Delaware River Basin Commission

Overview of Consumptive Use Coefficients

Chad Pindar, P.E.
Manager, Water Resource Planning Section

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October 16, 2018
Water Management Advisory Committee

PSEG Hope-Salem Creek Nuclear Power Plant Complex: Credit Google Images

Agenda

* Overview of consumptive use (CU) in the DRB
* Water use sectors
  * 6 sectors used for reporting
  * 22 sub-sectors stored in database
* DRBC Programs & CU coefficients
* Review Summer 2018 research results

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2016 Water Use/Consumptive Use in the DRB

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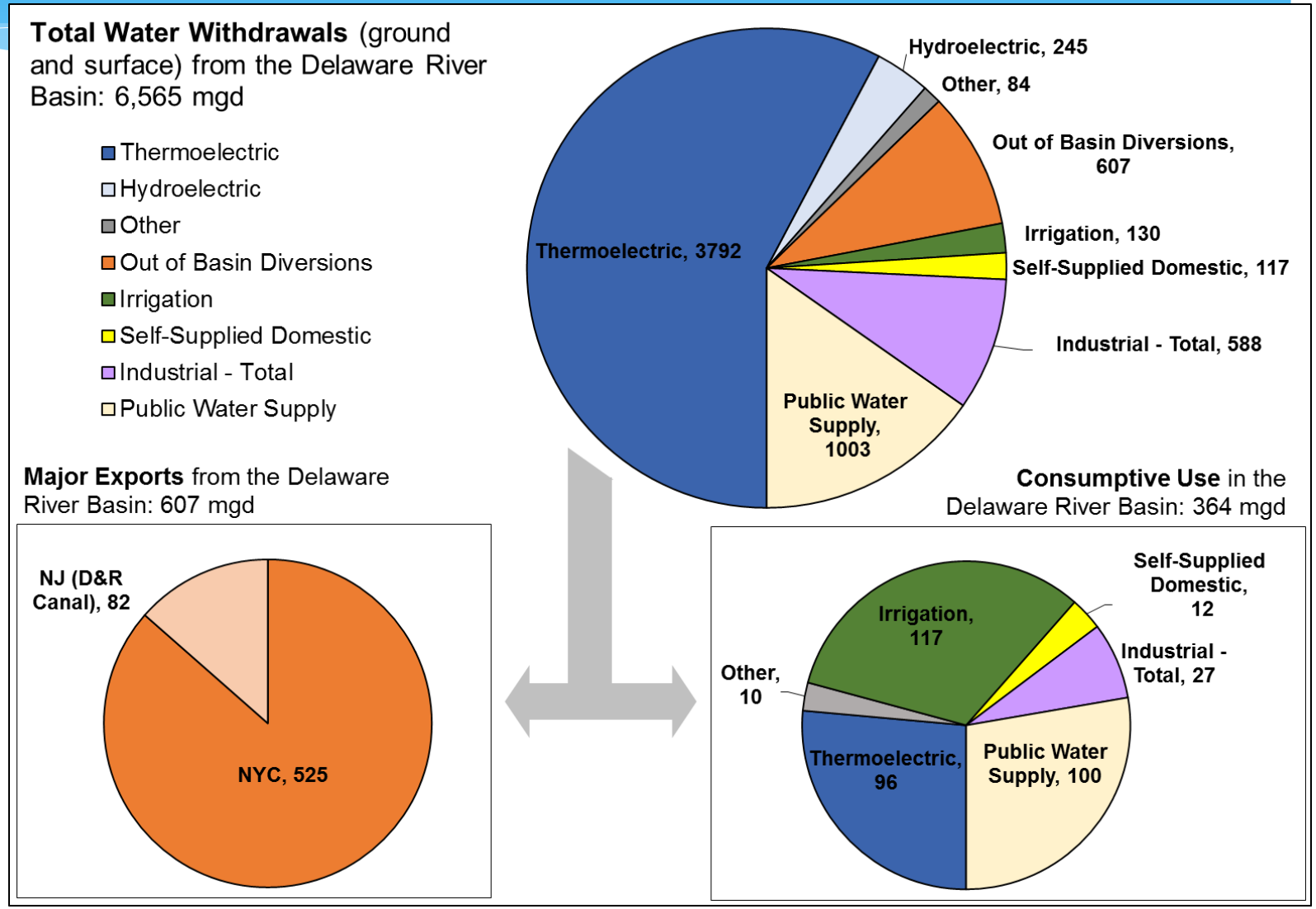
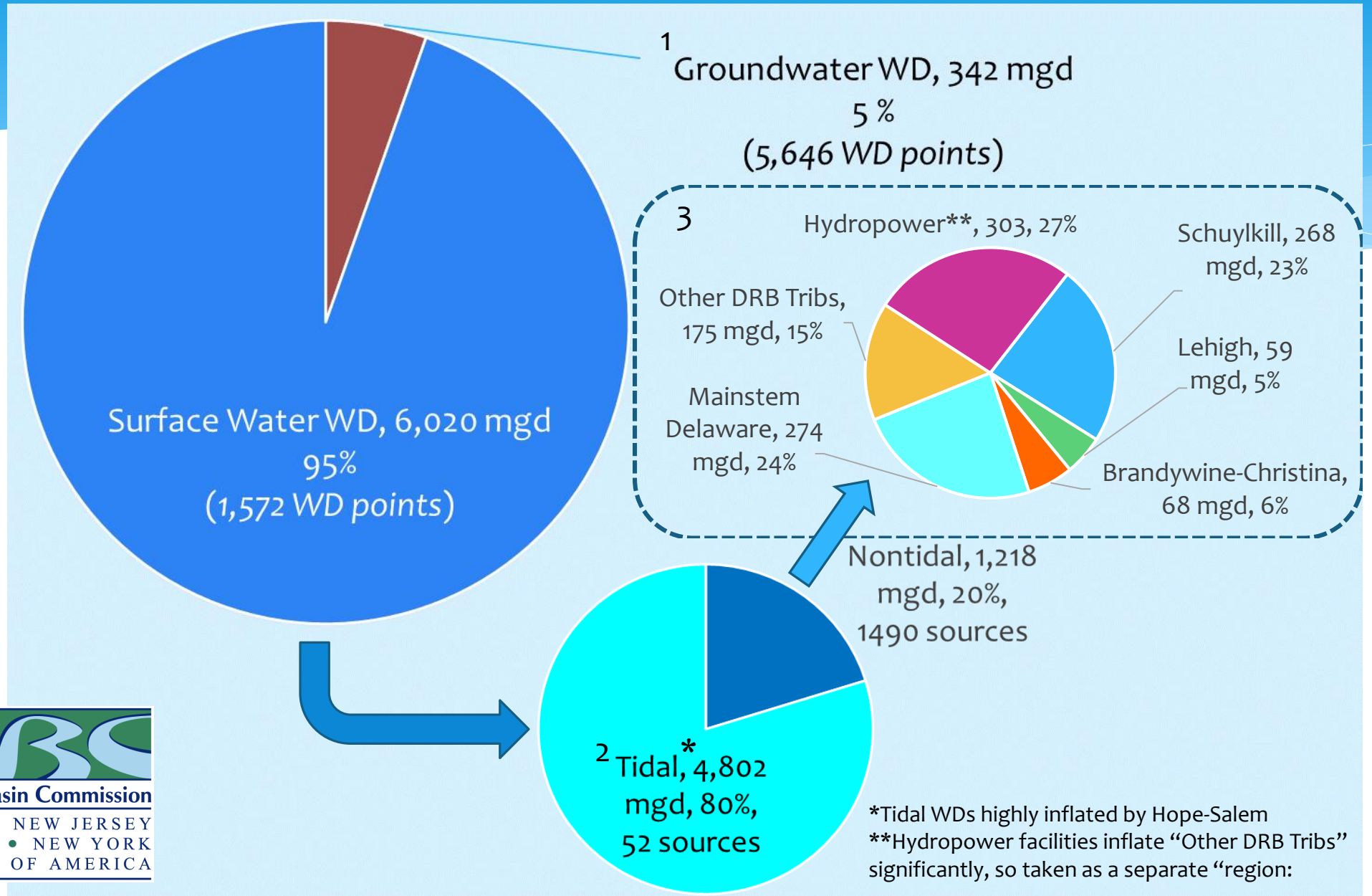
- Biggest CU sector is exports (607 mgd)—handled separately
- Within Basin (364 mgd):
  - Thermoelectric
  - Public Water Supply
  - Irrigation
- * Comprise 85% of CU

