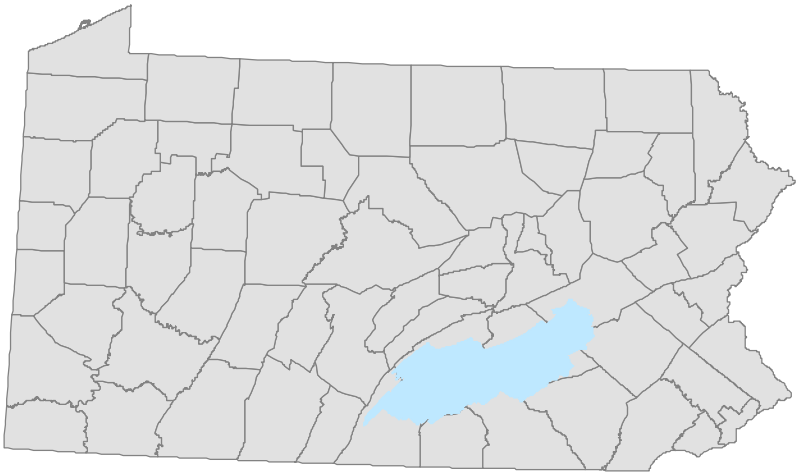
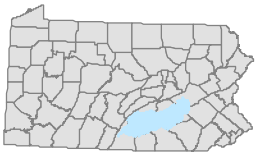
United States Department of Agriculture
Natural Resources Conservation Service



Rapid Watershed Assessment
Lower Susquehanna-Swatara Watershed

Rapid watershed assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals.

Helping People Help the Land



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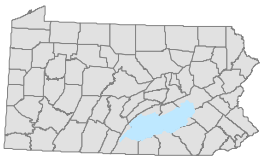
Preface

The Natural Resources Conservation Service (NRCS) is initiating rapid watershed assessments in order to increase the speed and efficiency generating resource information to guide conservation implementation, as well as the speed and efficiency of putting it into the hands of local decision makers. While these rapid assessments provide less detail and analysis than full-blown studies and plans, they do provide a foundation for watershed studies or area planning. In addition, the assessments provide the benefits of NRCS locally-led planning for resource conservation and conservation program implementation in less time and at a reduced cost than more complex studies.

Rapid watershed assessments will be valuable for Farm Bill program delivery, and provide useful information for county, watershed and regional planners. These assessments provide initial estimates of where conservation investments would best address the concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments can help landowners and local leaders set priorities and determine the best actions to achieve their goals.

