Water Use Trends in the Delaware River Basin

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Delaware River Basin Commission

2013 Mid-Atlantic Conference of the American Water Resources Association

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Delaware River Watershed Facts

- Approx. **15 million** people (almost 5% of the U.S. population) rely on the waters of the basin
- Drains **13,539 mi²** (34,659 km²), or 0.4% of the continental U.S. land area
- Flows **330** miles from Hancock, NY to Delaware Bay

Overview:

- Keeping Current: Water Withdrawal Data
  - States' reports to DRBC
  - DRBC's Surface Water Charging Program
- Big picture analysis
- Water Use – key sectors:
  - Public Water Supply
  - Power Generation
  - Industry
  - NYC Export

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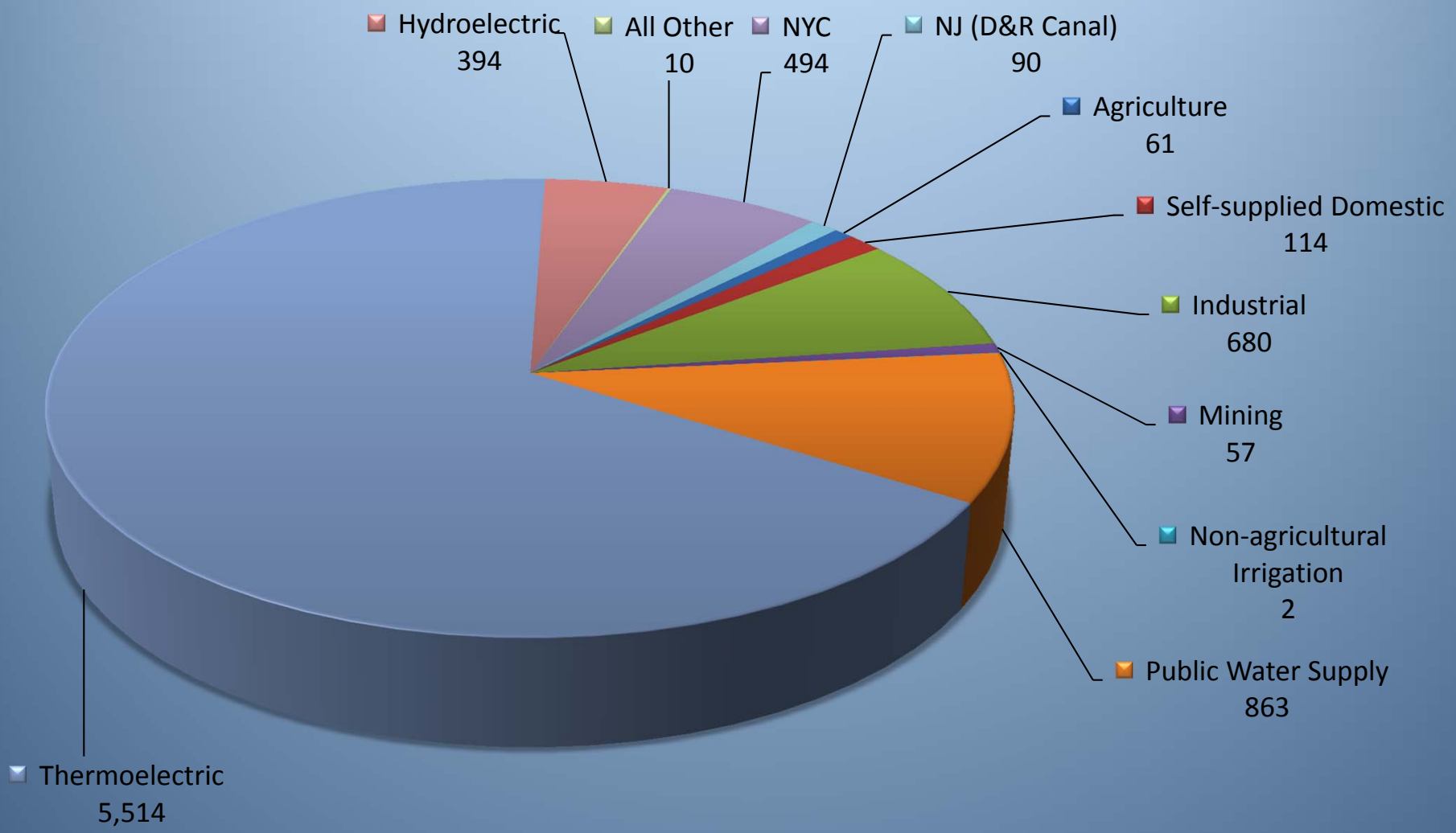
DRB – Total Withdrawals

8,279 Million Gallons / Day



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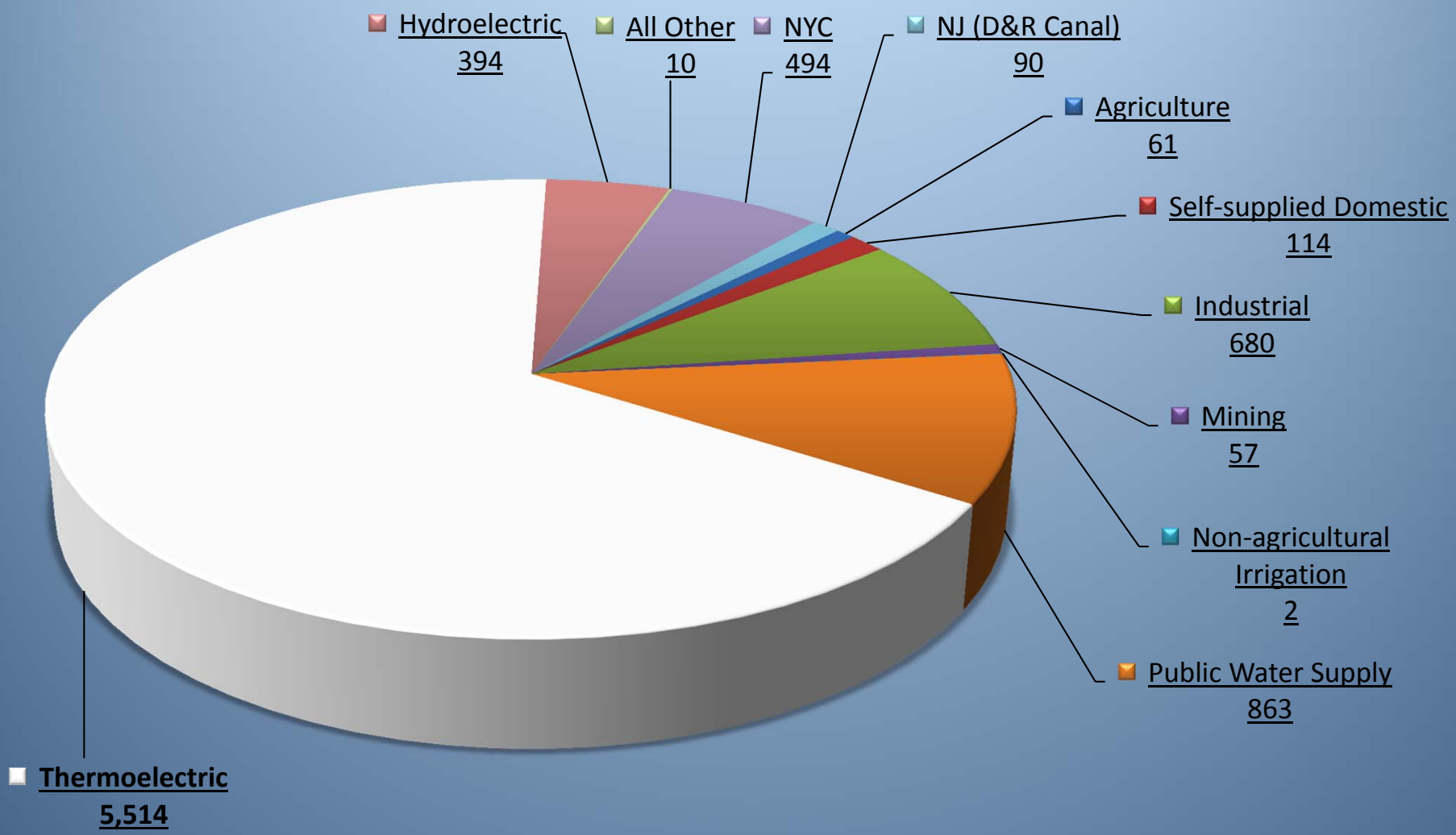

