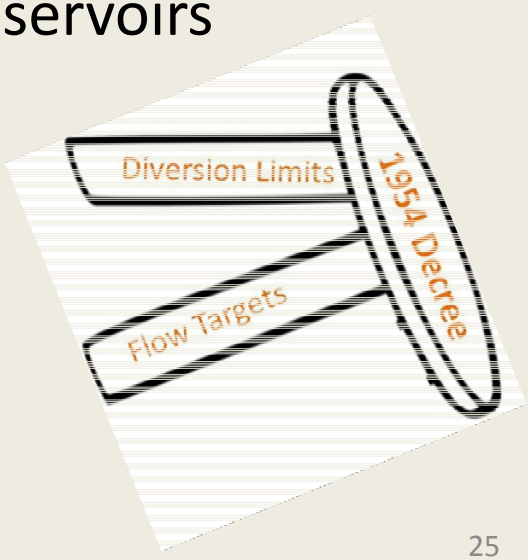
- The ability to overdraft coupled with NYC's reduced demand and lack balanced use with the Hudson Basin Reservoirs (no ERQ), gives NYC an incentive to conserve the Hudson basin storage, overdraft the Delaware Basin and trigger drought cutbacks, then utilize Hudson basin sources and preserve Delaware storage for later use, if needed. All the while the lower basin is under drought restrictions.

1954 Decree ≠ GFA/FFMP

And you may tell yourself, My God! What Have I Done!

GFA/FFMP:

- Not safe-yield based
- NYC Delaware basin reservoirs isolated from the Hudson Basin Systems
  - No re-evaluation of Hudson basin safe yields or changes to operations, just Delaware basin impacts
  - ERQ incorrectly quantified and suspended during drought
- Gave NYC ability to overdraft Delaware reservoirs
  - via Montague cutbacks and suspension of fisheries and ERQ releases
  - benefits to NYC and consequences to lower basin
- Entire Delaware basin affected by actions of one Party
- Equity lost



Decree to GFA/FFMP Wrap-up

And you may ask yourself- Am I right?... Am I wrong?

- Numerous engineering studies, some of which evaluated effects of DOR on safe yield
- Initial institutional response to drought appeared to follow Decree concepts- Committee for Reappraisal
- Committee for Reappraisal disappears…
- 8 years of relative silence from Parties and DRBC
- Good Faith Negotiations lead to fundamental changes to the water management paradigm of the Delaware Basin
- 30 years of “tweaking” but with little change

The Big Picture

- Decree was a reasonable and equitable agreement
- 1960's drought "shocked" the region
- Ended up with the GFA which:
  - removes the balance of equity
  - provides benefits to upper basin
  - places risks of those benefits on the lower basin
- Little change to water supply provisions since 1983
- NYC's declining demand expands its ability to benefit from GFA/FFMP overdrafting arrangements to detriment of lower basin
- Unanimous consent requirement makes implementing change difficult

Once In A Lifetime

- It's been 40 years since the NYC System safe yield was properly reevaluated.
- It's been 30 years since the flow management program was established.
- The conditions and assumptions under which the GFA negotiations were held have fundamentally changed.
  - NYC demand has declined to 1950s levels
  - modeling has improved
  - ecologic needs have arisen
  - infrastructure changes occurred/occurring
  - inequities of agreement identified
- The opportunity and need exists to re-evaluate the outdated operating paradigm.
- It's time to *[Start] Making Sense* with how we manage water in the basin.
- The core equity principles of the 1954 Decree, updated for current conditions, can provide the basis for a new agreement.

Questions?

Acknowledgements:
Tom Brand, P.E., Dr. Joe Miri, NJDEP
and
Talking Heads, Stop Making Sense

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