Total Water Withdrawals (ground and surface) from the Delaware River Basin: 6,565 mgd



Total DRB WDs in 2015 by Type/Location



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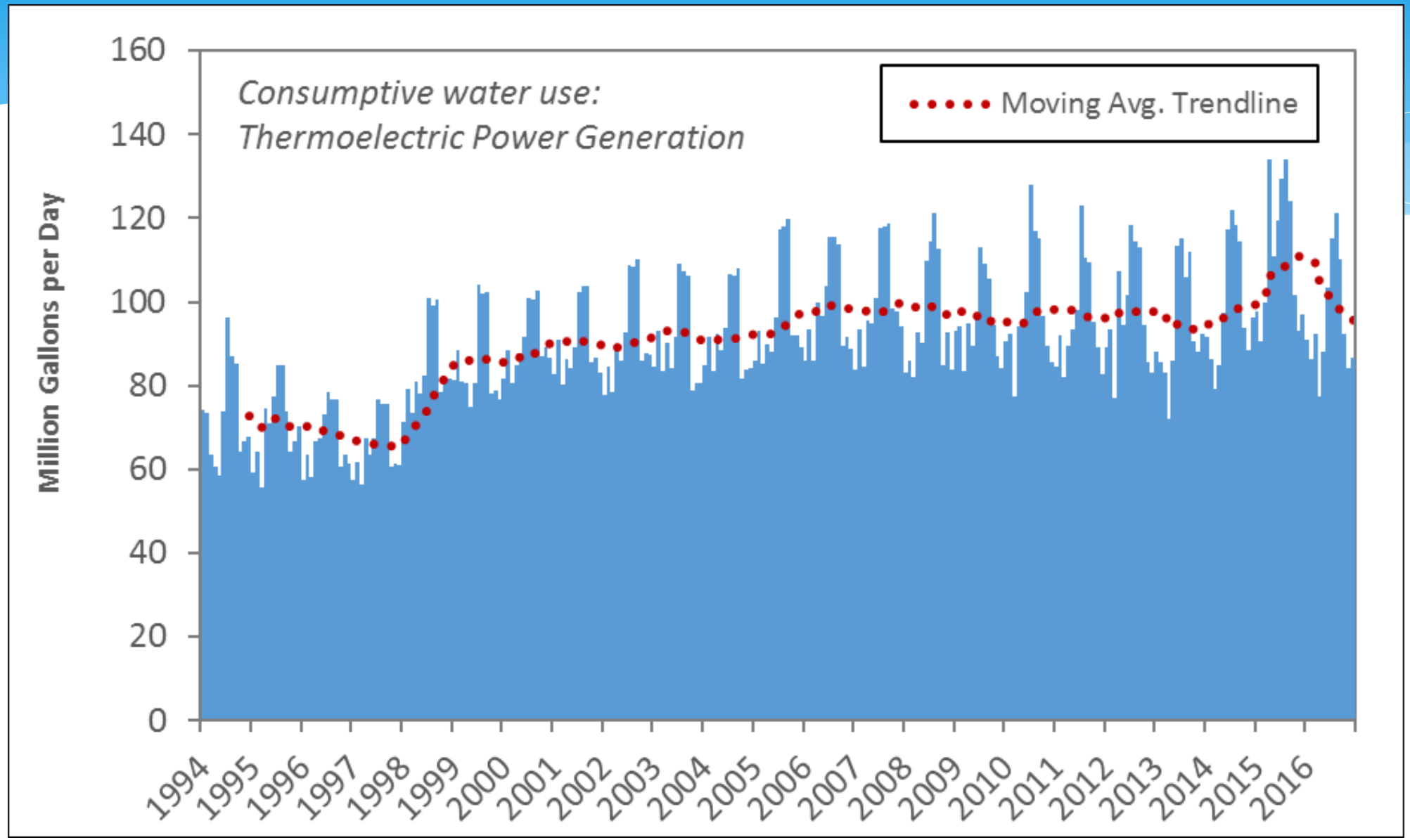
Consumptive Use over time: Thermoelectric



