

# Delaware River Basin Commission

## *The State of the Basin - 2019 Watersheds and Water Use*

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*WRA DRB , Fall Technical Symposium*

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Photo: David Mark, via Pixabay



# Indicators

## Watersheds / Landscapes

- Population
- Land Cover
- Impervious Cover

## Water Quantity

- Water Withdrawals
- Consumptive Use
- Groundwater Availability

**TOTAL POPULATION**  
in the  
**DELAWARE RIVER**  
**BASIN:**  
8.3 million

**PA** 5.6  
million

**NY** 0.1  
million

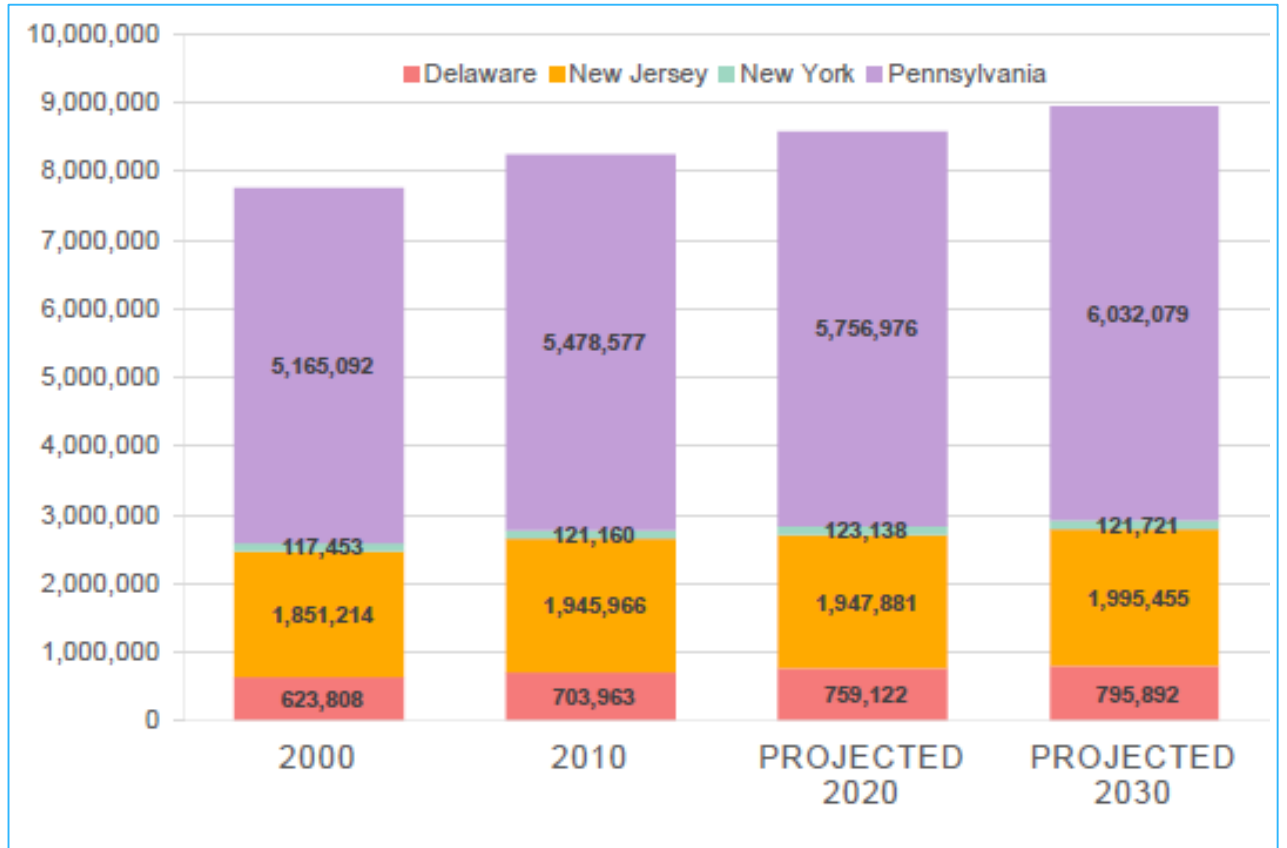
**NJ** 1.9  
million

**DE** 0.7  
million

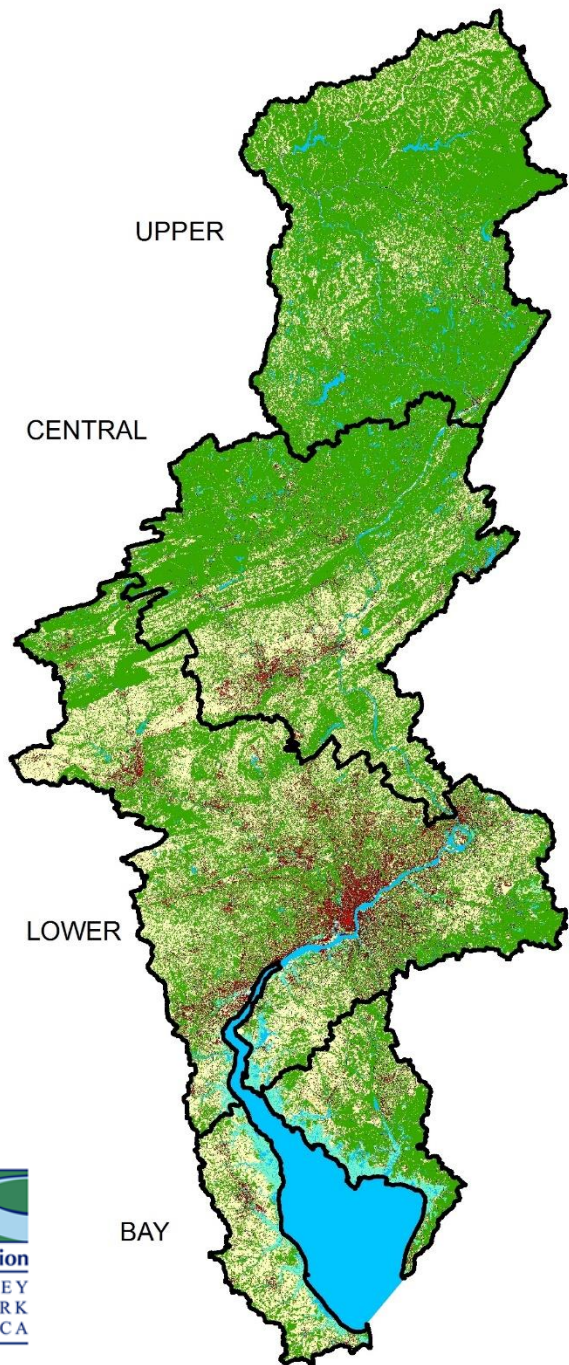
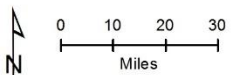