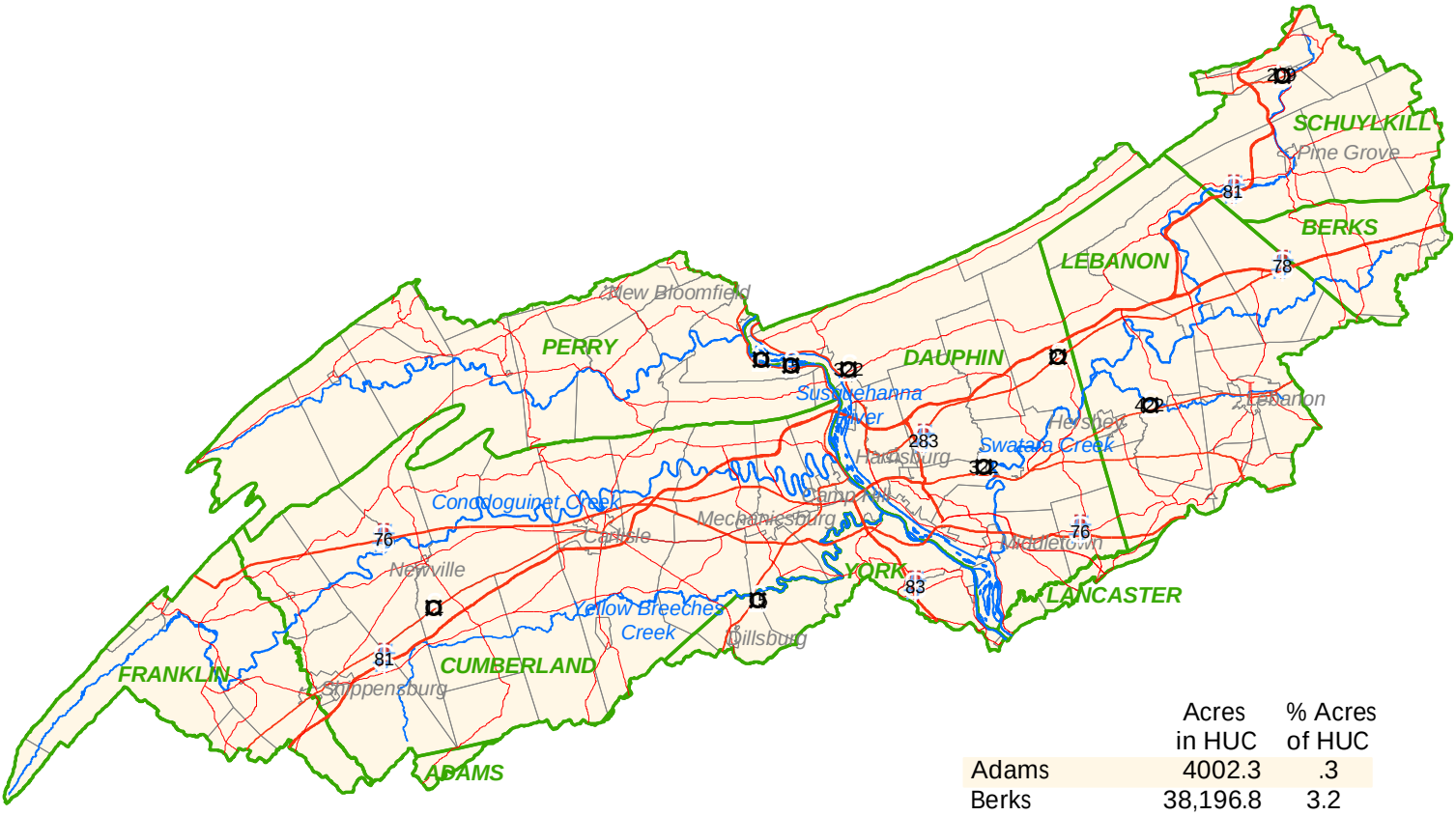
To produce the assessments, quantitative and qualitative data is collected and organized to create a watershed profile using Geographic Information System (GIS) technology. The data is analyzed to allow resource concerns and conditions to become apparent, and to generate maps and information to help people make better decisions about conservation needs and programs.

/s/ Craig R. Derickson
Pennsylvania State Conservationist

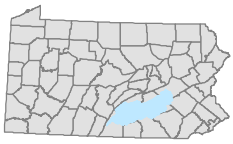


Introduction

The Lower Susquehanna-Swatara Watershed is located in South Central Pennsylvania in portions of Adams, Berks, Cumberland, Dauphin, Franklin, Lancaster, Lebanon, Perry, Schuylkill, and York Counties. The watershed is over 1.2 million acres in size, of which almost 427,000 acres is farmland. Ten Service Centers of the Natural Resources Conservation Service, ten County Conservation Districts and parts of four Resource Conservation and Development Council offices provide assistance to this watershed.



	Acres in HUC	% Acres of HUC
Adams	4002.3	.3
Berks	38,196.8	3.2
Cumberland	349,114.9	29.1
Dauphin	204,797.2	17.0
Franklin	88,097.3	7.3
Lancaster	7782.5	.6
Lebanon	177,086.1	14.8
Perry	197,454.3	16.4
Schuylkill	89,519.8	7.5
York	45,238.5	3.8