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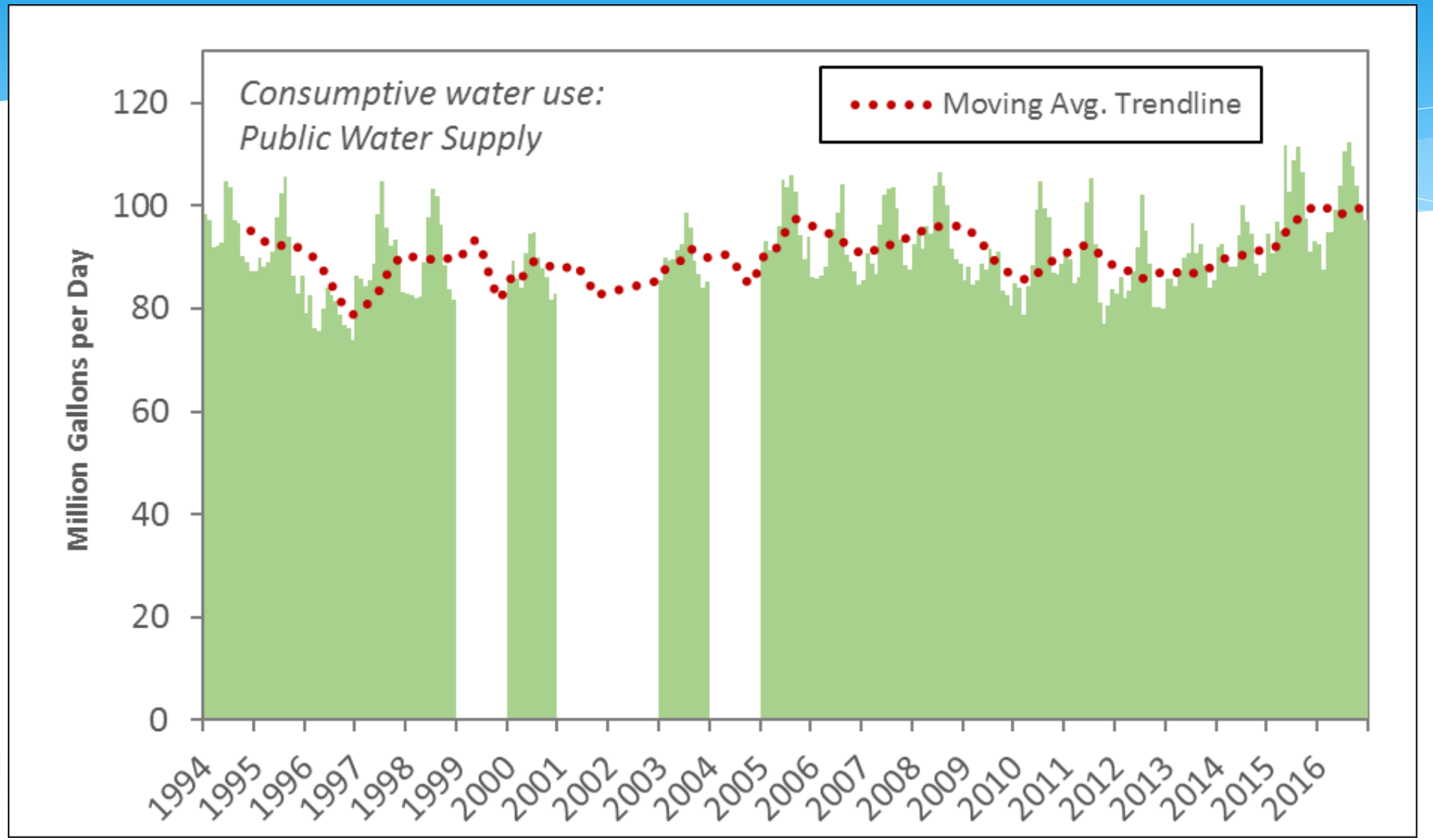
Consumptive Use over time: Public Water