# Population

- 2016: ~8.3 million basin residents
- 2030: Projected to be 9 million



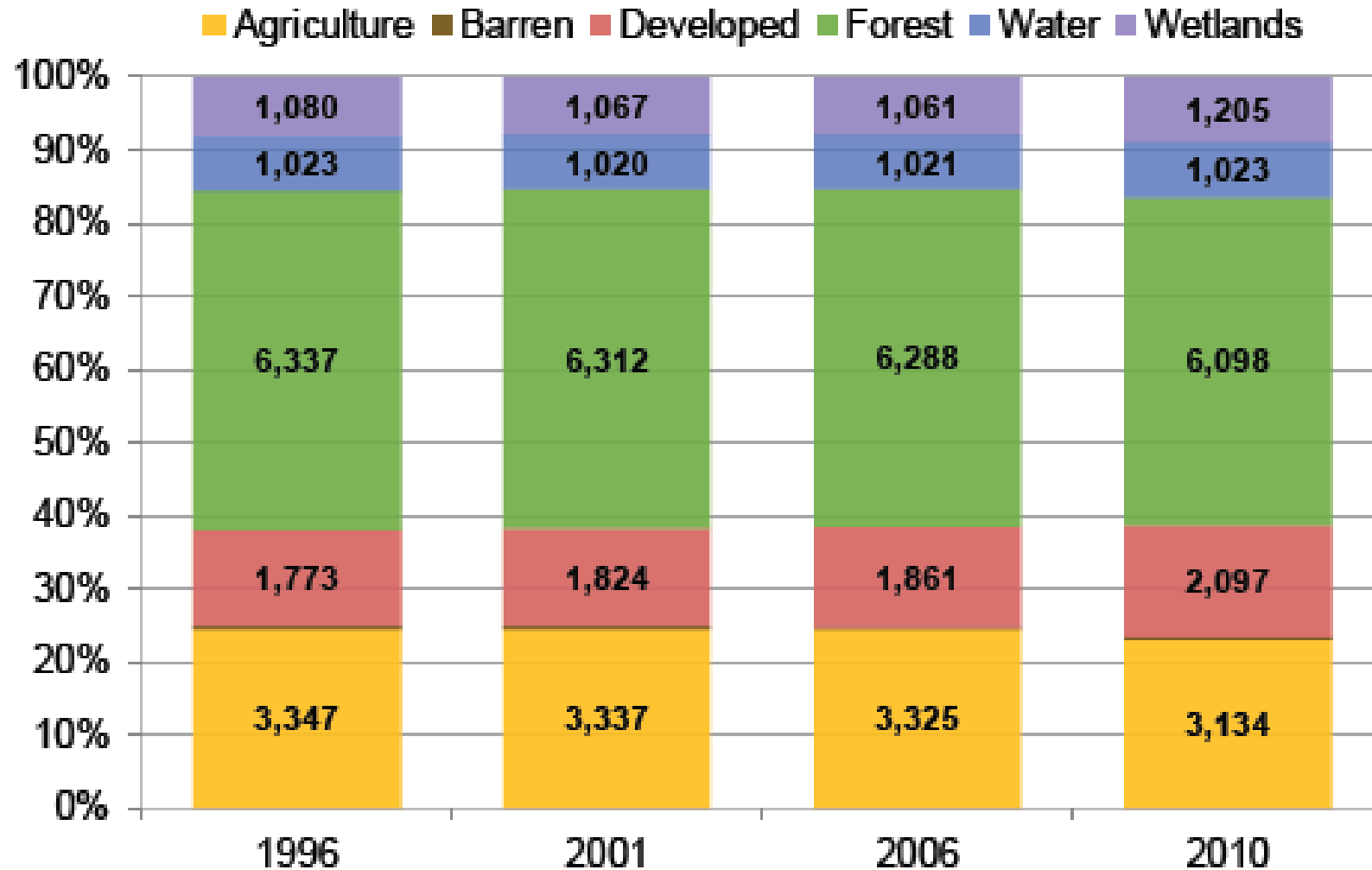
## Legend



# Landcover

- Most up-to-date data published by Shippensburg University
  - 1-meter resolution, LiDAR-based, 12 land cover classes
  - Predominantly Forested – especially Upper Basin
  - More urbanized around Wilmington – Philadelphia - Trenton corridor
- Action: continue to update high-resolution landcover over time for trends
- Management of growth will help mitigate negative impacts to source waters, water quality and aquatic life

# Landcover

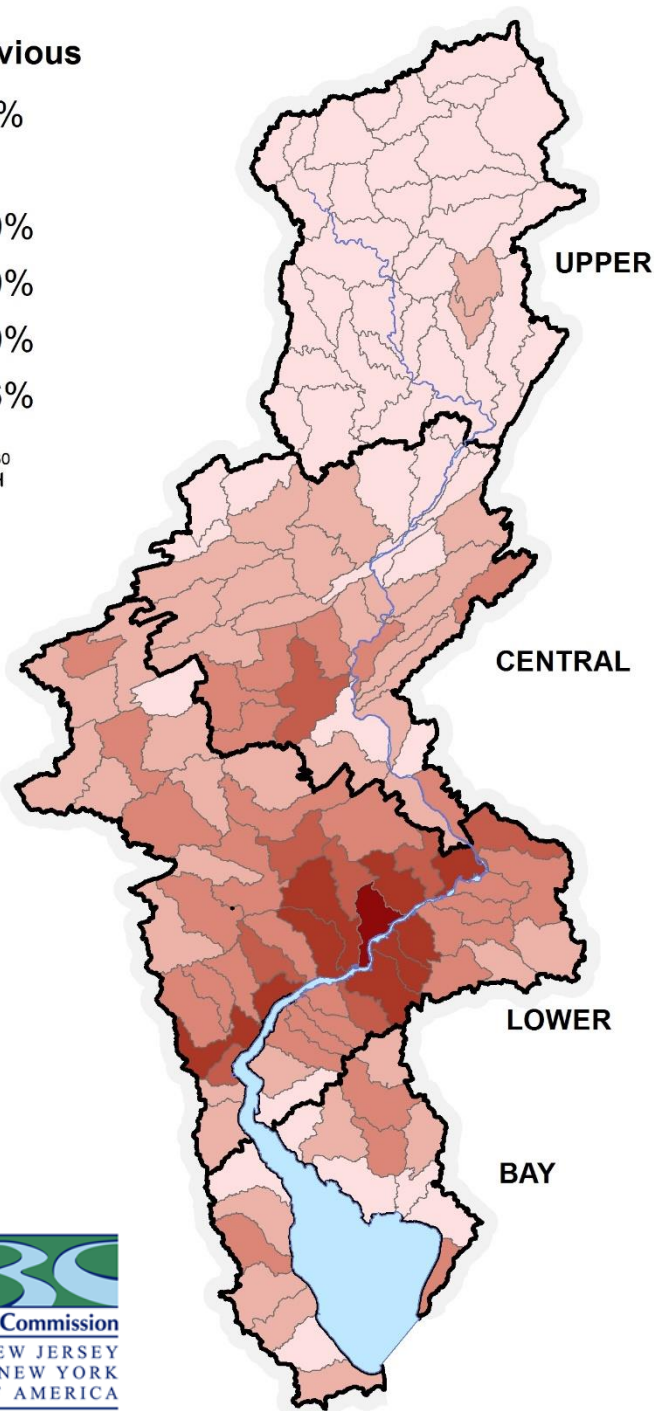
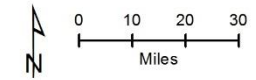
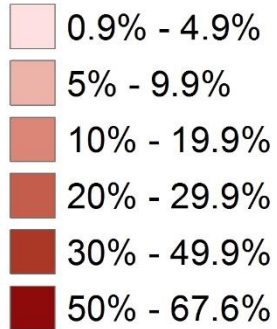


\*Numbers on chart indicate area in square miles  
Data Source: NOAA CCAP

- NOAA Coastal Change Analysis Program (CCAP) data for trends.
- Development is primarily from Forest and Agricultural lands