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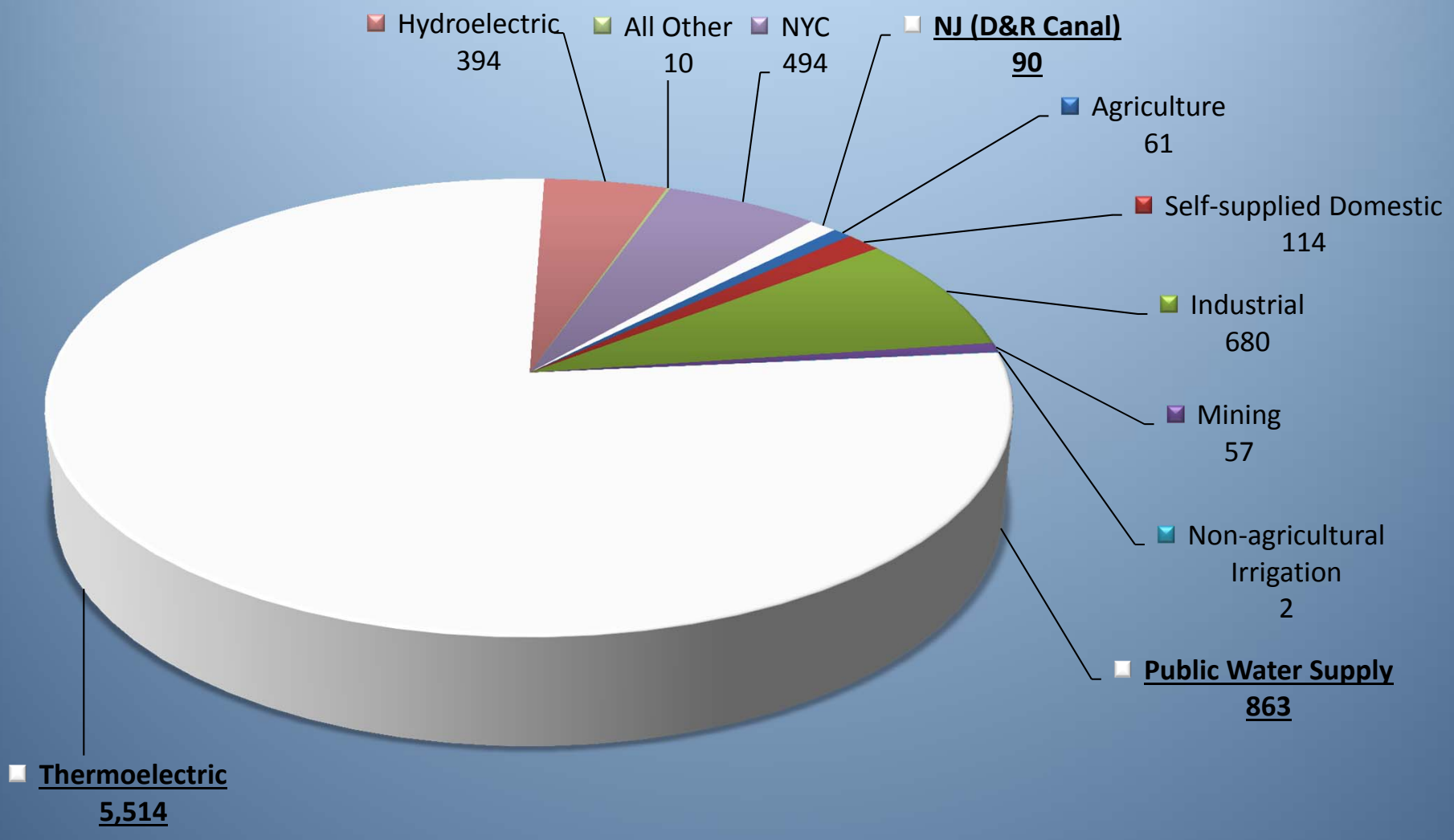

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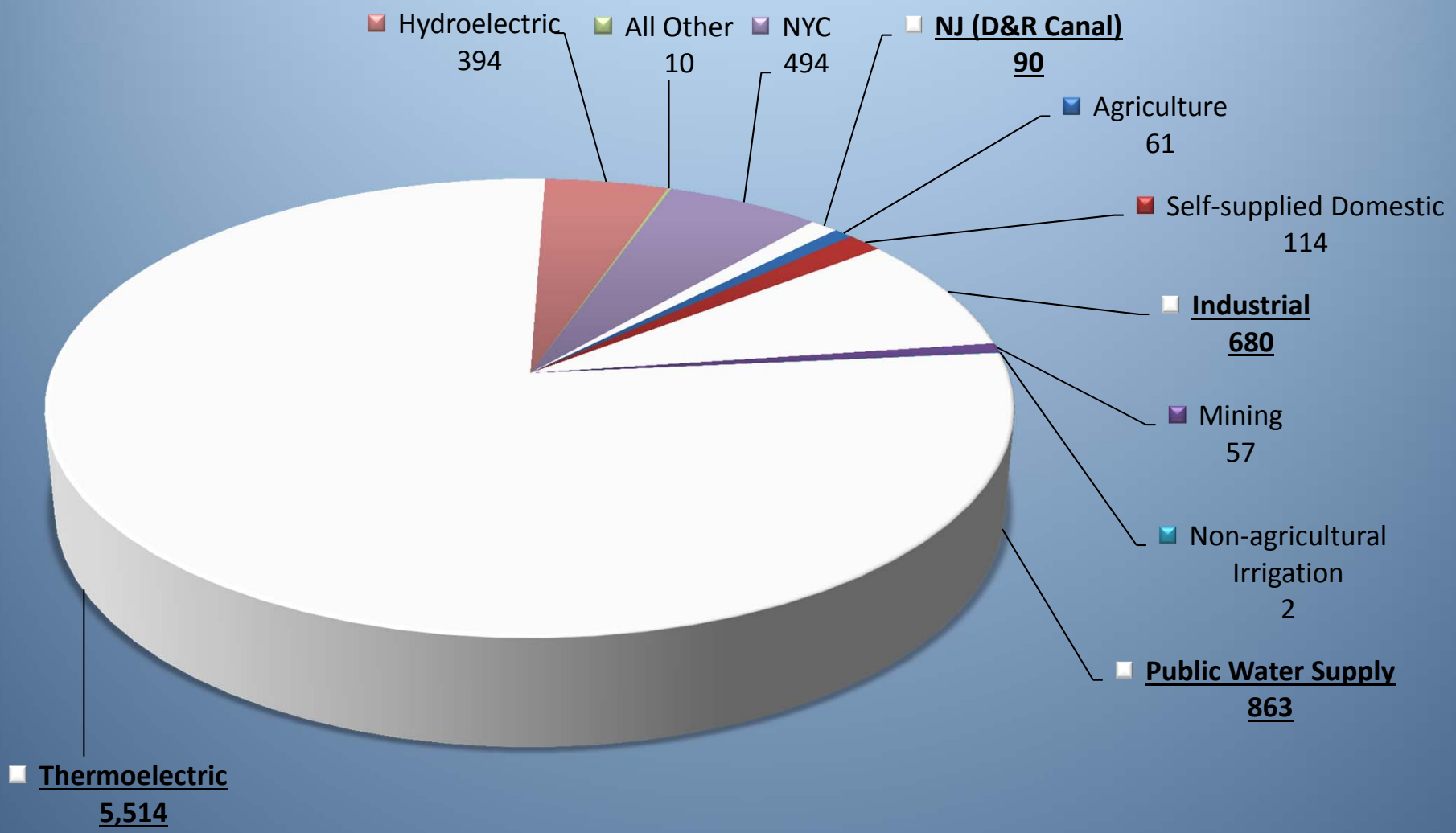