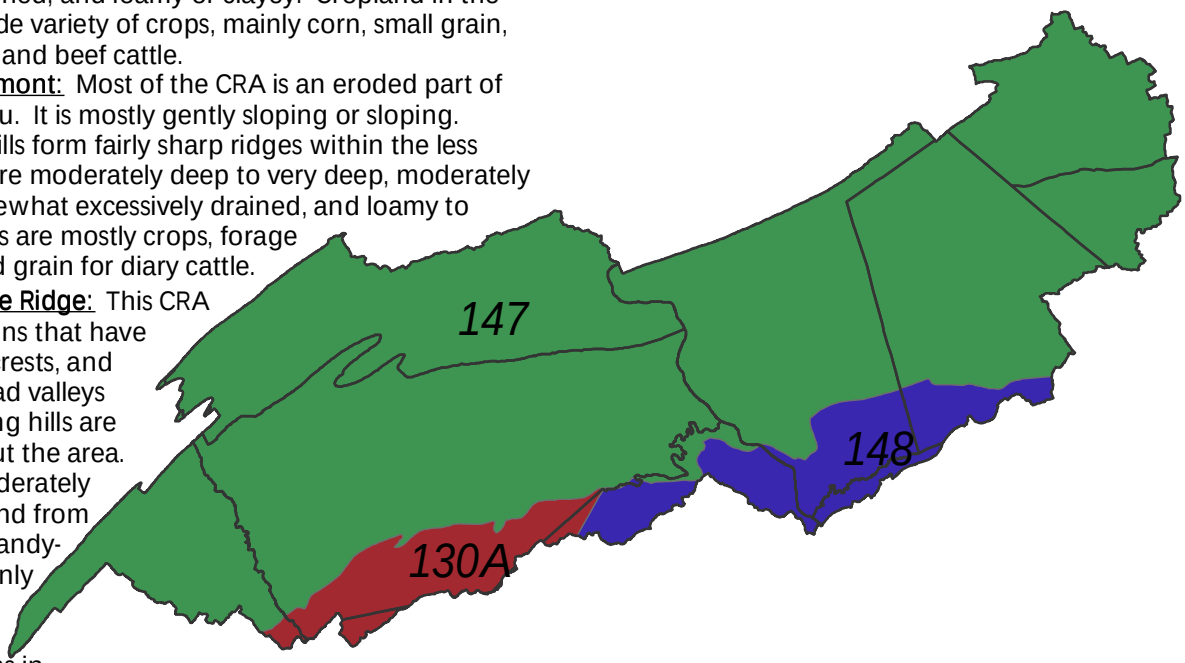


Common Resource Area (CRA)[1]

147 - Northern Appalachian Ridges and Valleys: This CRA is a folded and faulted area of parallel ridges and valleys. The ridges are strongly sloping to extremely steep and have narrow, rolling crests, and the valleys are mainly level to strongly sloping. Soils are shallow to very deep, generally excessively drained to moderately well drained, and loamy or clayey. Cropland in the area is used for a wide variety of crops, mainly corn, small grain, and forage for diary and beef cattle.

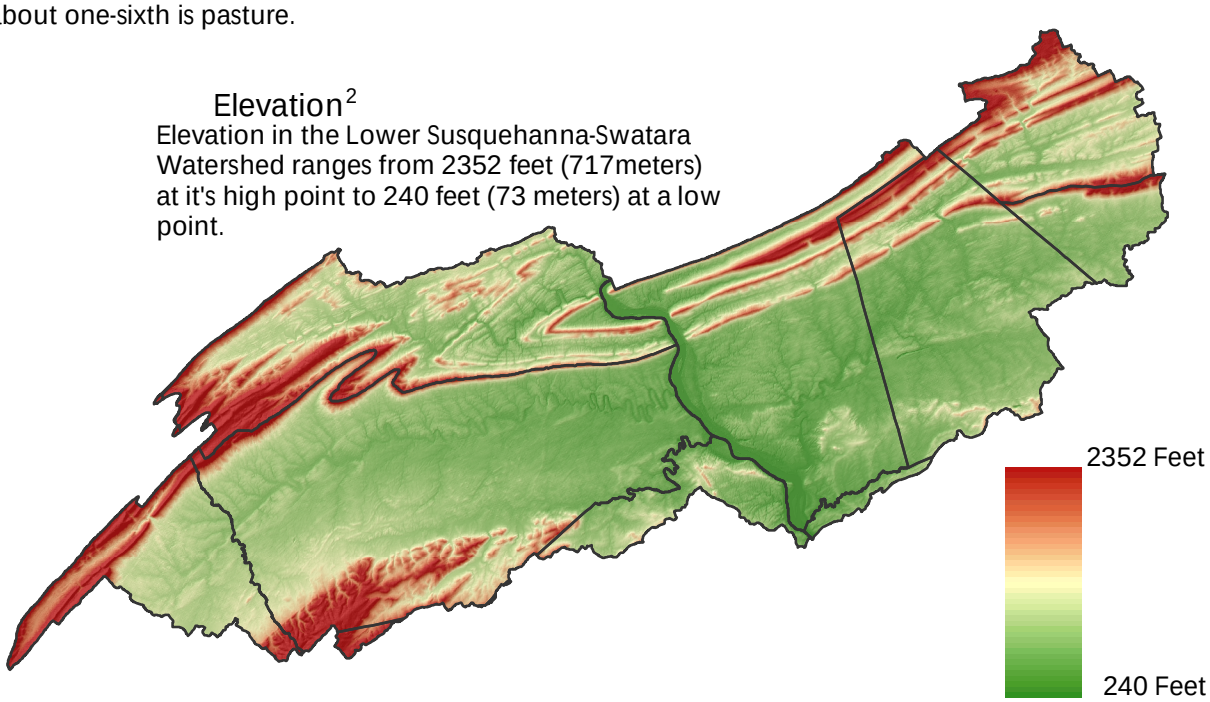
148 - Northern Piedmont: Most of the CRA is an eroded part of the Piedmont Plateau. It is mostly gently sloping or sloping. Intrusive dikes and sills form fairly sharp ridges within the less steep terrain. Soils are moderately deep to very deep, moderately well drained to somewhat excessively drained, and loamy to loamy-skeletal. Farms are mostly crops, forage crops, soybeans, and grain for diary cattle.

