

4. Data Access and Collaboration

4.1. Description of Pennsylvania's Water Use Data Program

Pennsylvania's water use data program has collected water use reports from users for several decades. Water use data was collected mainly through required reporting from public water suppliers (PWSs). Also, periodic mailings of water use survey forms to facilities using large quantities of water provided additional water use data.

Act 220 of 2002¹ called for the Pennsylvania Department of Environmental Protection (DEP) to perform an initial registration and annual report from: any person who withdraws more than 10,000 gallons of water per day averaged over any 30-day period; all PWSs (which serve at least 15 service connections or at least 25 residents year-round); and hydropower facilities regardless of amount or type of withdrawal. Act 220 of 2002 led to the adoption of 25 Pa. Code Chapter 110 Water Resources Planning regulations² in 2008. These regulations established ongoing registration, reporting, and recordkeeping requirements, including user-specific content for PWSs, power generation facilities, manufacturing industries, mining, agriculture, golf courses, and ski resorts. Data from water use reporting is stored in DEP's enterprise Water Use Data System (WUDS) database.

Annually, DEP receives over 8,000 sub-facility (SF) reports and over 2,000 primary facility (PF) water use reports. A SF is a site-specific record of a water source, such as a groundwater well or surface water intake. In addition, a SF report contains information such as the monthly amount withdrawn, purchased, or sold (in case of a PWS), days used per month, and how the source was measured (Figure 1).

A PF is the business entity or system that owns and operates one or more SFs. A PF water use report contains system water use information and is divided into PWS PF and NonPWS PF reports. The PWS PF report is only for PWSs (which serve year-round at least 15 service connections or at least 25 residents); there are over 1,900 active PWSs within the Commonwealth. The other PF report is the NonPWS PF report. This report is for all other

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
CHAPTER 110, WATER ALLOCATION, WATER MANAGEMENT PLAN
WATER WITHDRAWAL AND USE REPORTING

Client: XXXXX
Primary Facility: XXXXX
Subfacility: XXXXX

REPORT FOR CALENDAR YEAR JAN 1 TO DEC 31, 2021

* Items marked with an asterisk are required prior to final submission to DEP.

[Instructions](#)

MEASURING/METERING OF WATER

* Measurement Method:

Explain if Estimated or Calculated:

Last Date Tested: (mm/dd/yyyy)

Tested By:

WITHDRAWALS OR HAULED (TRUCKED) WATER USE FOR REPORT YEAR 2021

NOTE: If no withdrawals, enter "0"

Month	Total Gallons	Month	Days
* Jan Gallons	<input type="text" value="0"/>	* Jan Use	<input type="text" value="0"/>
* Feb Gallons	<input type="text" value="0"/>	* Feb Use	<input type="text" value="0"/>
* Mar Gallons	<input type="text" value="0"/>	* Mar Use	<input type="text" value="0"/>
* Apr Gallons	<input type="text" value="0"/>	* Apr Use	<input type="text" value="0"/>
* May Gallons	<input type="text" value="0"/>	* May Use	<input type="text" value="0"/>
* Jun Gallons	<input type="text" value="0"/>	* Jun Use	<input type="text" value="0"/>
* Jul Gallons	<input type="text" value="0"/>	* Jul Use	<input type="text" value="0"/>
* Aug Gallons	<input type="text" value="0"/>	* Aug Use	<input type="text" value="0"/>
* Sep Gallons	<input type="text" value="0"/>	* Sep Use	<input type="text" value="0"/>
* Oct Gallons	<input type="text" value="0"/>	* Oct Use	<input type="text" value="0"/>
* Nov Gallons	<input type="text" value="0"/>	* Nov Use	<input type="text" value="0"/>
* Dec Gallons	<input type="text" value="0"/>	* Dec Use	<input type="text" value="0"/>
Total Gallons	0	Total Days	0

Figure 1. Screen capture of the sub-facility (SF) water use report input screen.

¹ Act 220 of 2002

www.legis.state.pa.us/CFDOCS/LEGIS/LI/uconsCheck.cfm?txtType=HTM&yr=2002&sessInd=0&smthLwInd=0&act=0220.

² Chapter 110 Water Resources Planning regulations

www.pacodeandbulletin.gov/Display/pacode?file=/secure/pacode/data/025/chapter110/chap110toc.html

facilities, such as industrial, commercial, power generation, etc. A notable change in reported facilities has been water use for unconventional natural gas extraction by [hydrologic/hydraulic](#) fracturing of shale formation, commonly known as the Marcellus Formation. Reporting for these SFs (oil and gas) started in 2007. The number of reported sources peaked in 2015 (Figure 2).