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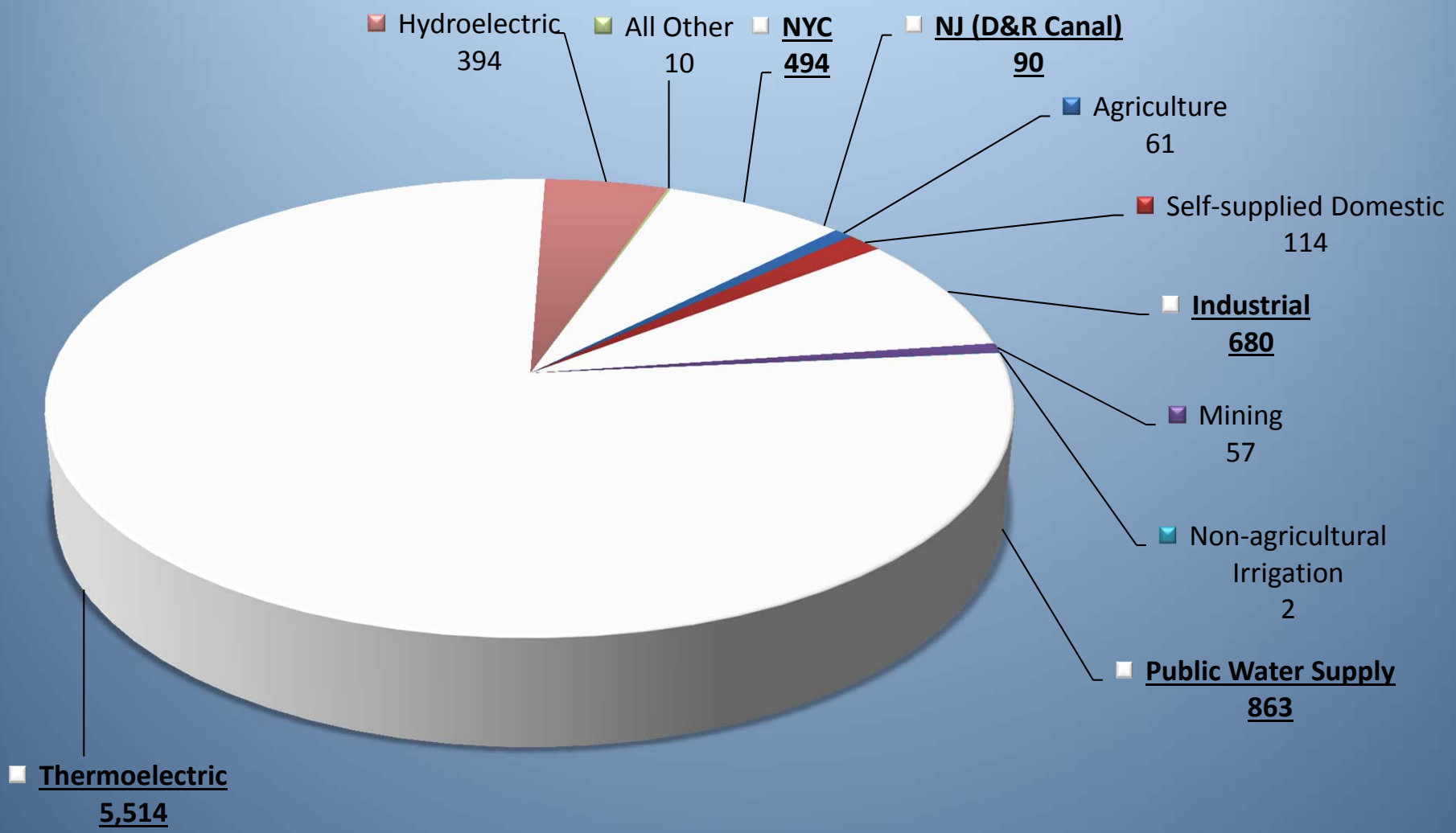
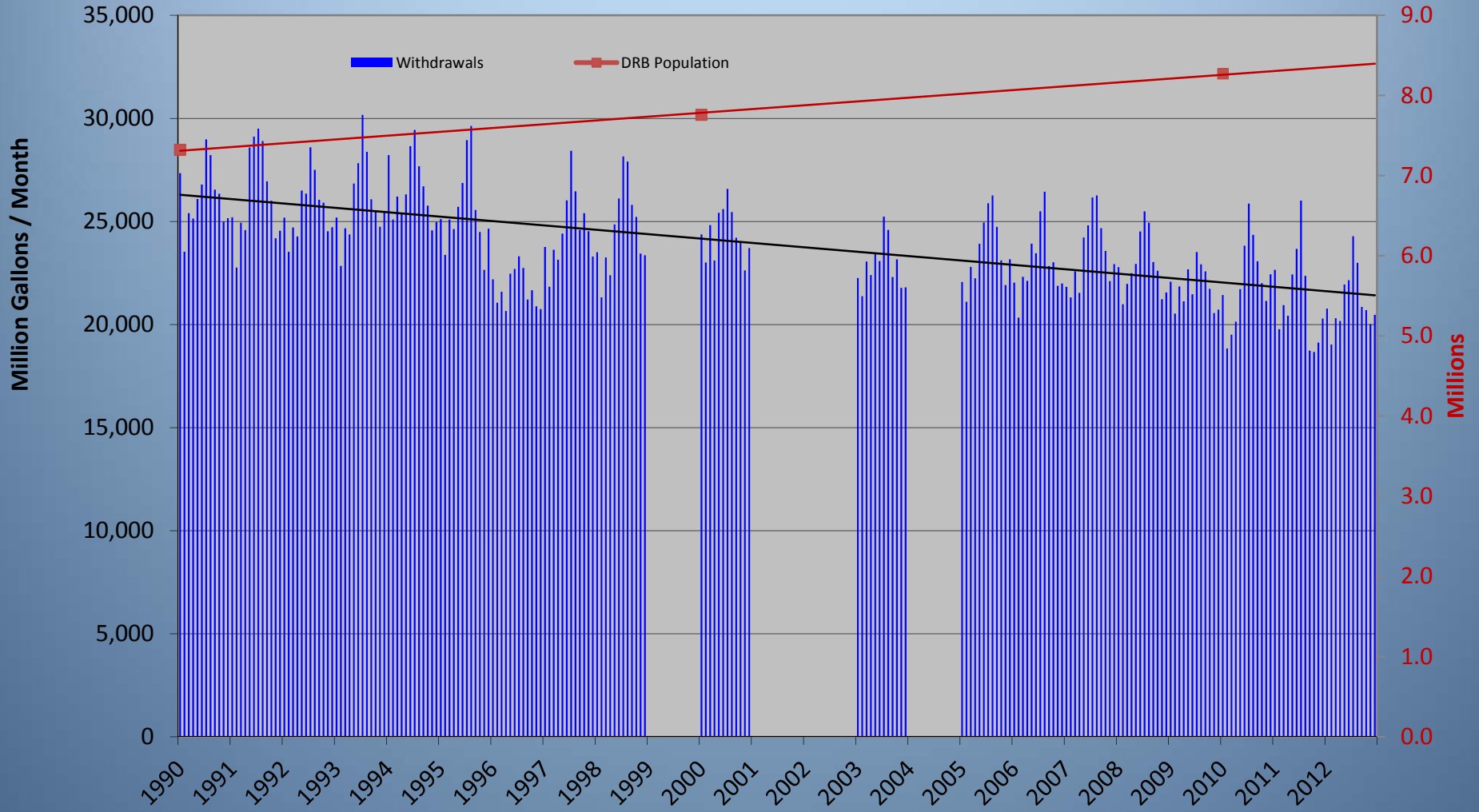


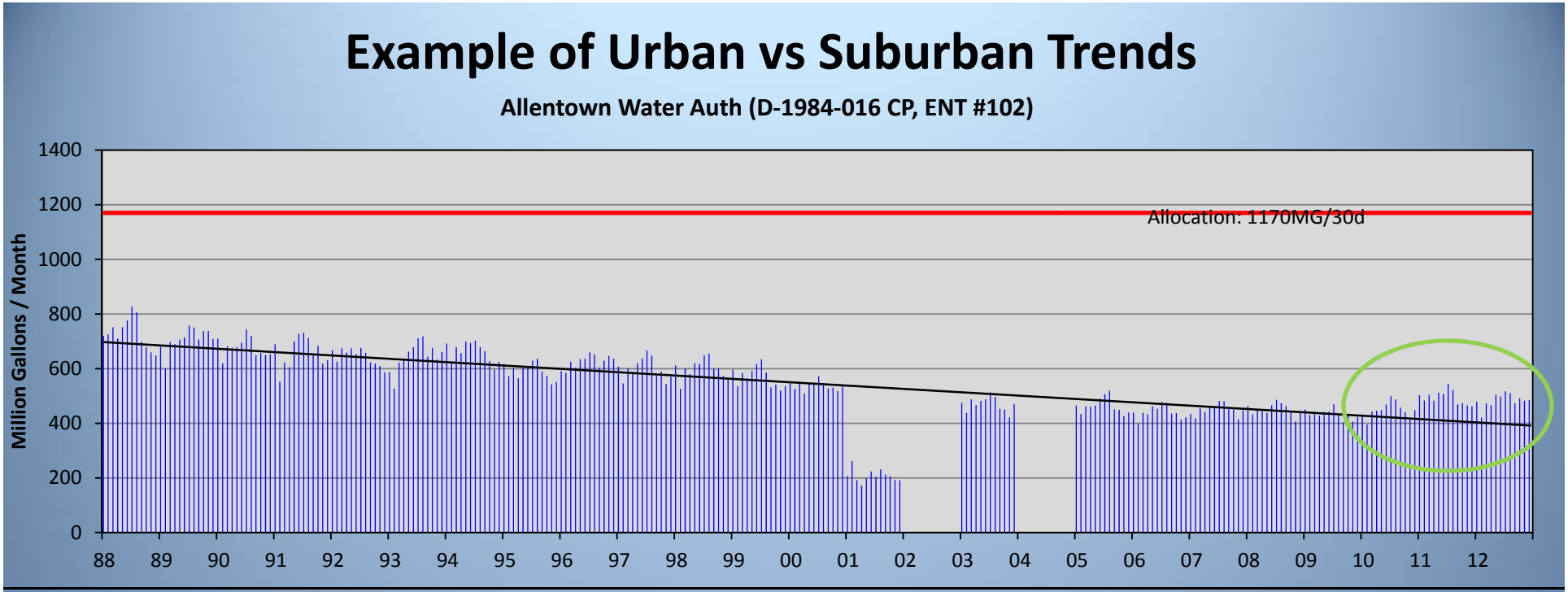
Public Water Supply

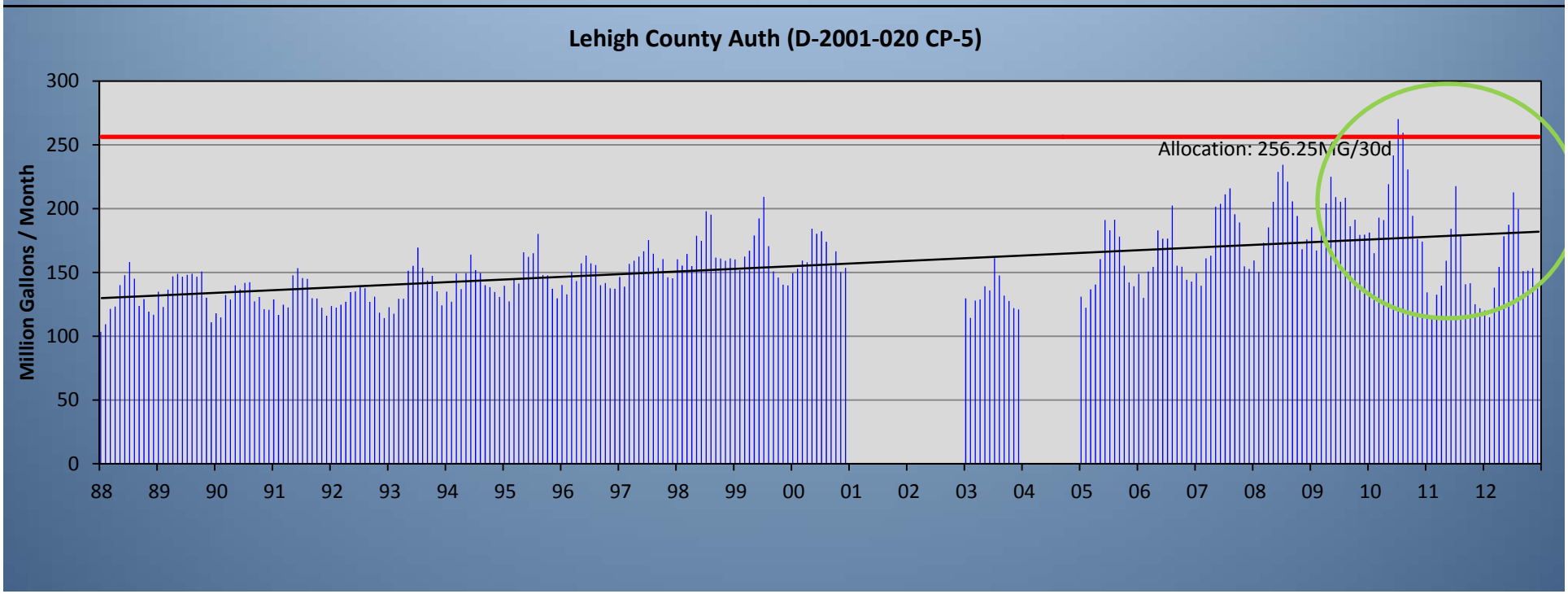
Aggregated Withdrawals of 40 Public Water Supply Systems in the DRB (Million Gallons/Month)