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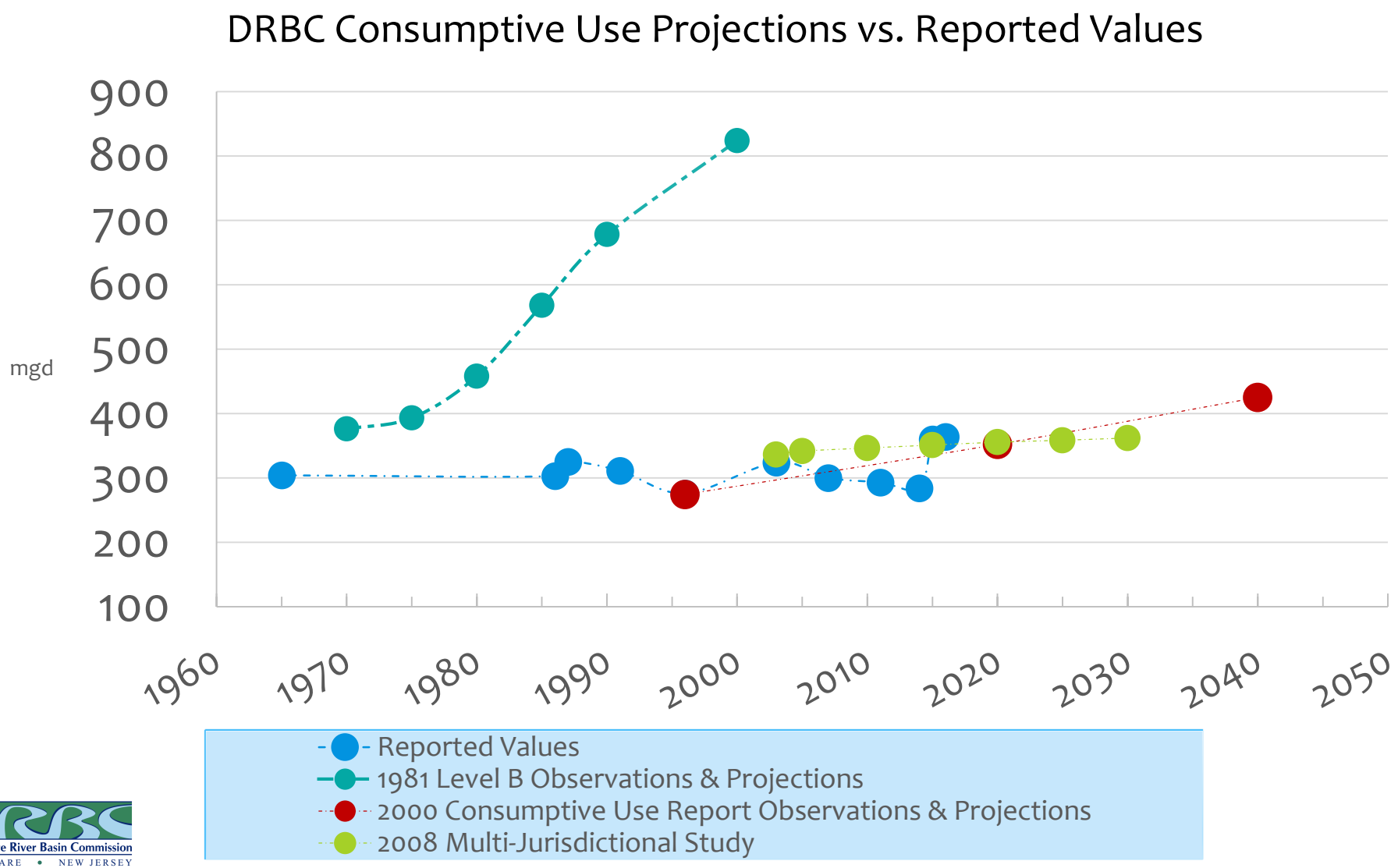
Consumptive Use over time



OBSERVED & REPORTED CU VALUES

Year	CU rate (MGD)	Source
1965	304	Staff report (1988)
1986	303	Staff report (1988)
1987	325	Water Resources Program (1990-91)
1991	311	Water Resources Program (1999)
1996	276	Staff report (2000)
2003	324	State of the Basin report (2008)
2007	300	Water Resources Program
2011	293	Water Resources Program
2014	284	Water Resources Program
2015	360	Staff analysis
2016	364	Staff analysis; pending publication in FY2019-2021 WRP