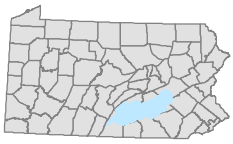
130A - Northern Blue Ridge: This CRA has rugged mountains that have steep slopes, sharp crests, and narrow valleys. Broad valleys and basins and rolling hills are extensive throughout the area. Soils range from moderately deep to very deep and from loamy-skeletal and sandy-skeletal to clayey. Only about one-tenth of the area is cropland mainly on small farms in valleys and coves, and about one-sixth is pasture.



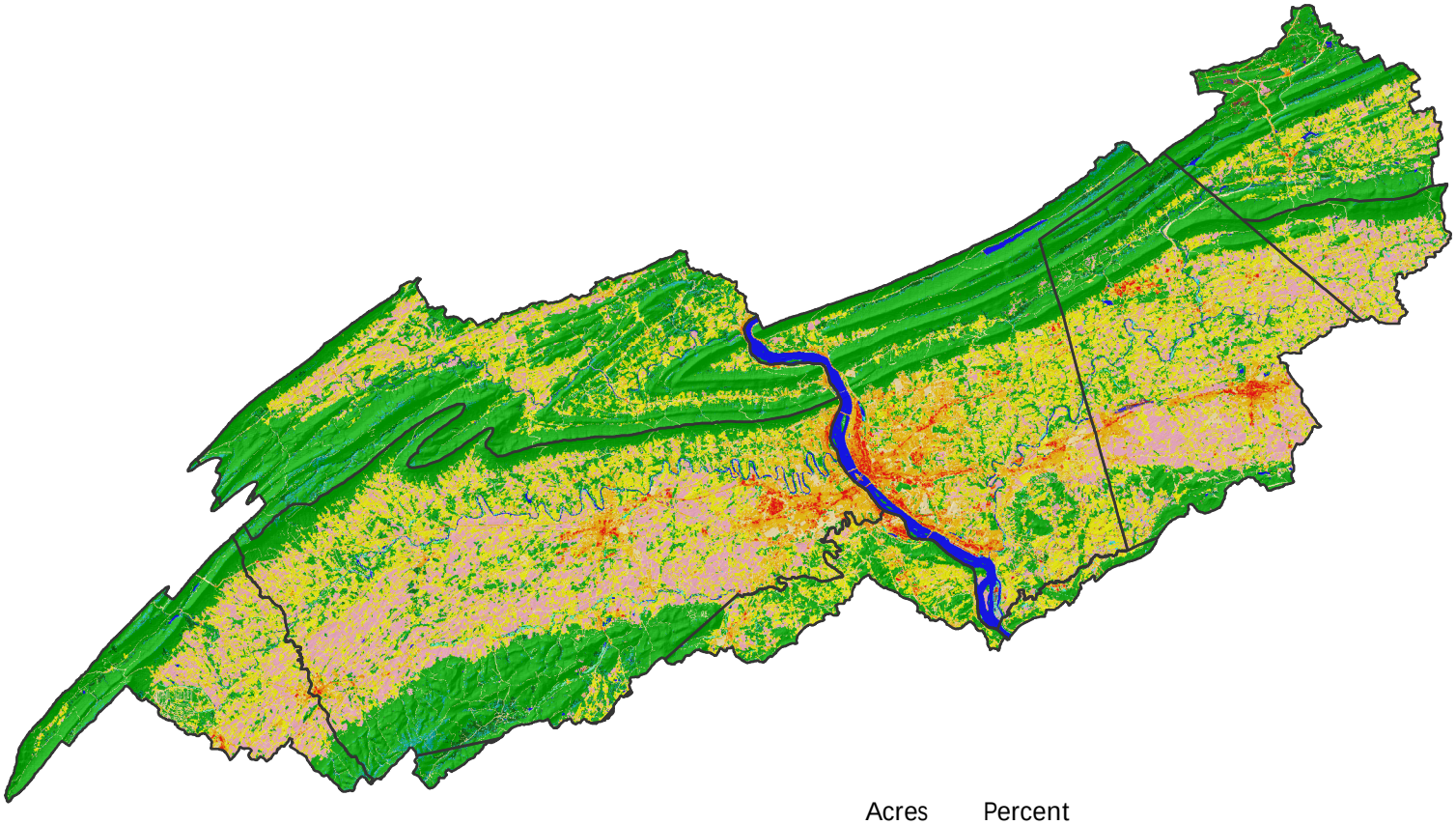
Elevation[2]