Trendlines 1990 - 2012: Approximately **15% decline** in withdrawals
Approximately **13% increase** in population

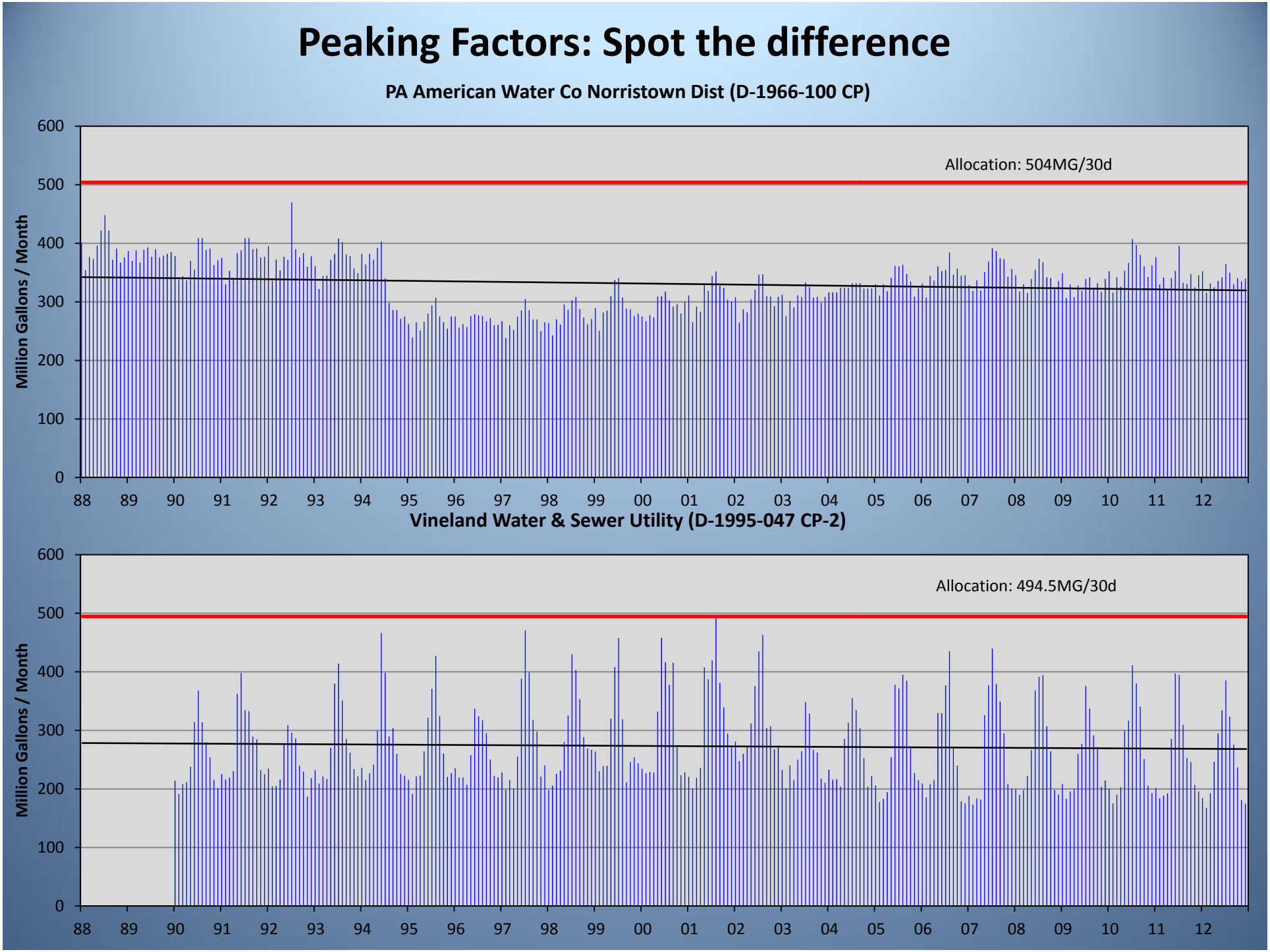


Example of Urban vs Suburban Trends





Peaking Factors: Spot the difference

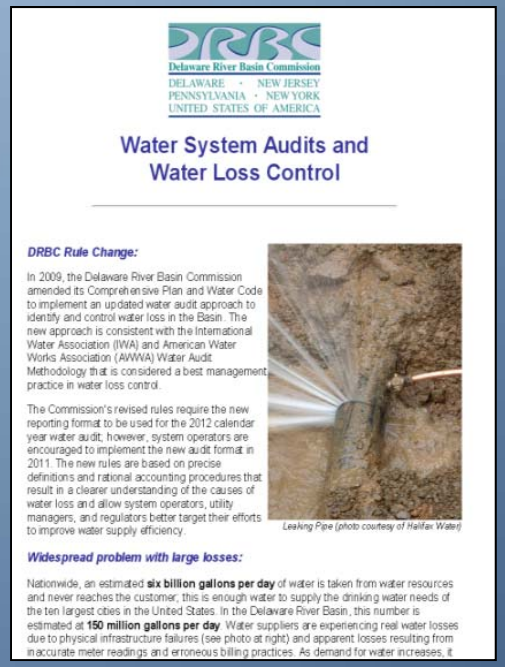


DRBC Water Audit:

- 2009: New DRBC Rule Approved
- 2009-2012: DRBC outreach (workshops, presentations…)
- 2012: AWWA Water Audit framework is required audit format
- **2013: First reports received, currently being analyzed**
- New DRBC webpage:

http://www.nj.gov/drbc/water-audits.htm

- Includes workshop materials
- Thanks to PWD, NJ American, Aqua PA



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Water System Audits and Water Loss Control

DRBC Rule Change:

In 2009, the Delaware River Basin Commission amended its Comprehensive Plan and Water Code to implement an updated water audit approach to identify and control water loss in the Basin. The new approach is consistent with the International Water Association (IWA) and American Water Works Association (AWWA) Water Audit Methodology that is considered a best management practice in water loss control.

The Commission's revised rules require the new reporting format to be used for the 2012 calendar year water audit; however, system operators are encouraged to implement the new audit format in 2011. The new rules are based on precise definitions and rational accounting procedures that result in a clearer understanding of the causes of water loss and allow system operators, utility managers, and regulators better target their efforts to improve water supply efficiency.

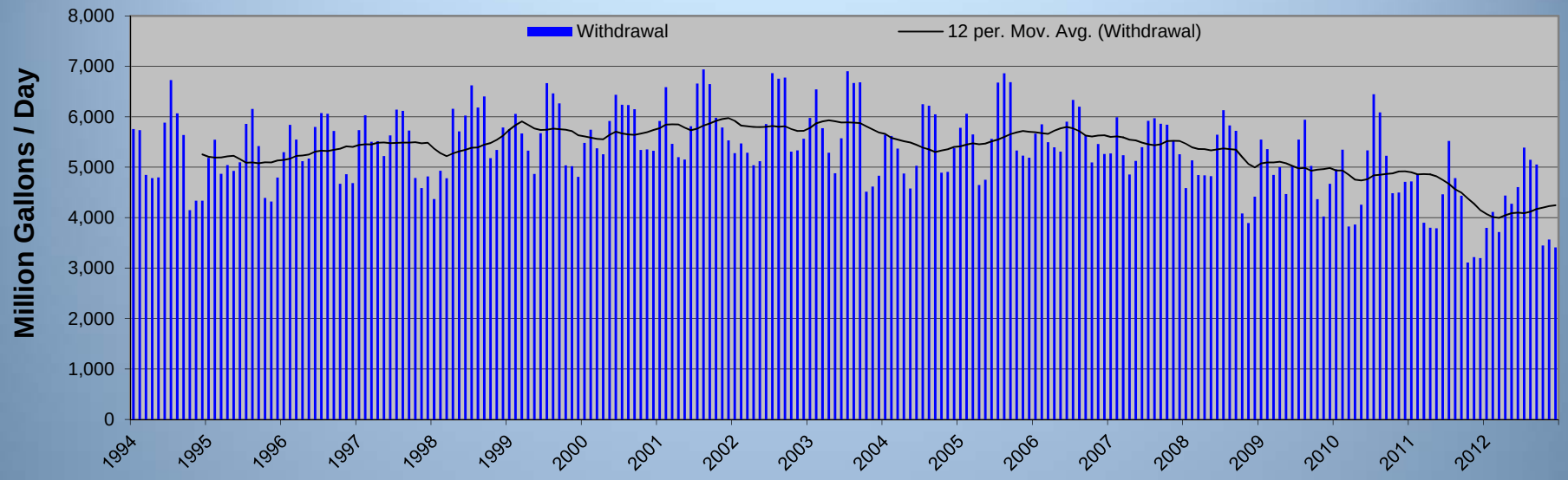
Leaking Pipe (photo courtesy of Halifax Water)

Widespread problem with large losses:

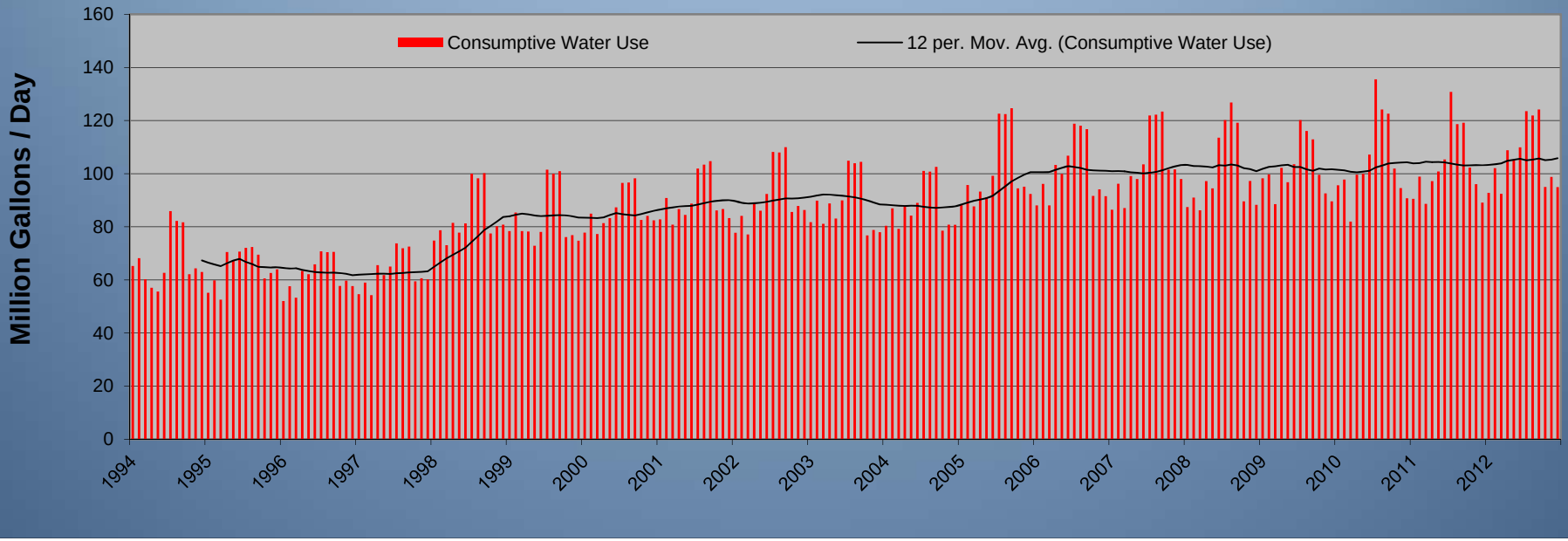
Nationwide, an estimated **six billion gallons per day** of water is taken from water resources and never reaches the customer; this is enough water to supply the drinking water needs of the ten largest cities in the United States. In the Delaware River Basin, this number is estimated at **150 million gallons per day**. Water suppliers are experiencing real water losses due to physical infrastructure failures (see photo at right) and apparent losses resulting from inaccurate meter readings and erroneous billing practices. As demand for water increases, it

Power Generation

Total Withdrawals for 37 Thermoelectric Facilities in the DRB



Total Consumptive Use for 37 Thermoelectric Facilities in the DRB



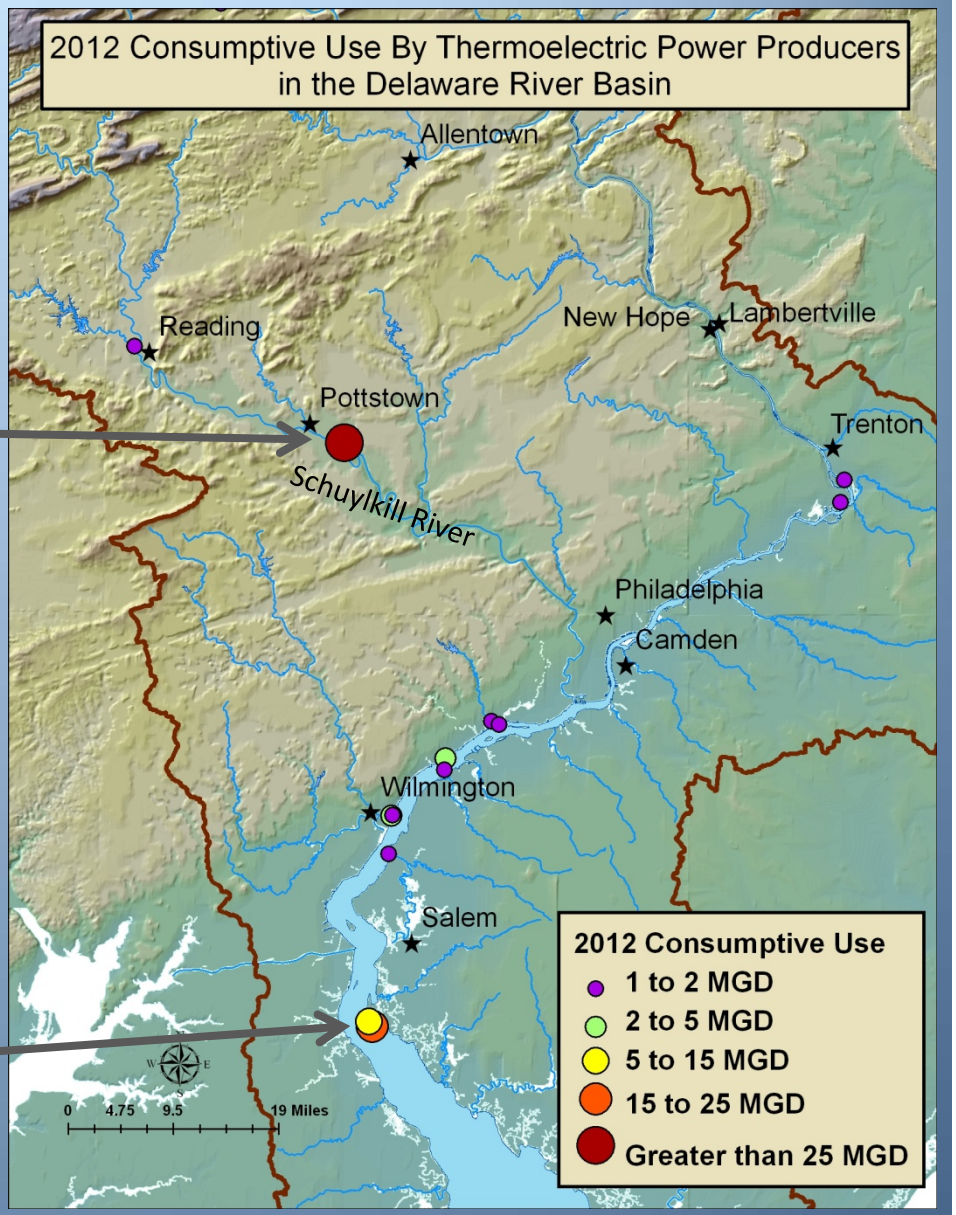
Thermoelectric: Cooling systems

Exelon - Limerick, PA (Evaporative Cooling)

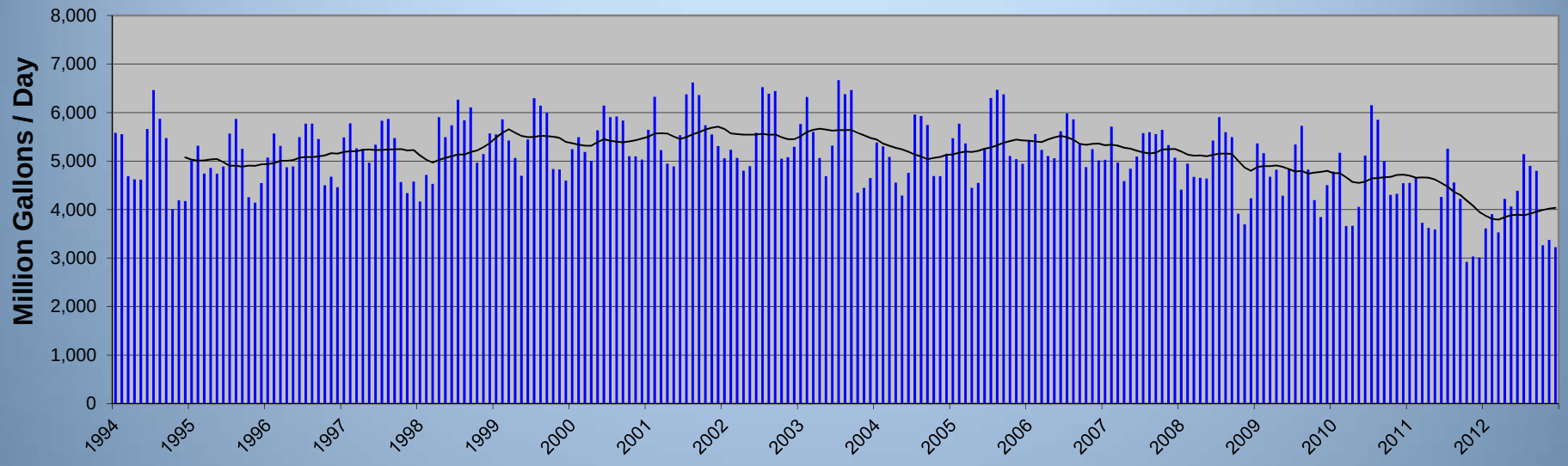
2,295 MW
40 MG/d withdrawal;
32 MG/d consumptive use

PSEG – Salem, NJ (Once Through Cooling)

2,380 MW
3,100 MG/d withdrawal;
21 MG/d consumptive use



Total Withdrawals for Thermoelectric Facilities with Once Through Cooling Systems