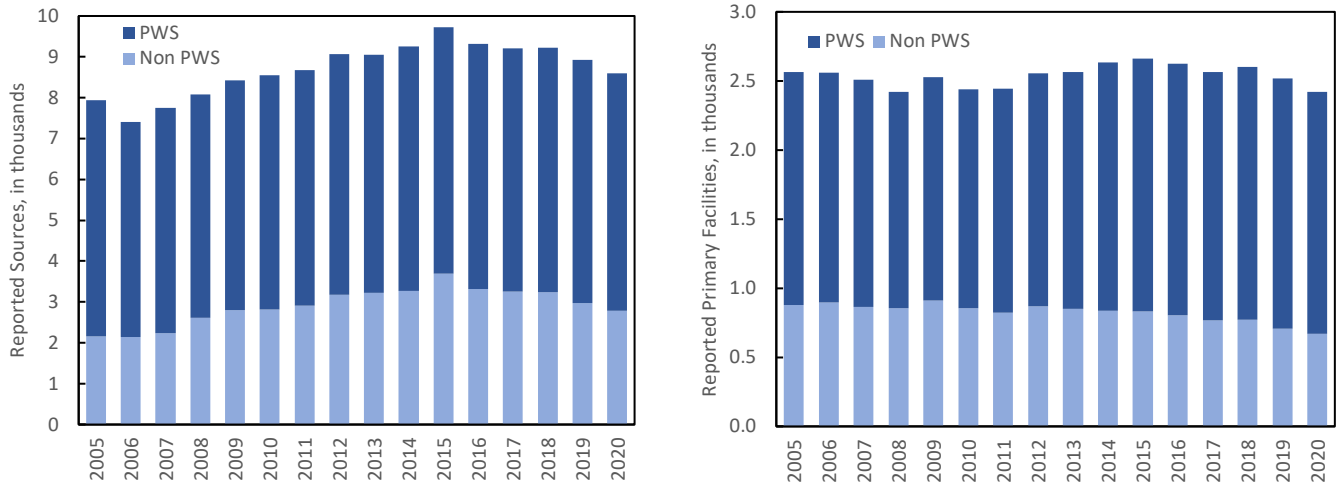


Figure 2. Trends in reported sources (sub-facilities, SFs) and primary facilities (PFs), 2005-2020.

A PWS PF report includes the average daily water distributed to different connection types (domestic, industrial, institutional, commercial, bulk sales to other PWSs, oil and gas, other, and water losses). The report also includes the number of connections by type, number, and type of connections per municipality, total population served, percent population served by municipality, peak and minimum daily use, and other system information.

The NonPWS PF report contains [information on returned ~~the amount of~~ water at the primary facility, returned ~~to~~ whether the amount of water is ~~discharged to a~~ receiving waterway, to a public sewage system, by another method of discharge, or a combination of all these.](#) An example would be a power generating plant reporting the water discharged to a waterway after leaving the plant's cooling system. Another example is a golf course reporting no water discharged from the site when all water withdrawal was consumed for irrigation. The report preparer is instructed not to account for stormwater runoff in the discharge amounts and not to include [consumptive use](#) amounts (i.e., evaporation, incorporation in product, deep well injection, off-site disposal) as an "other" discharge method. [By reporting the amount of water disposed at the primary facility, a mass balance equation \(consumptive use = total withdrawal from SF reports - returned water from PF report\) can be used to calculate the consumptive use for the facility.](#)

DEP reviews all water use registrations and annual water use reports for completeness and accuracy before accepting and sharing with the public. Registrations and reports not meeting DEP's acceptance review are returned with comments to the report preparer to address before resubmission.

4.2. Data Access Tool – Downloads and Viewers

In 2017, DEP launched a series of six water use report viewers to readily share users' registration and periodic reporting of water use information with the public. The project was fully funded by the United States Geological Survey's (USGS) Water Use Data and Research (WUDR) grant. The report viewers are a web-based program using an SQL Server for Report Services (SSRS) server-based reporting platform. The report viewers and

instructions are available on DEP's Water Reports³ webpage. All report viewers have a function to export a dataset to various file formats, including XML, CSV, and Excel. The viewers are as follows:

1. **Water Source Registration Viewer** extracts Act 220 of 2002 registration data. Information includes identifying and describing the registrant's name, description, and location of water sources. In addition, the viewer will allow the user to define a specific facility by ID or filter/query by the following fields: water use type (commercial, industrial, livestock, irrigation, mining, hydroelectric power, public water supply, oil and gas, thermoelectric power, wastewater collection and treatment, and other); SF type (surface water withdrawal, groundwater withdrawal, and interconnection); status (active or inactive); county; and watershed levels (two-digit to ten-digit hydrologic unit codes⁴). Due to DEP's sensitive information policy, PWS source locations will be limited to only municipality/county and watershed.
2. **Water Quantity Report by Source Viewer** extracts collected data from Chapter 110 annual SF reports. SF reports are relevant to all water use categories. They contain detailed source information, including monthly water withdrawals and days of use. Where applicable, SF reports include records of quantities purchased or sold, and days used through public water supply interconnections. Multiple fields can be used to filter the data in the viewer. Fields for filtering are: water use type, SF types, SF status, report years, counties, and watershed levels. An option to select a single facility requires an ID type and unique ID number.
3. **Water Use Report by Water Supplier Viewer** extracts Chapter 110 annual PF reports for PWSs. PF reports contain information about average daily water use by use type, number of connections by use type, connections by municipality by use type, total population served, percent of population served by municipality, peak and minimum amount and date, and other system information. In addition, the viewer contains filter/query boxes for the user to limit their search. Filters allow for searching by a system (PF) status, report year(s), watershed levels, and counties. The user can select an individual system using an ID type and unique ID number.
4. **Water Use Report by Facility Viewer** extracts data from the Chapter 110 annual PF reports from NonPWS PFs. The NonPWS PF report contains the amount and manner of water discharged after use. Currently, three forms of discharge are used: (1) direct discharge to receiving waterway, (2) discharge to a public sewage system, and (3) other. The viewer contains filter boxes for the user to limit their search; filters include facility status, report years, and counties. The user can select an individual system using an ID type and unique ID number.
5. **Water Allocation Daily Withdrawal Report Viewer** extracts data from daily water withdrawal reports submitted by PWSs monthly to DEP. The viewer contains filter boxes for the user to limit their search; filters include report years and counties. In addition, the user has the option to select an individual system using an ID type and unique ID number.
6. **Water Management Plan Daily Water Use Report Viewer** extracts data from daily water withdrawal reports submitted by oil and gas operators monthly to DEP. The viewer has filter boxes for the user to

³ DEP Water Reports webpage

www.dep.pa.gov/DataandTools/Reports/Pages/Water.aspx

⁴ For explanation of hydrologic unit codes (HUCs), see the USGS Hydrologic Unit Maps webpage

<https://water.usgs.gov/GIS/huc.html>

limit their search; filters include report years and counties. In addition, the user can select an individual system using an ID type and unique ID number.

In 2021, an additional viewer and data export tool was added to the DEP Water Reports webpage. The water use summary report⁵ summarizes total withdrawals by categories and source types using charts, maps, and tables at state, county, and watershed scales for the past five reporting years. The report also displays the locations of reported sources. However, the water use summary report excludes showing and providing the coordinates of PWS sources due to DEP's sensitive locational policy prohibiting readily sharing coordinates of these sources.