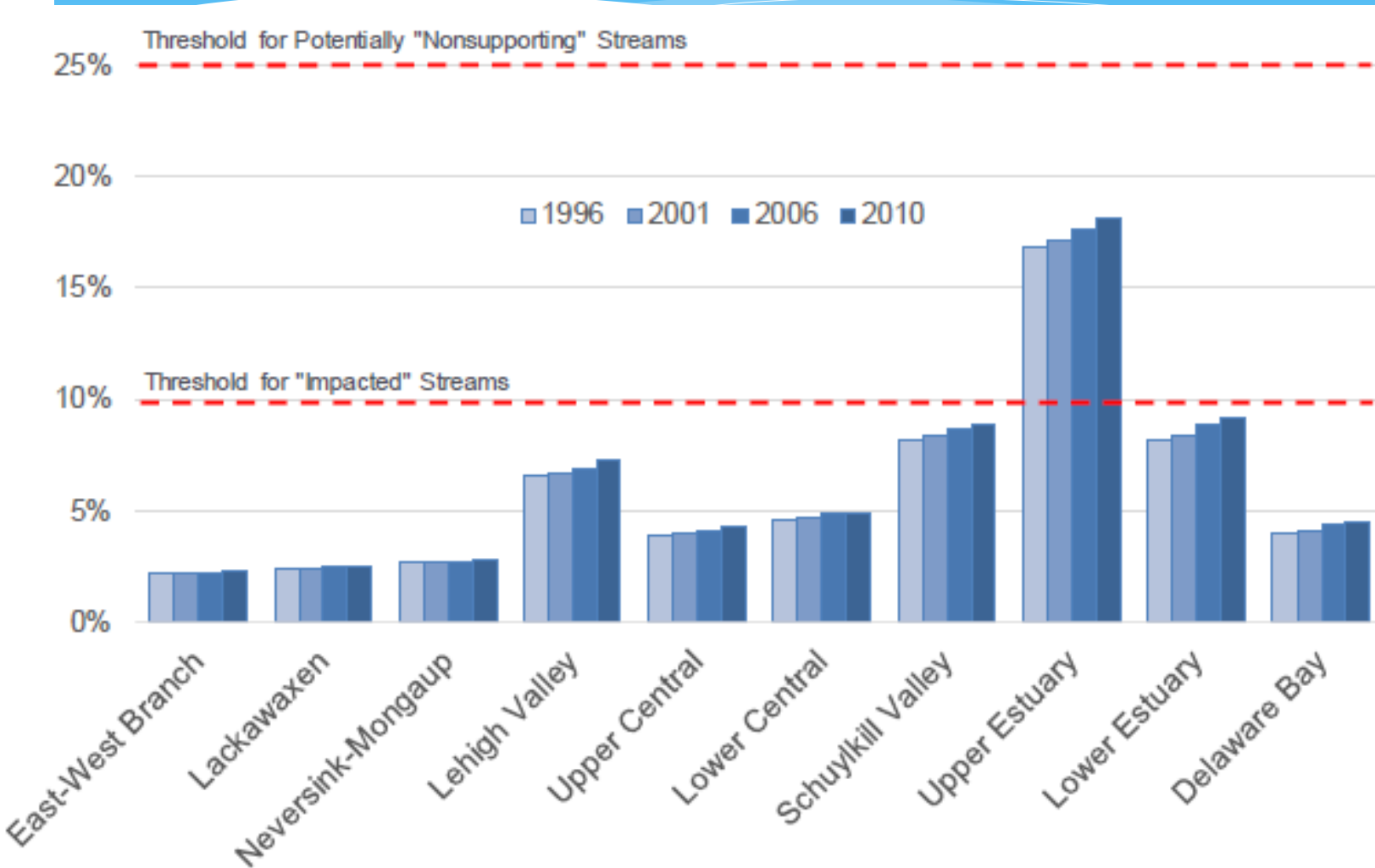
# Impervious Cover

## Percent Impervious



- Good indicator of “stream health”
- Roads, parking lots, rooftops, etc.
- Prevents infiltration of rainfall, adds to runoff, reduces GW recharge
- Watersheds with >10% I.C.- stream health begins to decline
- Utilized NOAA CCAP for analysis

# Impervious Cover

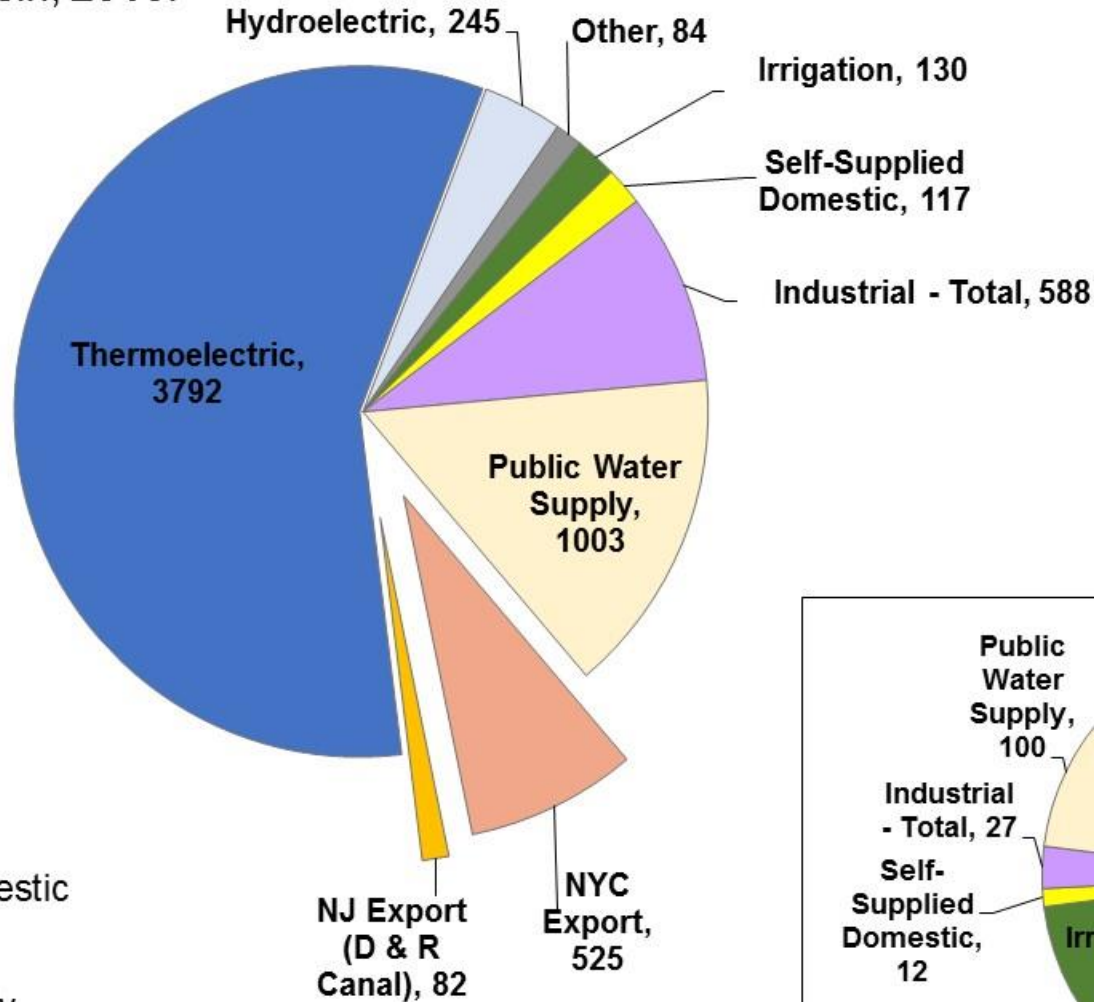


- Most of the basin is currently below the 10% threshold.
- Restoration: Stormwater retrofits in areas above 10%
- Protection: Management ordinances and BMPs in areas below 10%