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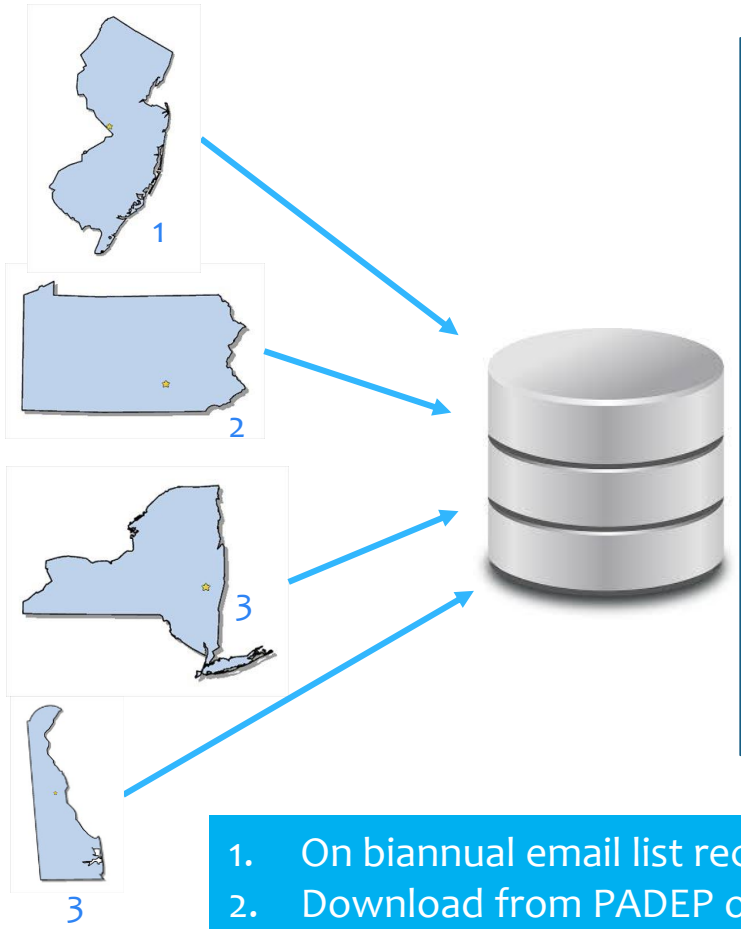
Water Use data from state partners

WU data received yearly from state partners (MS Excel)



Formats integrated into MS Access-Based DRBC Database.

Staff assign standardized water use sectors during this process (~7,000 total sources, ~150 new per year).

Assigning a sector associates a default CU coefficient with the withdrawal.

Outputs used in water supply planning graphics and analyses (e.g. Water Resources Program)

1. On biannual email list receiving water data from NJDEP
2. Download from PADEP online reporting portal system
3. Reach out and request from state contact as-needed

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Disparate data streams from 4 states. In most recent reporting (for CY2016):

- **DE** reported 9 sectors under "TypeUse"
- **NJ** reported 70 under "SUBJECT_ITEM_DESIGNATION"
- **NY** did not report a sector
- **PA** reported 7 sectors under "PRIMARY_FACILITY_TYPE", 11 sectors under "USE_TYPE" and 37 under "PRIMARY_FACILITY_TYPE_DESIGNATION"

State Data	*DRBC database (22 **sub-sectors**)*	*Reporting (6 **sectors**)*
	Agriculture	**Irrigation**
	Golf/CC	
	Non-Agricultural Irrigation	
	Nursey	
	Hydroelectric	**Hydroelectric**
	Bottled Water	**Other**
	Groundwater Remediation	
	Hospital/Health	
	Fish Hatchery	
	Remediation	
	School	
	Mining	
	Commercial	
	Fire	
	Prison	
	Ski	
	Recreation	
	Public Water Supply	**Public Water Supply**
	Industrial	**Industrial** (Can be further divided into refinery/non-refining)
	Industrial Process	
	Refinery	
	Thermoelectric	**Thermoelectric**

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DRBC Program-level use of CU Coefficients

Operations

Surface Water Charging

- ~288 SW users who pay
- Rates:
  - Consumptive: $82.14/Mgal
  - Non-Cons.: $0.82/Mgal
- About 50% report site-specific CU factor
- Standard CU factors on forms:
  - Skiing: 22%
  - Golf: 90%