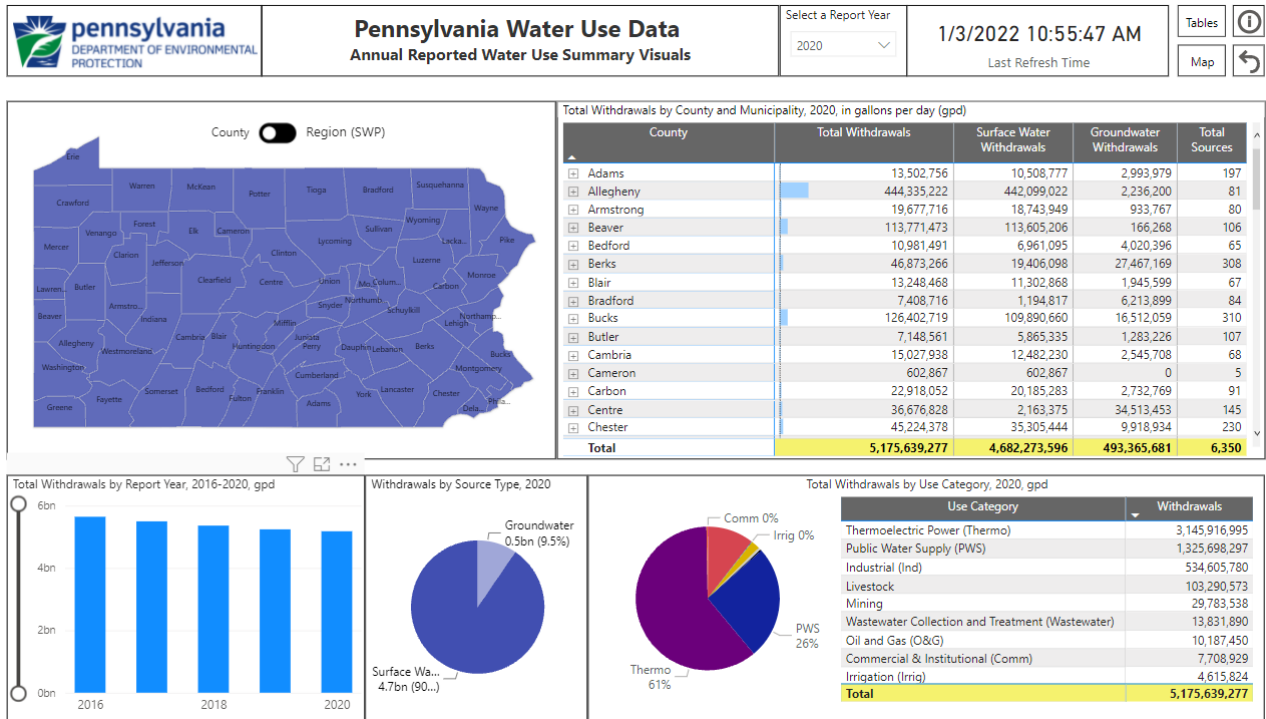


Figure 3. Screen capture of Water Use Summary Report viewer.

4.3. Refined Acquisition of Water Use Data

Data acquisition has significantly improved since the initial Act 220 of 2002 registrations were submitted in 2003. Back then, paper forms were mailed to water users and sent back to DEP. They were scanned and checked for errors before the information was uploaded into WUDS. Act 220 of 2002 also provides a periodic reporting requirement established by regulation for water users subject to the registration requirements as aforementioned. Act 220 of 2002 also states that the reporting frequency shall not be more frequent than annually. Annual reporting of monthly water use was initiated for the 2004 reporting for NonPWS water users and the 2005 reporting year for all PWSs. The collection of these reports was accomplished with the combination of "paper" and "paperless" reporting. Like the registrations, paper reports were scanned and

⁵ Water Use Summary Report
http://cedatareporting.pa.gov/reports/powerbi/Public/DEP/WUDS/PBI/PA_Water_Use_Annual_Summary_Report

checked for errors before uploading into WUDS. To accept electronic reporting, a web application was developed accessible from DEP's GreenPort⁶.

The decision to require only electronic submission of all water use reports for the 2012 report year resulted in significant improvement in data accuracy and submission rates. It reduced the staff time necessary to process and upload data from paper reports to WUDS. For example, the percentage of unreported withdrawals from the industrial sector improved from nearly 20% in 2011 to less than 10% in 2012.

With support from USGS via grants from the WUDR program, further refinement in the collection of water use data focused on increasing the accuracy and quality of the data reported to DEP. Making these refinements was essential to maintain the data with reduced staff and resources over the years. Specifically, the following is a list of improvements made to the report application since 2018:

Chapter 110 report application improvements

- Internal completion checks
 - Added user functionality
 - Additional validation, acceptance, and verification checks
- Linking SF and PF reports and requiring the report preparer to complete and submit at least one SF report before starting a PF report were added. Establishing this link eliminates the chance of only receiving an SF report(s) without a PF report and vice versa.
 - Filtering functionality was added to the user interface screen.
 - The SF report(s) values are totaled within the application. They are then used to compare the total values submitted in the PF report to validate values between SF and PF reports.
 - The application's PWS PF report checks whether the reported values for minimum and maximum daily water use are acceptable based on their average daily water use.
 - In the NonPWS PF report, the previously submitted method(s) of reported discharge or return automatically populates on the form. Therefore, the report preparer cannot remove the method(s) until they provide a reason for the change.
 - The application checks the previous value (from the most recent prior accepted report) when any water quantity amount is entered. For example, if the new amount is less than half or one and half times greater than the previous value, the field will be flagged as a possible error. Population served by a public water system is checked against the previously accepted reported value.

Lastly, to improve the process of collecting water use registrations and encouraging compliance with registering new and existing water use sources, three remaining Chapter 110 forms were converted from paper to online forms for electronic submission. The remaining Chapter 110 forms are water use registration, termination of the registration, and SF revision. These forms were developed into separate applications within GreenPort and made available in 2021.