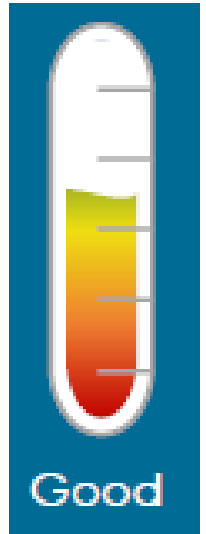
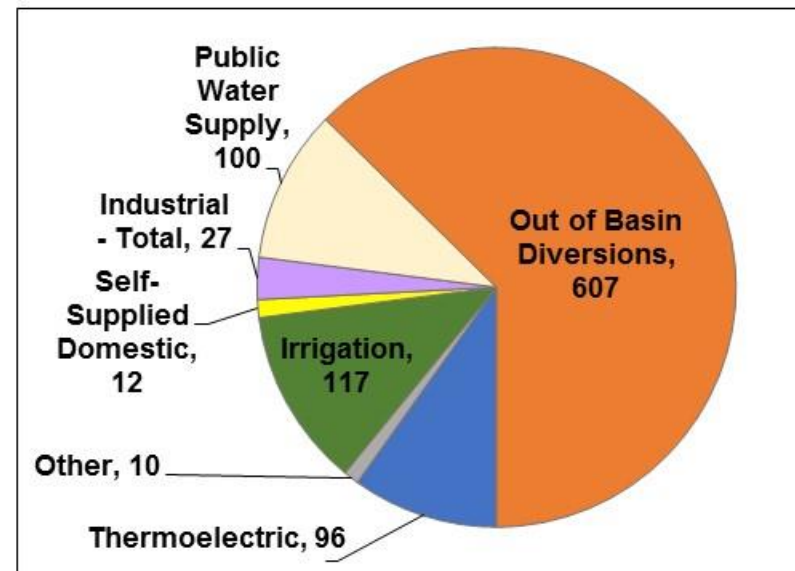
# Basin Water Use

**Total Water Withdrawals**  
(ground and surface) from the  
Delaware River Basin, **2016**:  
6,565 mgd



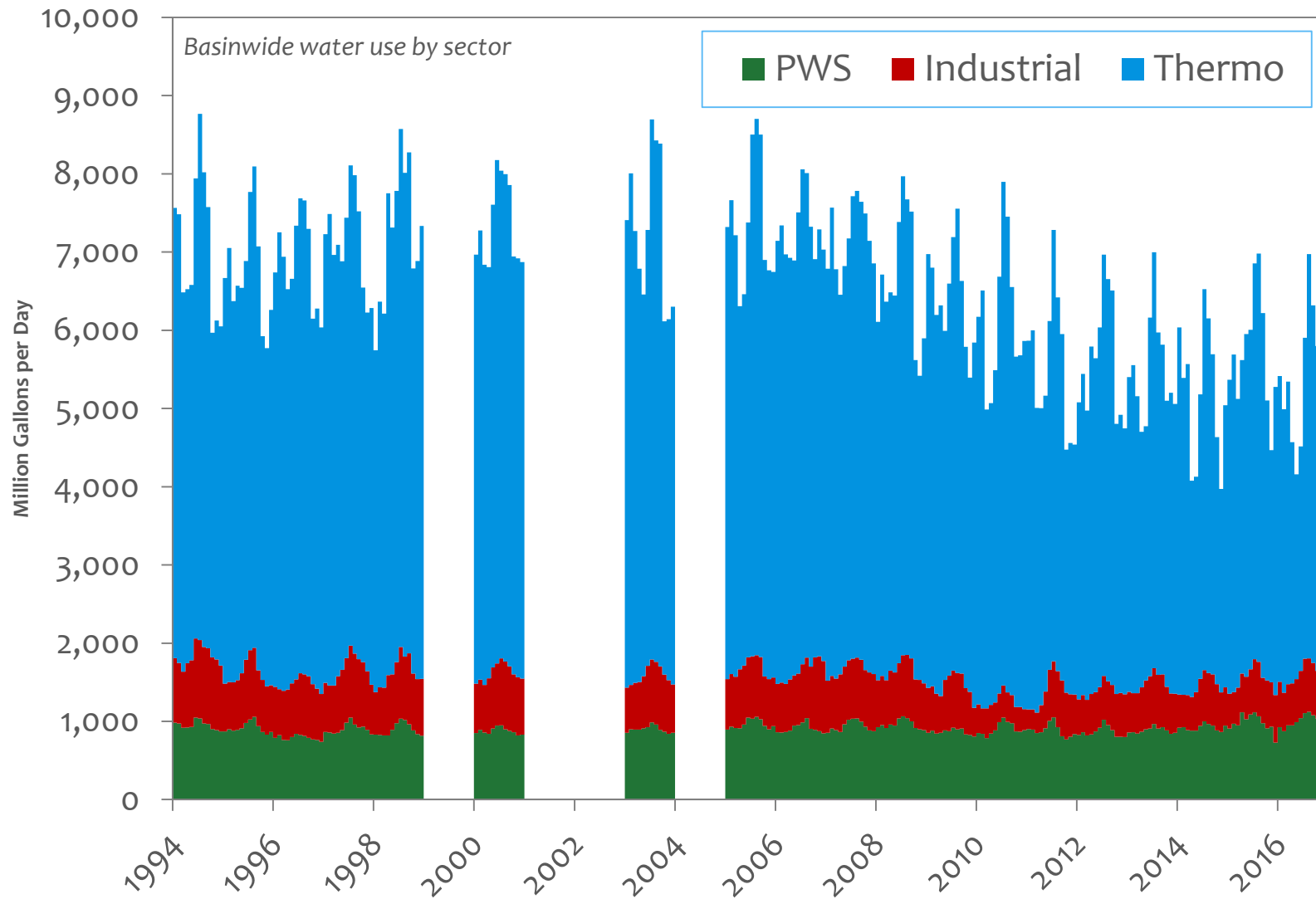
- Thermoelectric
- Hydroelectric
- Other
- Irrigation
- Self-Supplied Domestic
- Industrial - Total
- Public Water Supply
- NYC Export
- NJ Export (D & R Canal)