Elevation in the Lower Susquehanna-Swatara Watershed ranges from 2352 feet (717meters) at it's high point to 240 feet (73 meters) at a low point.



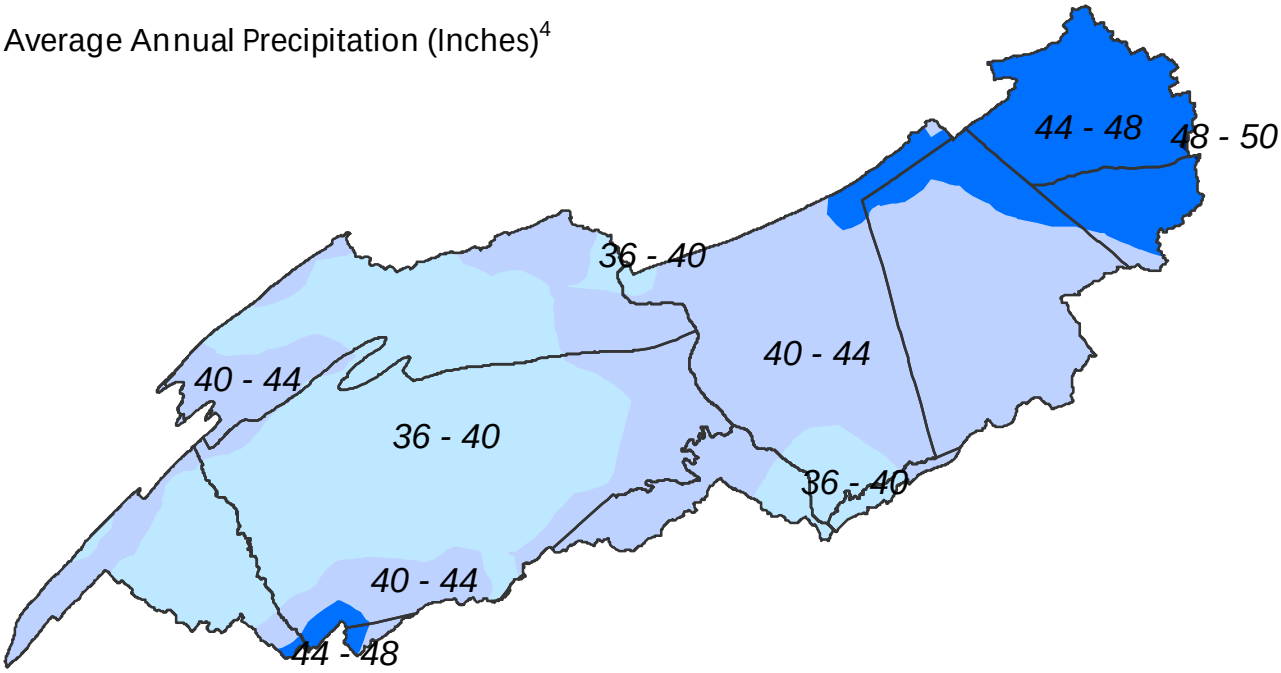


Land Use / Land Cover 2001[3]



	Acres	Percent
Water	21,582.8	1.8
Developed, Open Space	87,109.6	7.2
Developed, Low Intensity	72,722.6	6.0
Developed, Medium Intensity	22,522.1	1.9