Consumptive Use Replacement

- Power (Merrill Creek)

Project Review

- Written into most WD dockets
- ~600/1250 docket records have site-specific coefficient populated in database
- Unclear whether >1 mgd withdrawals have site-specific CU coefficients

Planning

- Annual water use reporting such as the Water Resources Program
- Water Supply Planning
  - 2060 studies
  - SEPA-GWPA

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Summer 2018 Research Objectives

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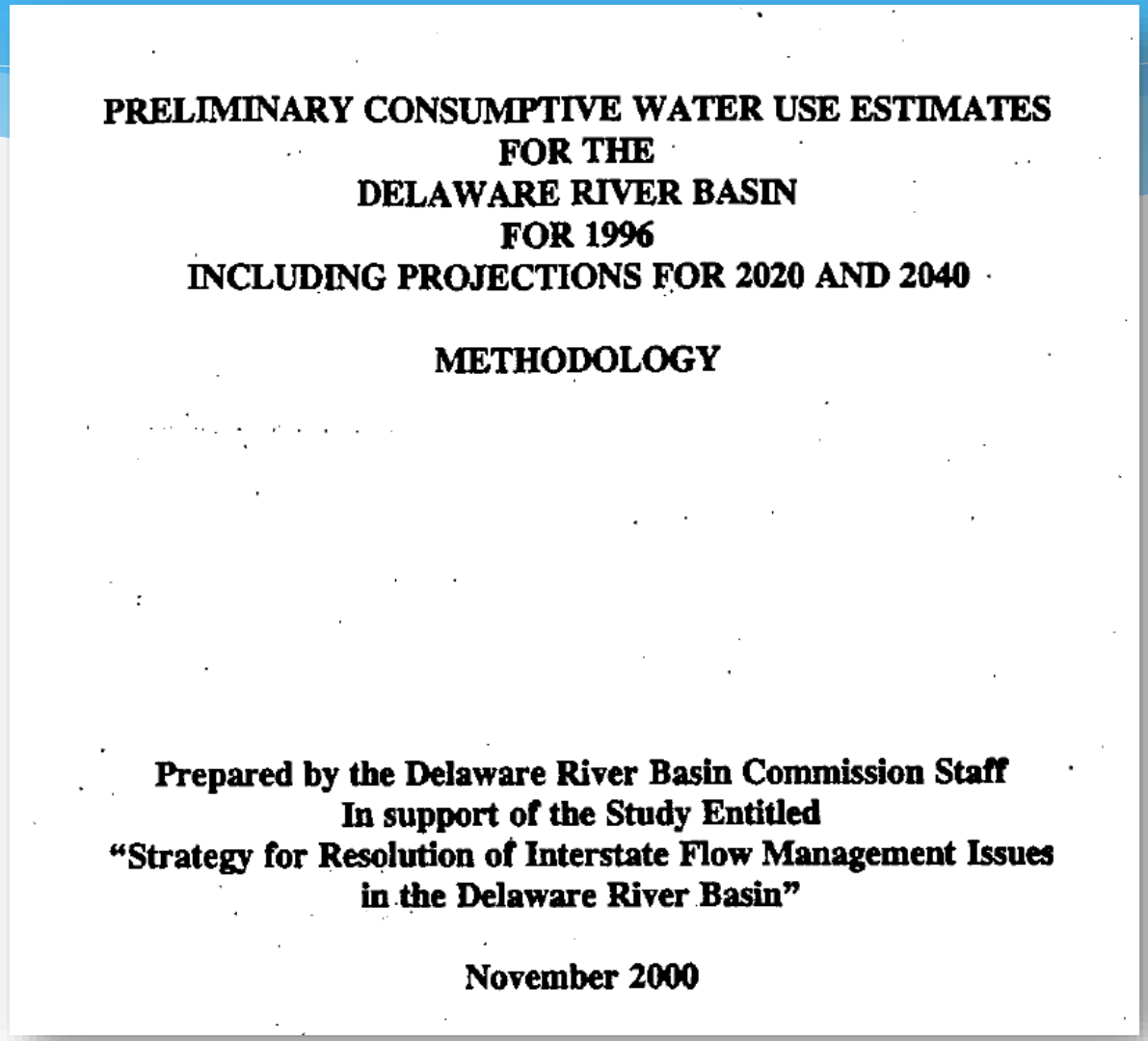
1. Document the origin of DRBC CU coefficients
2. Identify current CU coefficients used by DRBC for each sector
3. Compare to published sector coefficients