**Consumptive Use and  
Major Basin Exports:**  
969 mgd



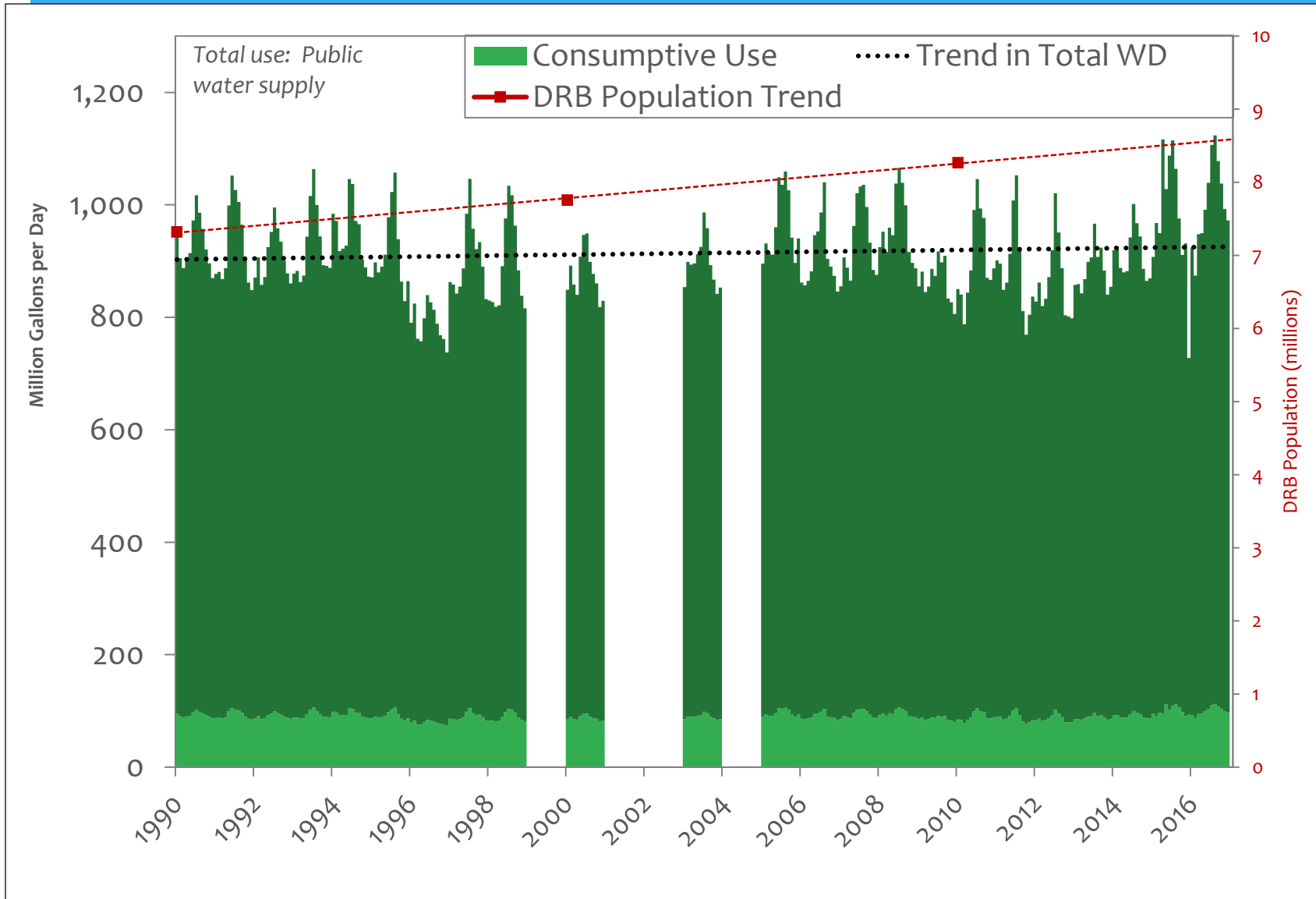


# Water Use Trends – 3 Key Sectors



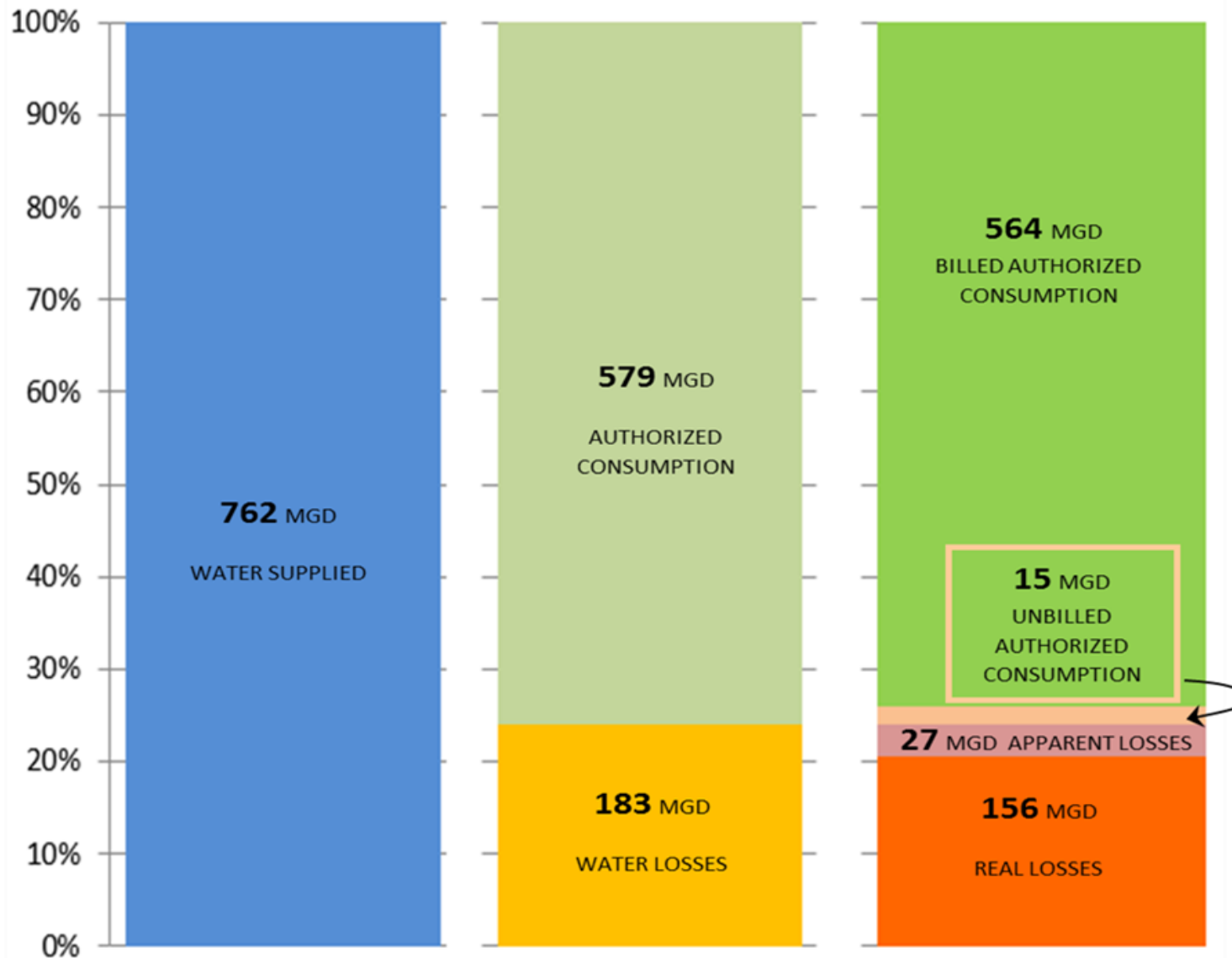
- Measuring and reporting water use has greatly improved since the 1990's
- Stable or decreasing trends

# Water Use Trends – Public Water Supply



- Population growth
- PWS sector use is relatively flat
- Attributed to conservation efforts
- Similar at a national scale