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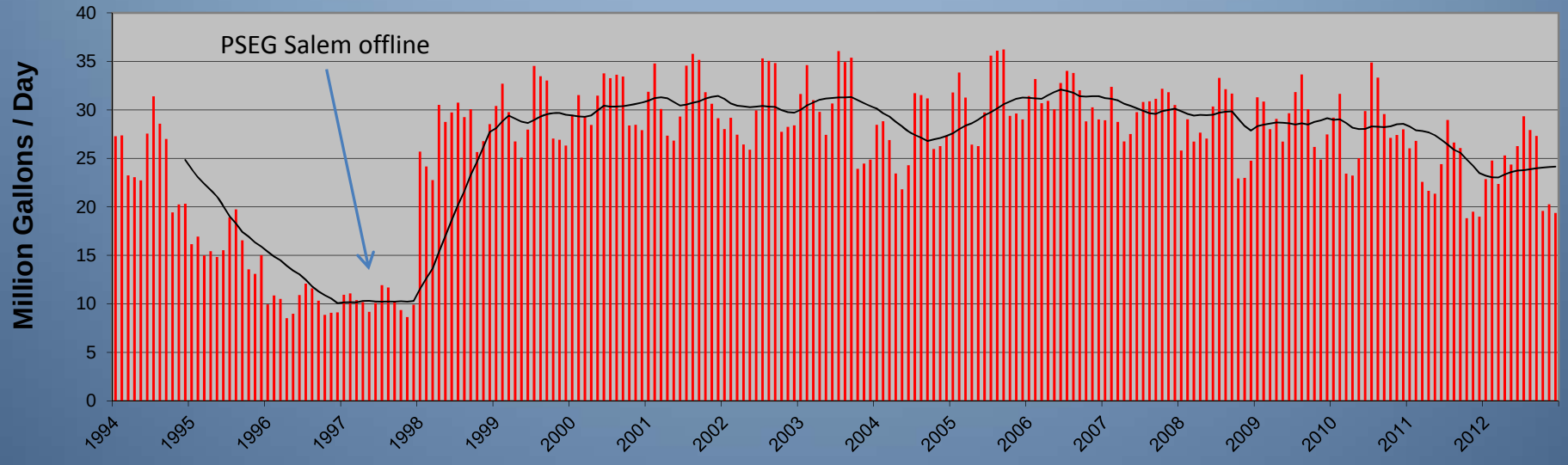
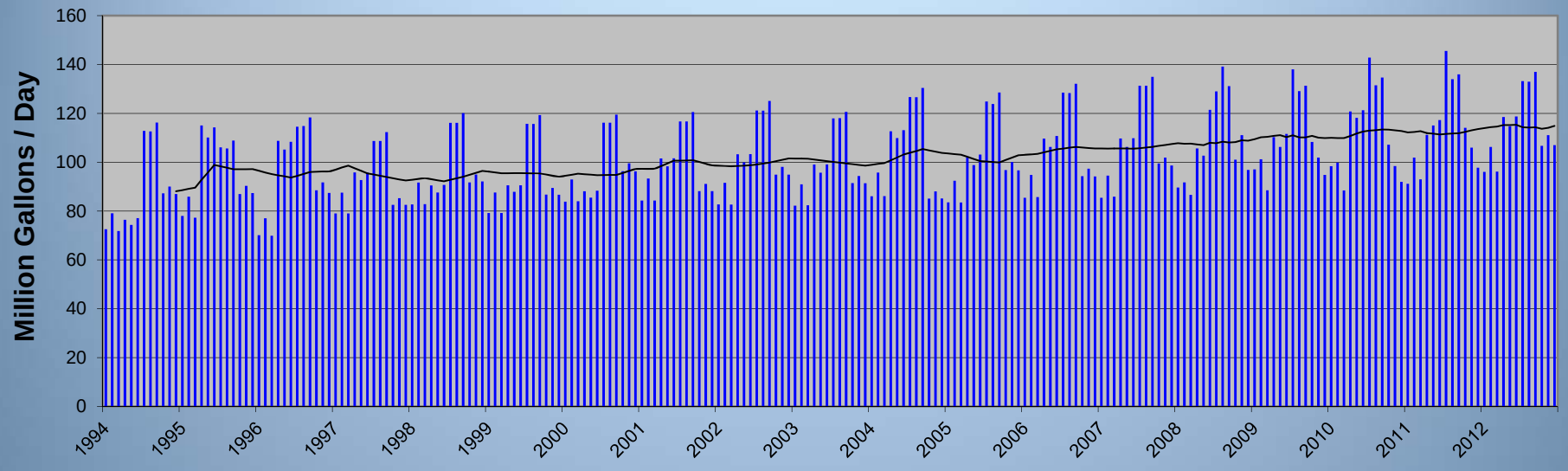


Total Withdrawals for Thermoelectric Facilities with Cooling Tower Systems



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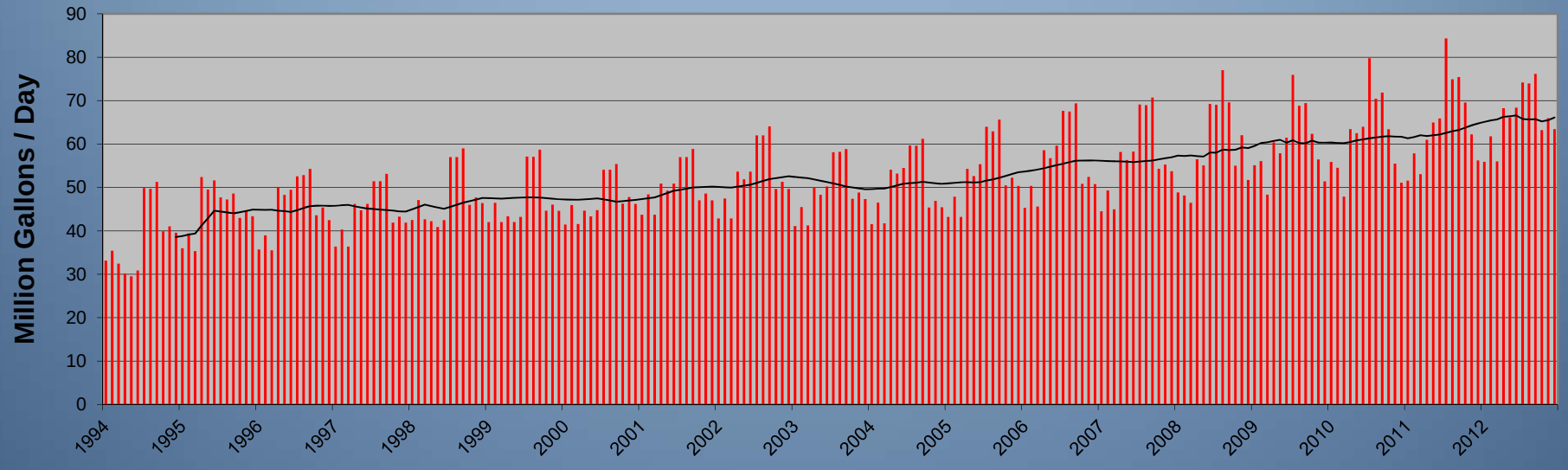
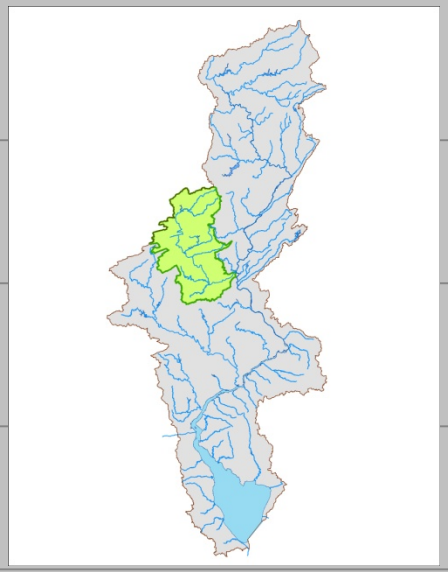