⁶ DEP's GreenPort
<https://greenport.pa.gov>

4.4. Data Collaboration

In 2021, a secure centralized site for sharing water use data was set up to exchange large amounts of water data between DEP and partner agencies. The site was designed to automate transferring of data for integration in a partner agency’s own applications. This eliminates the labor-intensive manual processes involved with sharing large datasets or the need for a user to manually query and download data from a web-based application, such as DEP’s report viewers described above in Section 4.2.

4.4.1. USGS

The centralized data sharing site allows DEP to electronically deliver water use data to USGS. USGS has prioritized improving data delivery from states, which was beneficial in securing a 2019 WUDR grant to develop this centralized data sharing site.

DEP will continue to support USGS's StreamStats⁷ application by providing monthly water withdrawals and point source discharge flow data reported to DEP's Electronic Discharge Monitoring Report (eDMR) System⁸. StreamStats is a national GIS-based application useful for water resources planners and engineers. The application allows a user to delineate a drainage area on streams and deliver basin characteristics and flow statistics estimates. An additional function was added to the Pennsylvania version of StreamStats⁹ to compute total withdrawals and returns for a delineated drainage area from the water use provided by DEP (Figure 4).

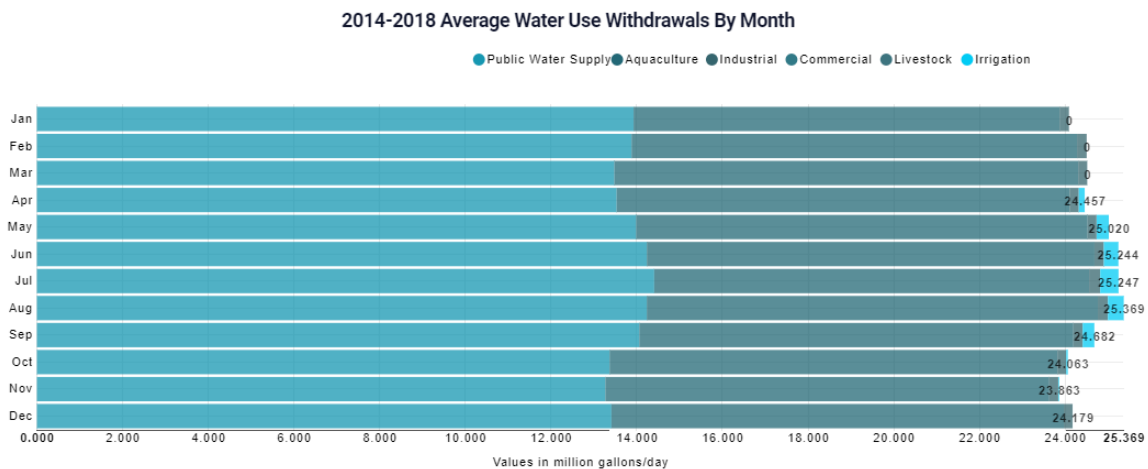


Figure 4. StreamStats water use data in Yellow Breeches Creek watershed, New Cumberland, Pennsylvania.

4.4.2. River Basin Commissions

Within Pennsylvania, DEP, the Susquehanna River Basin Commission (SRBC), and the Delaware River Basin Commission (DRBC) routinely collect water use reports from users and the regulated community. In some cases, due to permitting and/or regulation requirements, users are reporting the same or similar data to these multiple

⁷ USGS StreamStats

<https://streamstats.usgs.gov/ss/>

⁸ Electronic Discharge Monitoring (eDMR) System

www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/eDMR/Pages/default.aspx

⁹ Pennsylvania StreamStats Information

www.usgs.gov/centers/pennsylvania-water-science-center/science/pennsylvania-streamstats

agencies. As previously noted, a secure centralized location for sharing water use data was developed in 2021. The water use data tables from DEP and SRBC are currently updated every week using overnight automated batch loads and uploaded into each other's enterprise databases.

The development of the centralized data sharing site has made it easier for DEP to exchange data with partner agencies on a more frequent basis. Because similar reporting requirements within the basin commissions and DEP result in some duplicated water use data being collected, a project is planned to develop an application to identify identical sources stored within the agencies' databases. These sources will be identified with a unique reference number shared between agencies' datasets.

DEP provides water use summary data for the Great Lakes portions of the state for uploading to the Great Lakes Regional Water Use Database¹⁰. Specifically, the data uploaded is summarized by withdrawals and consumptive use by use categories within the Lake Erie and Lake Ontario basins. A report of this database has been provided by the Great Lakes Commission each year since 1987.

¹⁰ Great Lakes Regional Water Use Database
<https://waterusedata.glc.org/index.php>