# Water Auditing for PWS Sector

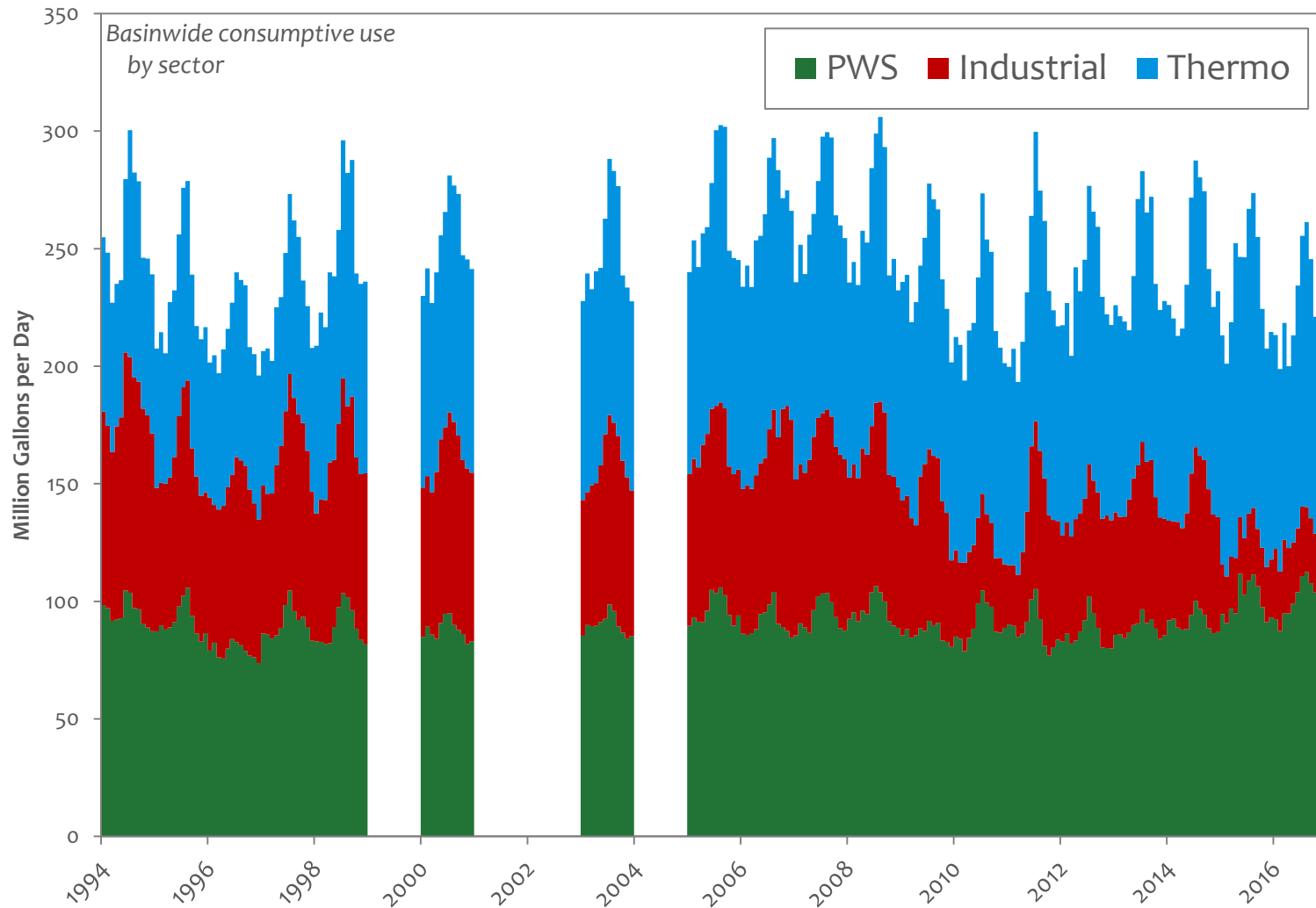


- 300 PWS utility systems submit audits yearly
- 156 MGD is leaked
- \$132 million in non-revenue water

Billed authorized: All consumption that is billed to customers of the utility; this includes metered and unmetered connections.

Unbilled Authorized: All consumption that is unbilled but is still authorized by the utility. This is likely to include water used in activities such as firefighting, flushing of mains and sewers, street cleaning and fire flow tests. It may also include water consumed by the utility itself in treatment or distribution operations, or metered water provided to civic or institutions free of charge.