Lehigh Watershed Thermoelectric

Monthly Water Withdrawals in Million Gallons per Day

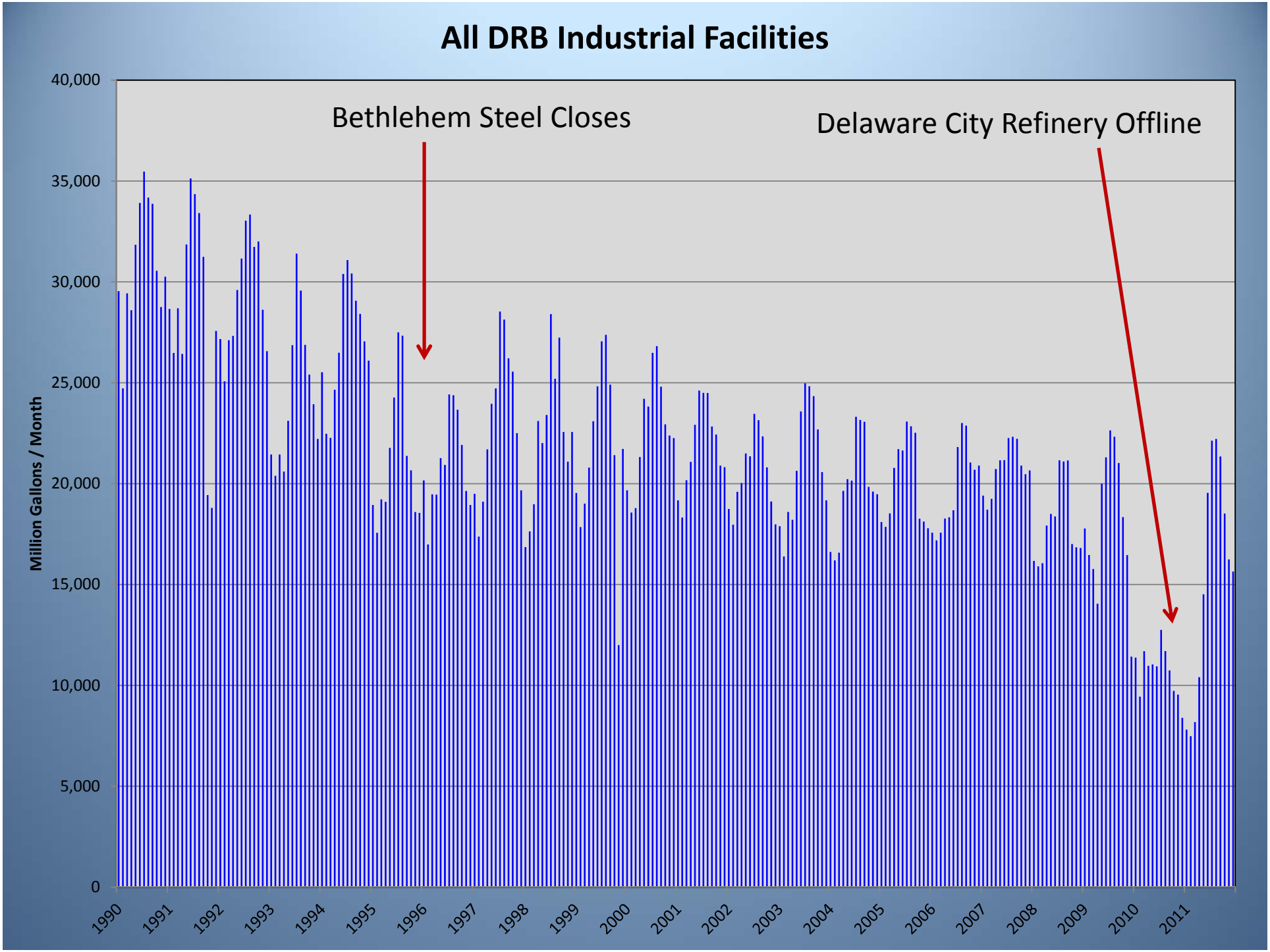


Million Gallons per Day

0
1
2
3
4
5
6
7

1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Industry


All DRB Industrial Facilities
Bethlehem Steel Closes
Delaware City Refinery Offline
Million Gallons / Month
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Refineries in the DRB – Ever Evolving

- The largest industrial users in the DRB are generally refineries.
- All 7 DRB refineries have experienced significant changes due to changes in ownership.
- In some cases facilities are being reevaluated and revamped to meet changing markets.

Refineries Revamped

Monroe Energy – Trainer Refinery :

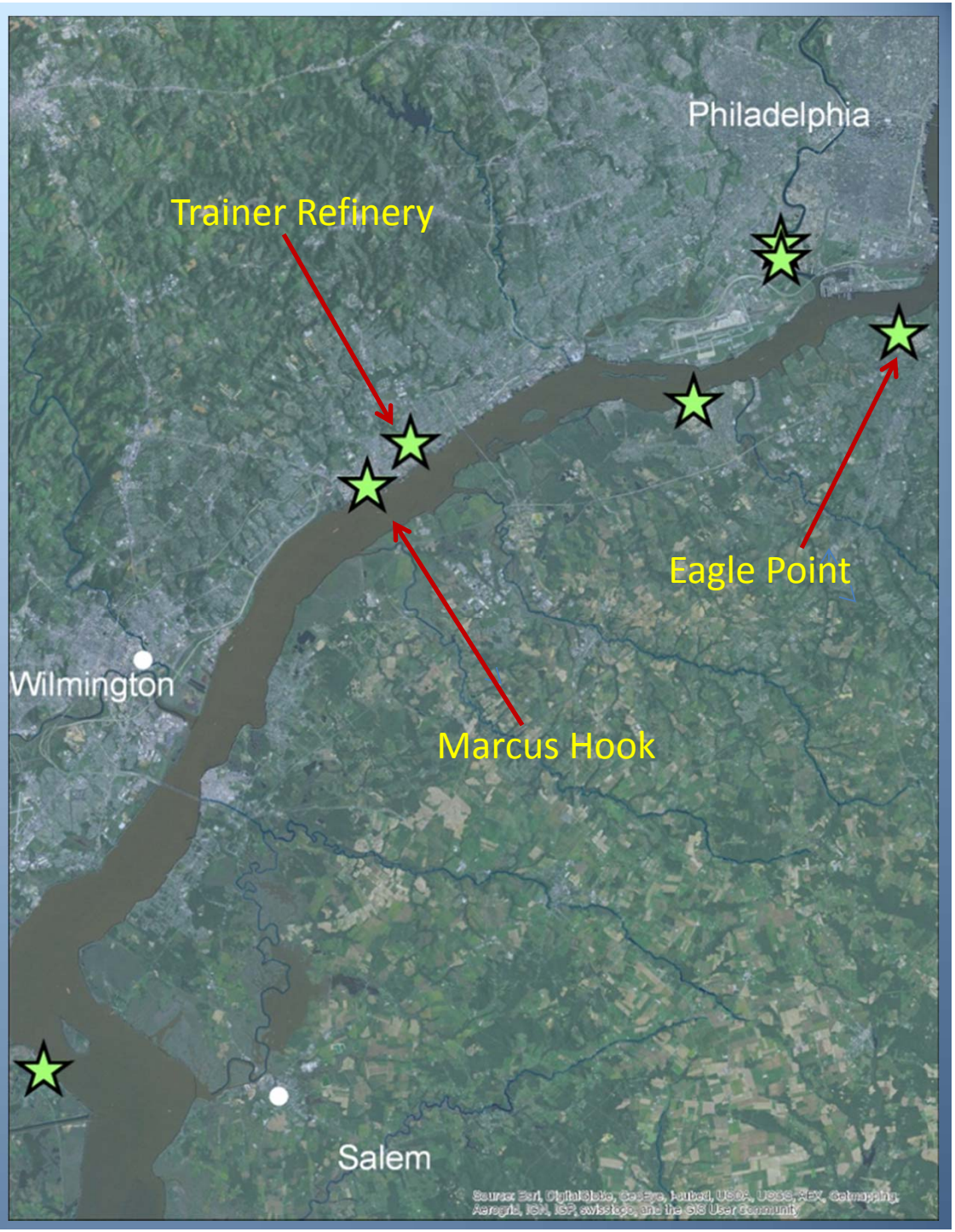
- Converted to produce jet fuel to lower Delta's fuel costs.

Sunoco Logistics – Marcus Hook:

- Plant being converted to major shipping hub for natural gas liquids from the Marcelus and Utica Shales.

Sunoco Logistics – Eagle Point:

- Stopped refining in 2010.
- Now used as a major storage and distribution hub.



Refineries still Refining

Philadelphia Energy Solutions – Philadelphia Refinery:

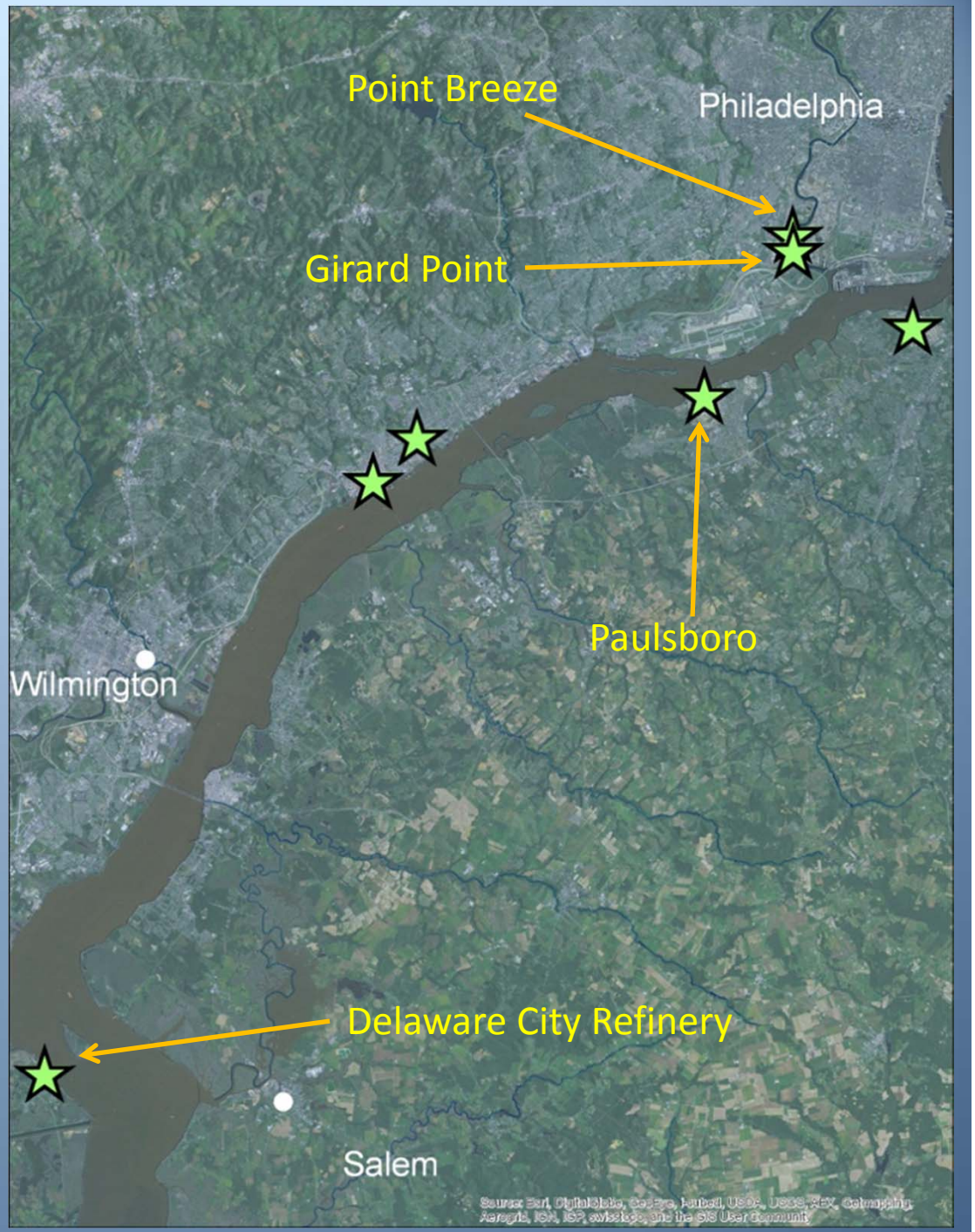
- Operating as two separate Facilities, Girard Point and Point Breeze.

