DRBC Case Study: Southeastern PA Groundwater Protected Area

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Newtown Artesian Well. Credit: Bob Damiani
Special Groundwater Management Areas of the Delaware River Basin

Usually created to respond to historical issues related to groundwater withdrawals or water resource features of high value.

Southeastern Pennsylvania Groundwater Protected Area
Southeastern Pennsylvania Groundwater Protected Area

GWPA established in 1980 Due to...

- Increasing population and demand of groundwater resources in southeastern Pennsylvania
- More frequent interference and conflicts among users of the same groundwater resource
- Lowering water levels in streams
- Low recharge rates of the bedrock geology
Key GWPA Dates and Resolutions

- October 8, 1980: Resolution No. 80-18
  Delineated and declared GWPA in SEPA pursuant to Article 10 of the Compact

- December 16, 1980: Resolution No. 80-27
  Included additional townships in Chester (East and West Bradford) & Lehigh (Lower Milford) Counties

- December 22, 1980: Cooperative Agreement with PA
  Commission primary responsibility of oversight of the GWPA

- January 1, 1981: GWPA Regulations Effective

- June 25, 1986: Resolution No. 86-13
  Required groundwater withdrawal metering, recording and reporting to PADEP

- January 28, 1998: Resolution No. 98-1
  Established numerical withdrawal limits for subbasins – 14 Neshaminy subbasins first

- June 23, 1999: Resolution No. 99-11
  Established numerical withdrawal limits for subbasins for the remaining 62 Subbasins
Intent of SEPA GWPA Program

Protect groundwater resources by effectively managing water withdrawals to:

- Prevent the long-term depletion of groundwater
- Protect stream flow during drought conditions
- Protect the rights of present and future users
- Acquire additional information to more accurately plan and manage water resources
- Encourage water conservation
Southeastern Pennsylvania Groundwater Protected Area

* Regulations apply to municipal boundary
* Between 1990-2013 total withdrawals were reduced by approximately 8.5 billion gallons or 23.4 million gallons a day

Geography
1,200 Square Miles
Five Counties
128 Municipalities
76 Sub-basins
Special Requirements

- Permits required for withdrawals in excess of 10,000 gpd for any 30-day period, Dockets required for withdrawals in excess of 100,000 gpd for any 30-day period
- Advance notice of exploratory drilling – 30 days
- Hydrogeological report - 48 hour pumping test and monitoring of wells and surface water bodies
- Well registration, metering, and reporting
- Conservation requirements
- Compliance with subbasin withdrawal limits
Southeastern Pennsylvania Groundwater Protected Area

76 subbasins associated by municipality and consisting of all of Montgomery and also parts of Berks, Bucks, Chester, and Lehigh Counties.

76 assessment units.
Southeastern Pennsylvania Groundwater Protected Area

- Each subbasin contains an annual withdrawal limit
- Withdrawals limits established in 1998, 1999
- Withdrawal limit = 1-year-in-25 average annual baseflow
- Potentially stressed = >75% of withdrawal limit
Annual stream baseflow rates based on rock type
Subbasin withdrawal limits were approved for the 76-subbasins based on the 1-in-25 year average annual baseflow rate (MGY)

- Resolution No. 98-1 – 14 Neshaminy Subbasins
- Resolution No. 99-11 – 62 Remaining Subbasins

Each withdrawal limit was considered the target amount to ensure adequate streamflow in perennial streams and to minimize the overdraft of groundwater resources during times of drought.
Each GWPA subbasin has a withdrawal limit defined in million gallons / year (mgy)

Annual water use data is received from the Pennsylvania Department of Environmental Protection (PADEP)

Commission maintains a current database of annual groundwater withdrawals for all subbasins

Current determination based on actual use not allocation.
2017 Groundwater Percent Withdrawals Based on Withdrawal Limits

Subbasin Names > 50% Withdrawal Limits

- Schuylkill-Crow Creek (171%)
- Pine Run Basin (64%)
- North Branch Neshaminy Creek (63%)
- Newtown Creek (63%)
- Doylestown Subbasin Neshaminy Creek (63%)
- Schuylkill-Trout Creek (53%)
Southeastern Pennsylvania Groundwater Protected Area

* Cumulative groundwater withdrawals from 1987-2017

* Reductions since 2000
Primary Drivers of Change

- Conjunctive use
  - Forest Park (Point Pleasant Pump) – Delaware River SWWD
  - PA American Yardley – Delaware River SWWD
- GW Contamination (PFAS/PFOA)
- Quarry Withdrawals
- Facility Closures
- Data Categorization
Forest Park Water: Neshaminy Creek Intake - Monthly Withdrawals (MGD)

D-1965-076 CP-11 allocates 40 MGD from the Neshaminy Creek intake with a max of 39.5 MGD coming from the Delaware River and 0.5 MGD coming from the Neshaminy Creek drainage area.
GWPA Summary

- Total GWPA GW withdrawals declining
- Majority of subbasins withdrawing below 50% of limit
- Use reporting and withdrawal data has improved
- Conjunctive use primary driver for GW declines
  - Mainstem Delaware – reservoir contributions help drought resilience

Neshaminy Creek, courtesy of the PA Fish & Bat Commission
GWPA Program Conclusions

- The SEPA GWPA is closely managed with regard to groundwater withdrawals, well interferences and water supply planning.
- Current methodology allows for the identification of subbasins which may exceed the potentially stressed or the maximum withdrawal limits.
- Allows staff to steer applicants away from potentially stressed subbasins when possible.
- Program successful!

Sustainable Groundwater Resources = Success
Online Plots of Groundwater Data from DRBC

SEPA-GWPA (John Yagecic)
https://www.drbc.net/Sky/sepagwpa.htm

SEPA-GWPA (Evan Kwityn)
https://evankwityn.shinyapps.io/Subbasin_SEPA_GWPA/