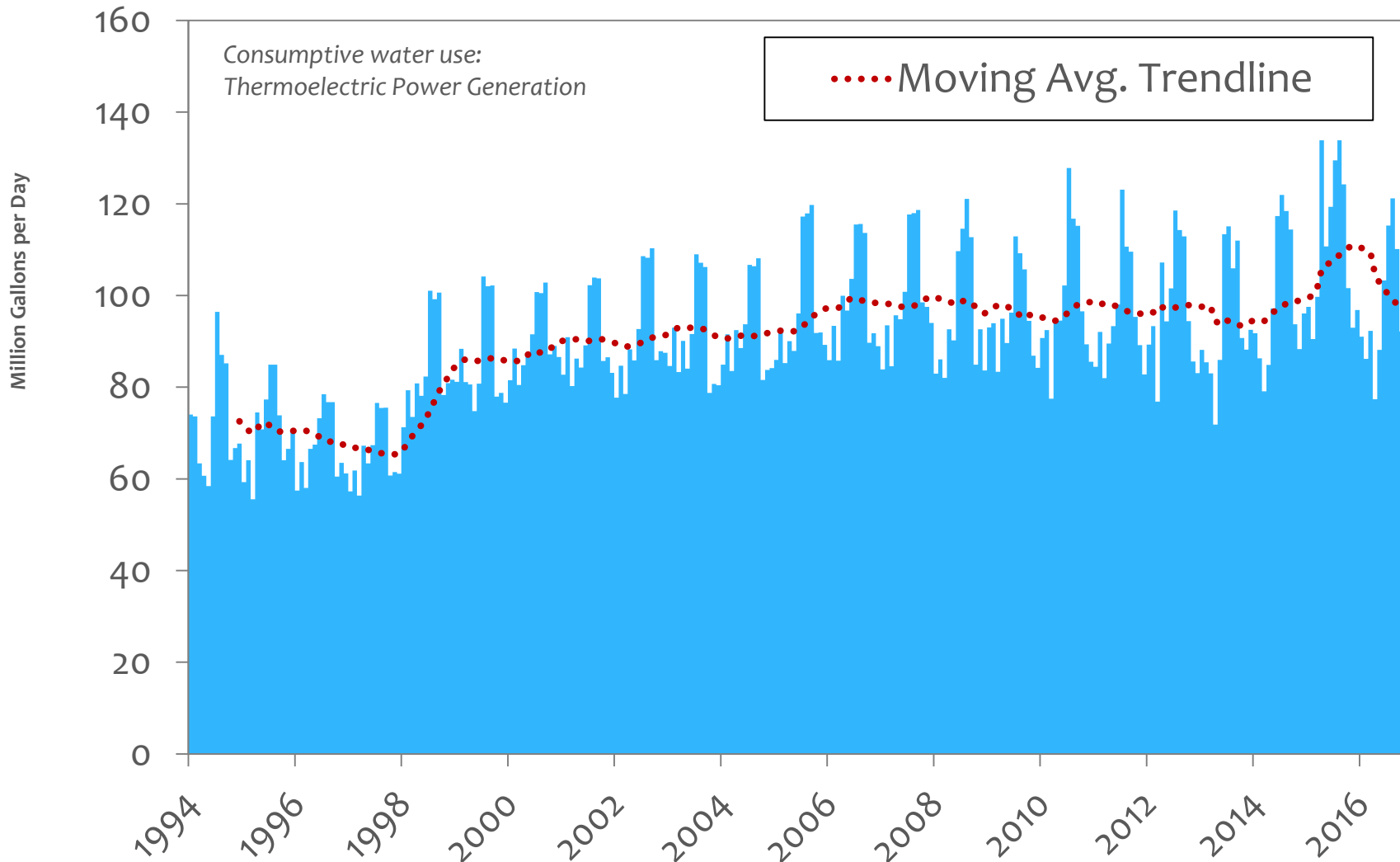
# Water Use Trends – Consumptive Use



- Consumptive Use is stable in the DRB
- Action: Confirm C.U. factors by sector



# Consumptive Use – Thermoelectric Generation

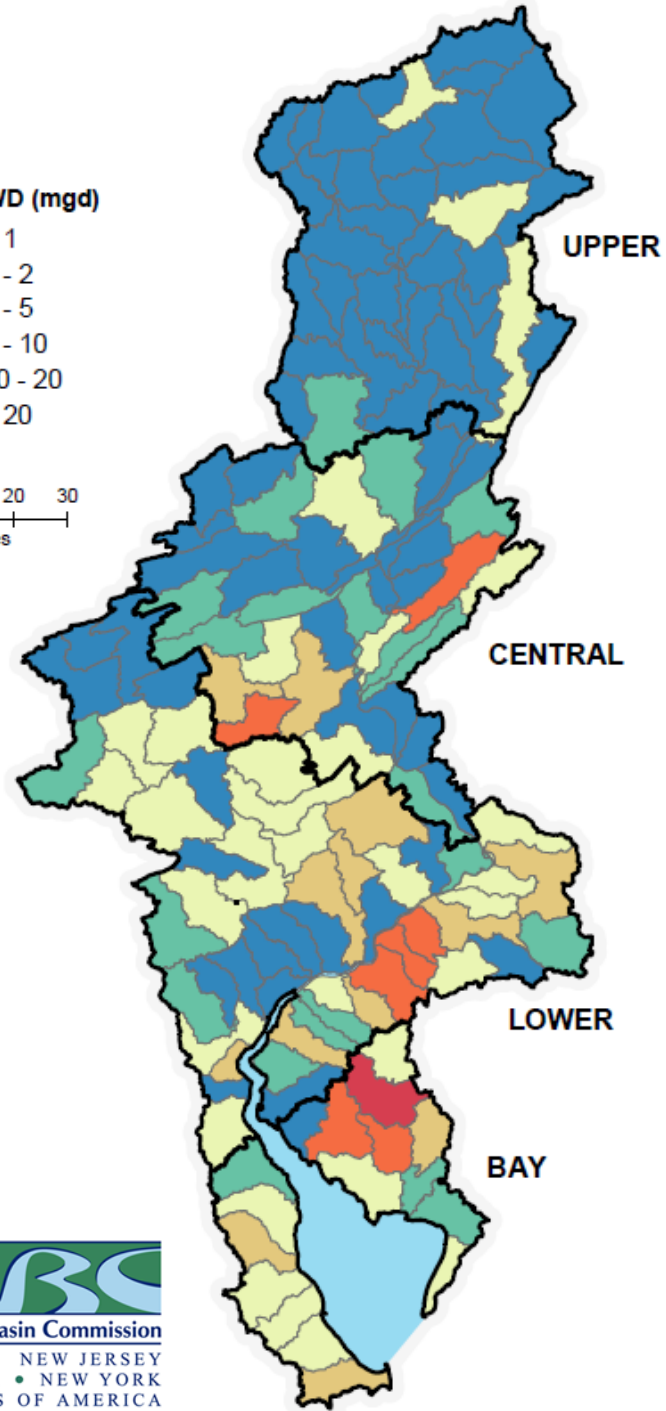
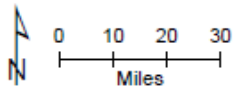


- Thermoelectric is the one sector where we have seen C.U. increases
- Management / replacement program for this sector

# Groundwater Use & Availability

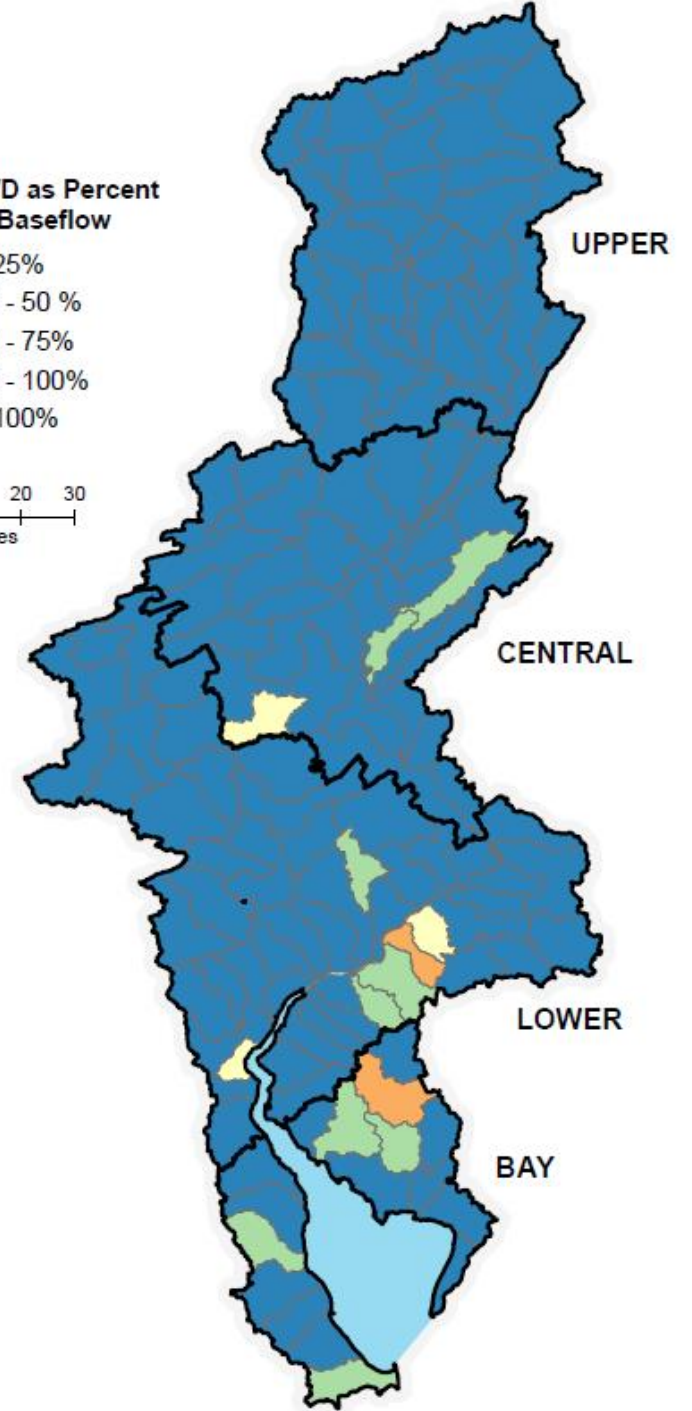
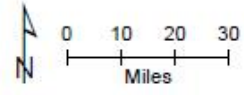
2016 GWWD (mgd)