PBF Energy - Paulsboro:

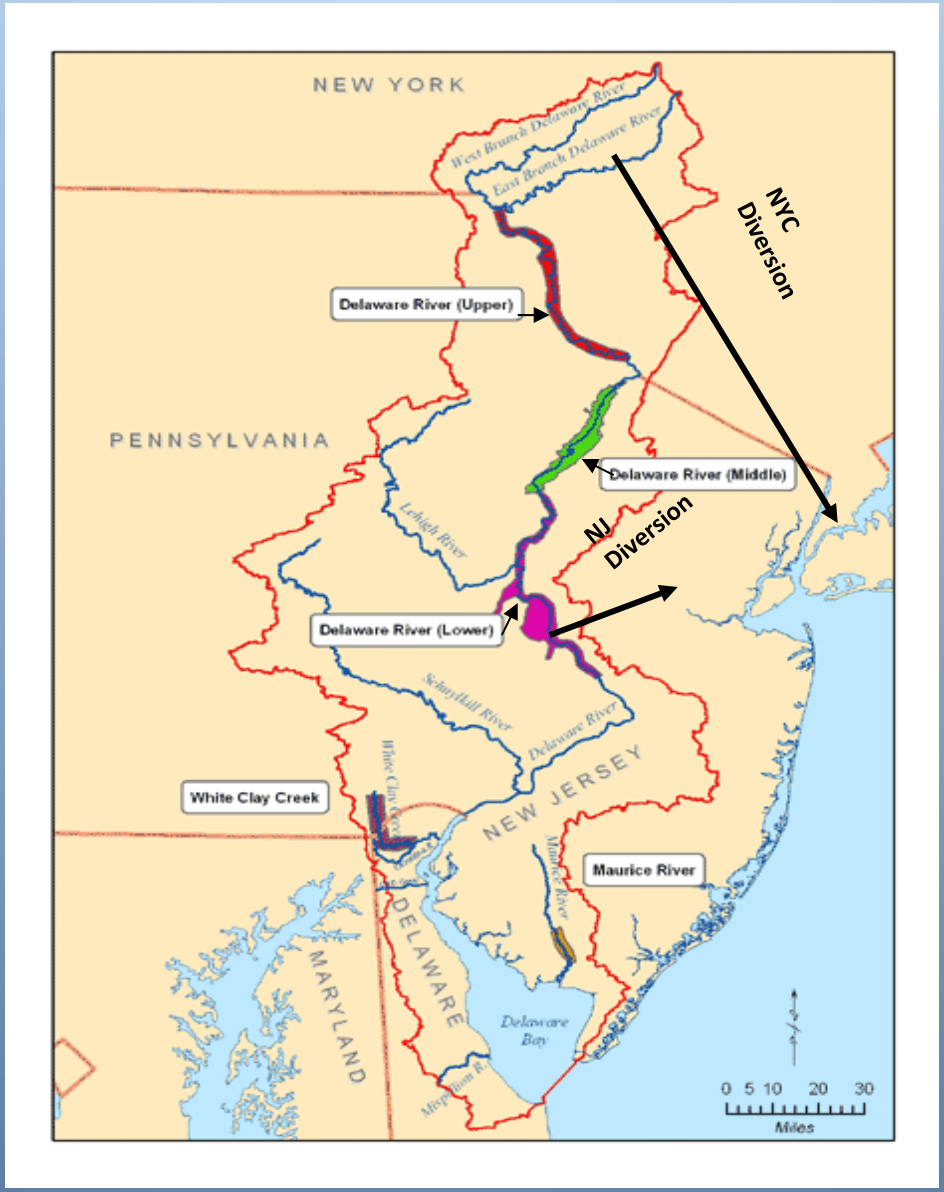
- Purchased plant in 2010.

PBF Energy – Delaware City Refinery:

- Purchased in 2010.
- Plant shutdown during 2009 and stayed closed until June of 2010.
- Not fully operational until October of 2011.



Out-of-Basin Transfers



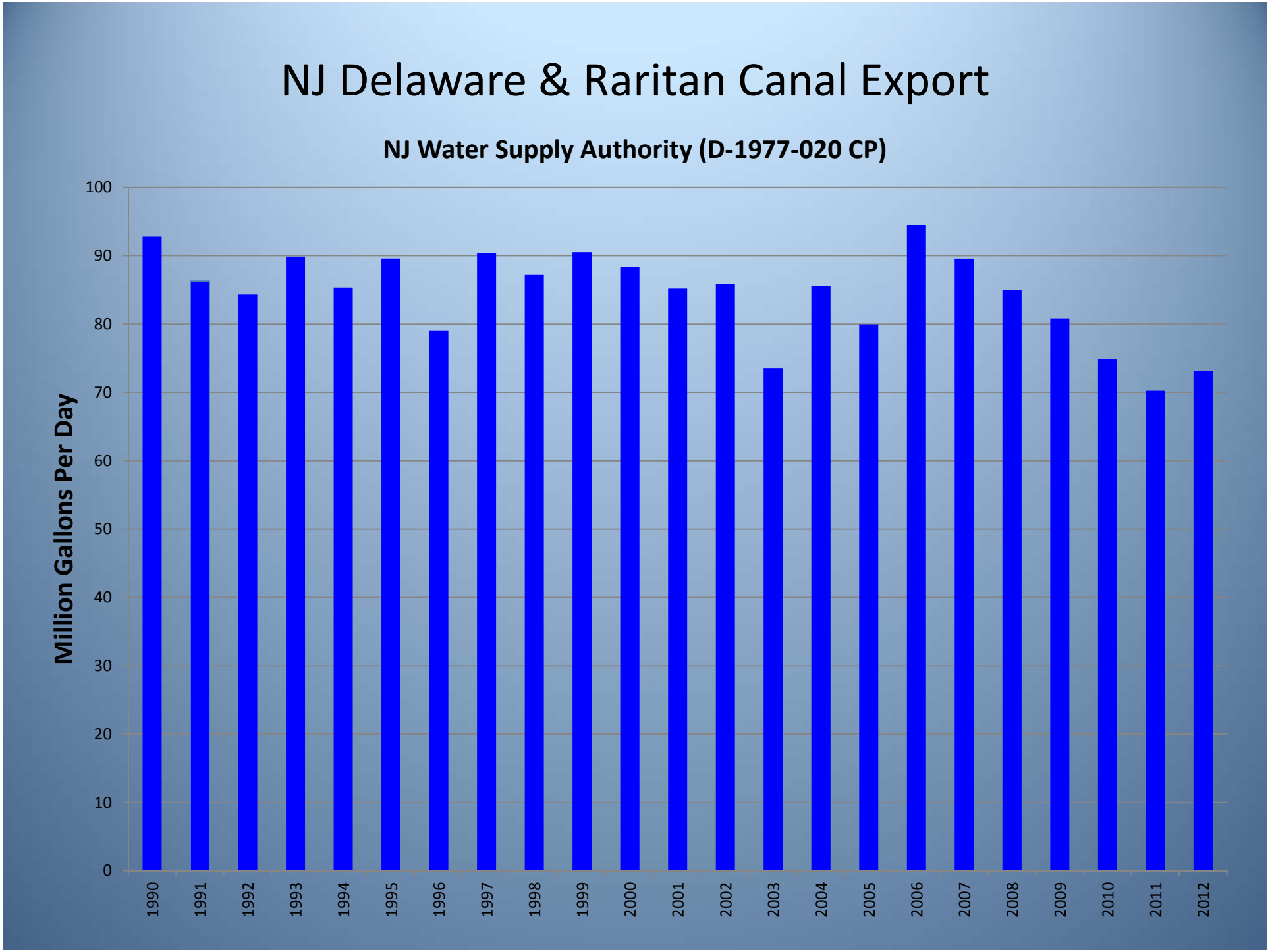
Water Exported to New York City from Delaware River Basin 1955 - 2012 (Annual Data)

Million Gallons per Day

1,000
900
800
700
600
500
400
300
200
100
0

1955 1957 1959 1961 1963 1965 1967 1969 1971 1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009 2011

NJ Delaware & Raritan Canal Export



What does it all mean?

- Big picture: Relatively flat demand; localized demand pressures
- PWS:
  - Conservation efforts have helped to offset growth due to population increases
- Industry:
  - Decreased water use over time, very sensitive to the loss of large facilities.
  - Refineries in the Basin have gone through a period of great uncertainty, appear to be stabilizing for the moment.
- Power:
  - Trend away from Once Through Cooling to Evaporative Cooling
  - Evaporative Cooling – potentially allows consumptive use to move upstream/tributaries (compared to Once-Through)
- What about Instream flows / Climate change?

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Notes on Data:

- Good data drives all analysis and is needed as building blocks for good decision making.
- Water withdrawal data in the Basin has improved. (DRBC and States)
- DRBC has undergone significant database upgrades and now has good electronic data on its withdrawal docket allocations.
- There is always room for improvement: e.g., Agriculture, customer type (PWS), gal/MW (PWR)

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Questions?

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