Photo: Flickr - USDA - Center pivot irrigation on a farm in DE

Thank you to Allison Kaltenbach: Summer 2018 Water Resource Planning Section Intern, University of Delaware rising senior

Summer 2018 Intern Findings

- No DRBC regulations (Water Code & RPP) on CU coefficients
- No formal policy/resolution that establishes CU coefficients
- 2000 internal DRBC report using 1996 data documents some CU coefficients
- Current sub-sectors organized following 2000 report



PRELIMINARY CONSUMPTIVE WATER USE ESTIMATES
FOR THE
DELAWARE RIVER BASIN
FOR 1996
INCLUDING PROJECTIONS FOR 2020 AND 2040

METHODOLOGY

Prepared by the Delaware River Basin Commission Staff
In support of the Study Entitled
"Strategy for Resolution of Interstate Flow Management Issues
in the Delaware River Basin"

November 2000

Summer 2018 Intern Findings

Primary CU Coefficient References (SRBC, NJGS/NJDEP, & USGS, respectively):

Balay, J. W., Zhang, Z., Zimmerman, J. L., Jr., MaCoy, P. O., Frank, C. G., & Liu, C. (2016). *Cumulative Water Use and Availability Study for the Susquehanna River Basin.* Retrieved August 21, 2018, from https://www.srbc.net/our-work/reports-library/technical-reports/303-cumulative-water-use-availability/docs/cumulative-water-use-availability-report.pdf

Domber, S.E., & Hoffman, J.L. (2004). *New Jersey water withdrawals, transfers, and discharges by watershed management area, 1990-1999*. N.J. Geological Survey Digital Geodata Series DGS 04-9: computer workbook available online at www.njgeology.org.

Shaffer, K.H., and Runkle, D.L., (2007). *Consumptive water-use coefficients for the Great Lakes Basin and climatically similar areas*: U.S. Geological Survey Scientific Investigations Report 2007–5197, from https://pubs.usgs.gov/sir/2007/5197/pdf/SIR2007-5197_low-res_all.pdf

Comparative analysis

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Sub-Sector	DRBC Default Factor	SRBC Default Factor	Domber & Hoffman (2004)	Shaffer & Runkle (2007)
Bottled Water	100%	80%	80%	NA
Agriculture	90%	90%	90%	91%
Golf/CC	90%	90%	90%	91%
Non-Agricultural Irrigation	90%	90%	90%	91%
Nursery	90%	90%	90%	91%
Fire	20%	20%	50%	NA
Mining	20%	12%	12%	13%
Remediation	20%	10%	10%	NA
Ski	22%	15%	NA	NA
Commercial	15%	10%	23%	10%
Hospital/Health	10%	10%	13%	10%
Industrial	10%	10%	10%	10%
Prison	10%	15%	23%	NA
Public Water Supply	10%	15%	13%	13%
Recreation	10%	10%	0%	NA
School	10%	15%	23%	10%
Fish Hatchery	5%	5%	5%	NA
Thermoelectric	2%	2%	3%	2%
Groundwater Remediation	0%	10%	10%	NA
Hydroelectric	0%	3%	0%	0%
Refinery	NA	NA	NA	*15%

Improved Data Management based on Findings

- Triggered a “clean up” of withdrawal sectors for Water Use Reporting:
  - Clearly delineated sectors and sub-sectors
  - Eliminated redundant sub-sectors
  - Assigned more specific sectors to sources where possible (sectors vs. sub-sectors)
  - Created new sub-sector under industrial for refineries

- Standardizing reporting procedures
  - Apply site-specific from Power and Industrial dockets where applicable
  - Fill in the blanks with “defaults”

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Discussion Items

- PWS: current value vs. values documented in literature
- Establish formal policy on subsectors & associated CU coefficient
- CU replacement for industrial users during Critical Hydrologic Condition
- Database synchronization between Project Review and Water Use

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