- < 1
- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- > 20



2016 GWWD as Percent of 25 Year Baseflow

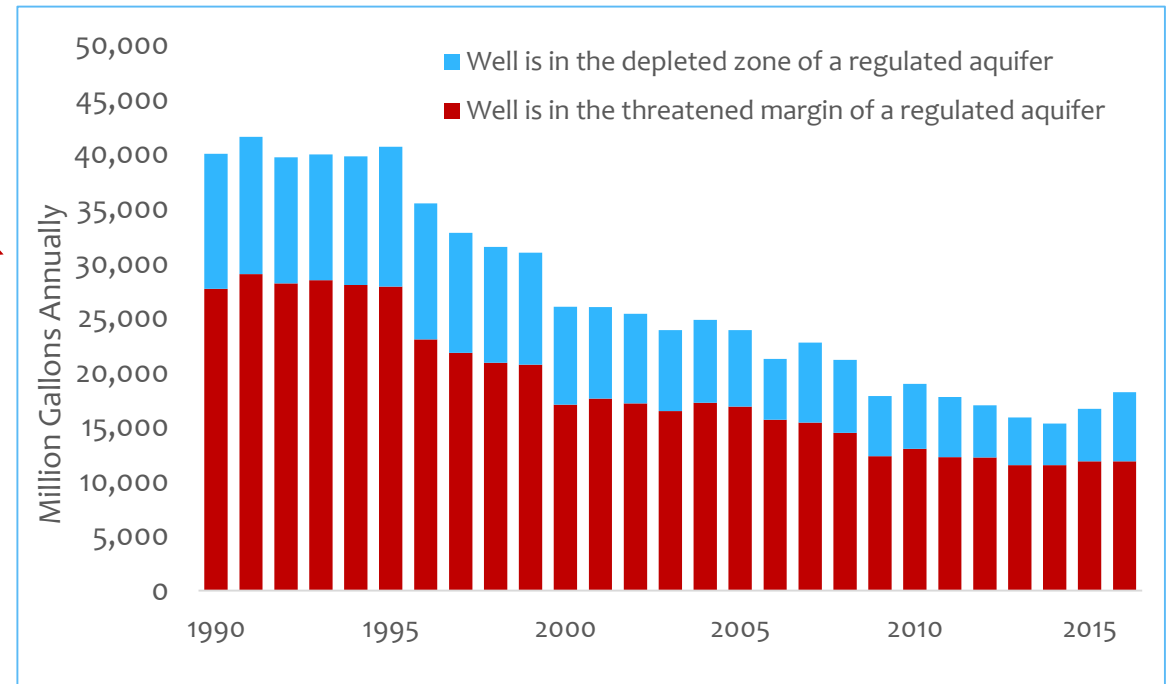
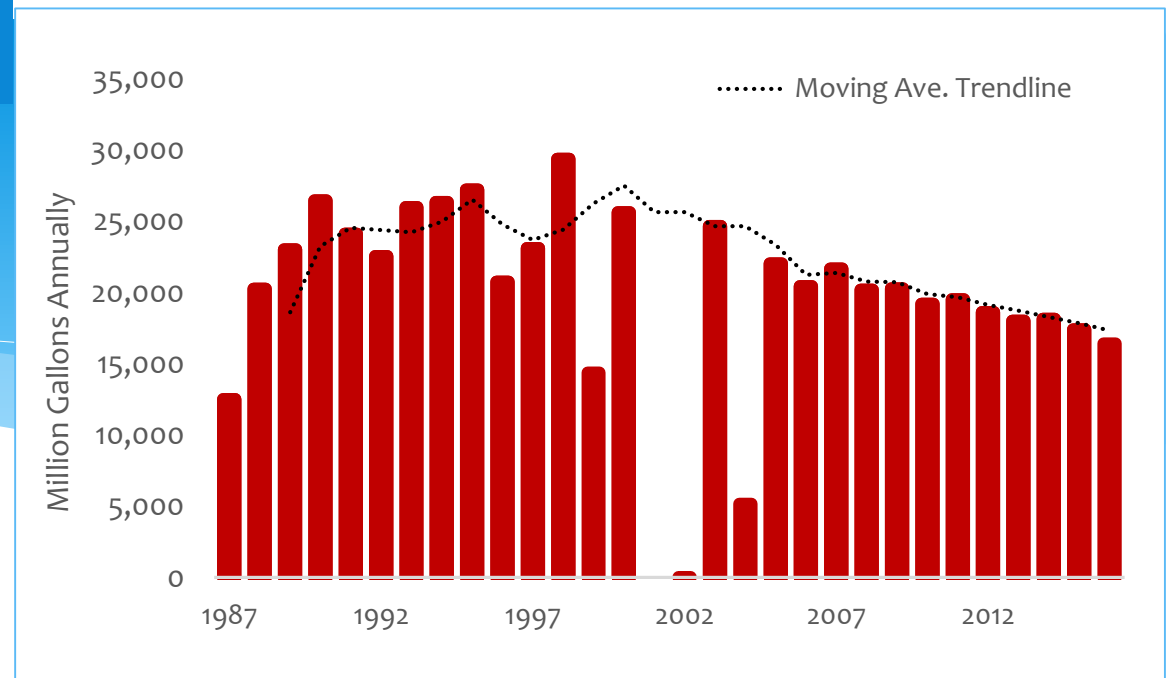
- < 25%
- 25 - 50 %
- 50 - 75%
- 75 - 100%
- > 100%



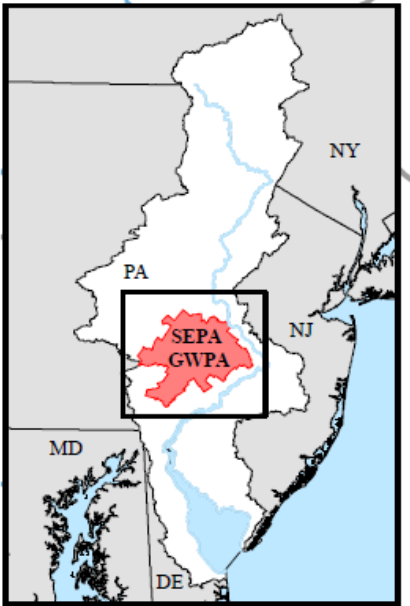
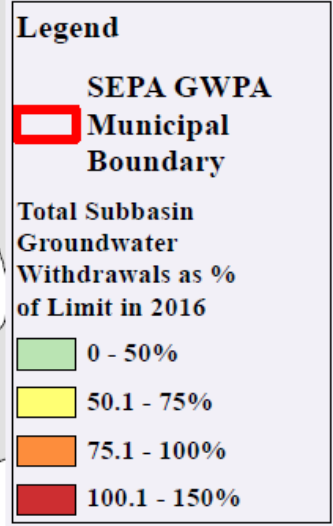
- Majority of Basin is in very good shape
- Below the “potentially stressed” threshold



# GW: Special Management Areas









# Southeast PA Groundwater Protected Area









- Watersheds for analysis are smaller than those used for basin-wide assessment
- One watershed that is “Stressed” is due to a quarry
- Sustainable withdrawals



# Indicator Summary

 = Poor
  = Fair
  = Good
  = Very Good  
 = Excellent
  = Not Rated

Watersheds/Landscapes		Status	Present Condition / Trend	Recommendations
Population		<i>No Rating</i> The population is expected to increase in the Basin from 2010 to 2030 by 700,000 people.	<ul style="list-style-type: none"> <li>Plan for land development and its impacts on natural resources</li> <li>Balance increased need for development with stresses on water resources</li> </ul>	
Land Cover		<i>No Rating</i> Urbanization has resulted in a loss of forested and agricultural lands, especially in the Lower Region.	<ul style="list-style-type: none"> <li>Manage effects of water resources associated with development</li> <li>Partake in conservation efforts</li> <li>Continue tracking land cover changes</li> </ul>	
Impervious Cover	 ↓	<i>Good</i> The lower region of the Basin had increased impervious surfaces due to urbanization.	<ul style="list-style-type: none"> <li>Apply impervious cover percentages to land cover categories</li> <li>Reduce impact from impervious surfaces through stormwater management strategies</li> </ul>	
Water Quantity		Status	Present Condition / Trend	Recommendations
Water Withdrawals	 ↔	<i>Good</i> The public water sector has maintained a stable rate of withdrawals despite increasing population in the DRB.	<ul style="list-style-type: none"> <li>Continue reporting water withdrawals</li> <li>Continue implementing water auditing program</li> <li>Study potential growth in water demand for the thermoelectric sector</li> </ul>	
Consumptive Use	 ↔	<i>Good</i> Consumptive use for public water supply stayed flat; for thermoelectric power generation has increased; and industrial has decreased.	<ul style="list-style-type: none"> <li>Update consumptive use factors</li> <li>Extend water loss accountability beyond water audit to develop normalized indicators</li> <li>Create regulations to reduce industry standard losses</li> </ul>	
Groundwater Availability	 ↑	<i>Very Good</i> Groundwater conditions are expected to continue to improve over time.	<ul style="list-style-type: none"> <li>Continue improving water use reporting</li> </ul>	

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**Delaware River Basin Commission**

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***Managing, Protecting and Improving the Basin's  
Water Resources since 1961***