Developed, High Intensity	9676.6	.8
Barren Land (Rock/Sand/Clay)	2165.8	.2
Deciduous Forest	507,398.5	42.3
Evergreen Forest	22,198.8	1.8
Mixed Forest	21,356.2	1.8
Pasture/Hay	251,565.2	20.9
Cultivated Crops	174,926.3	14.6
Woody Wetlands	5556.4	.5
Emergent Herbaceous Wetlands	2082.5	.2

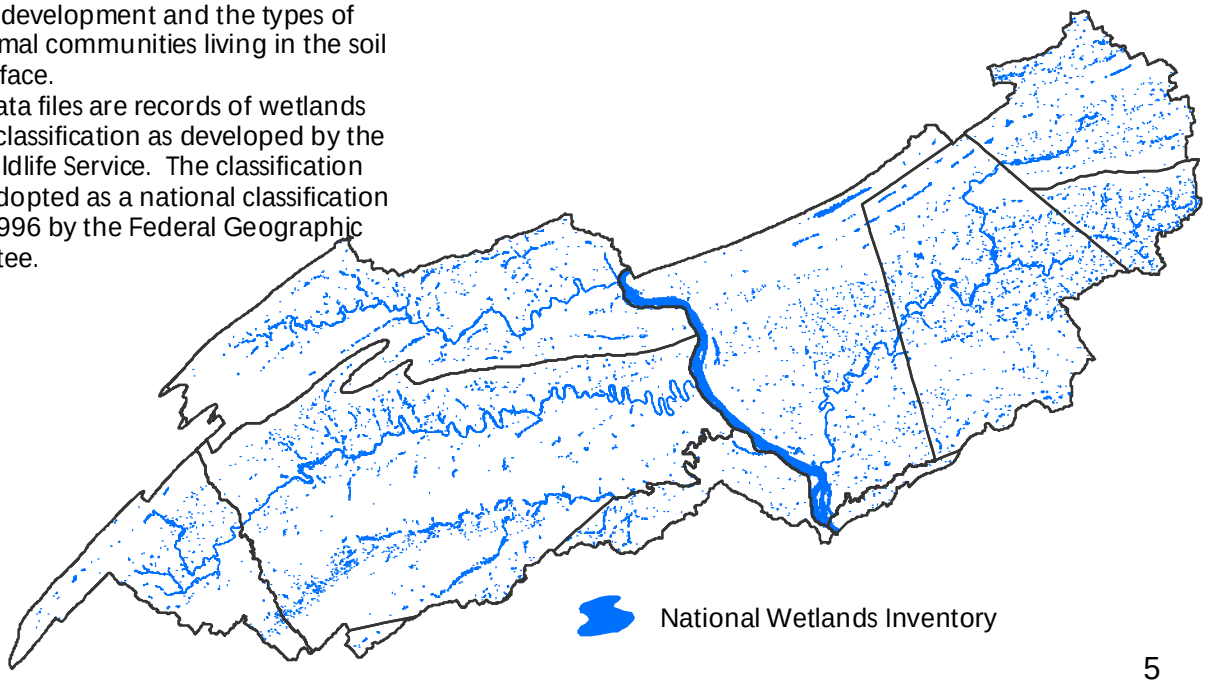
Average Annual Precipitation (Inches)[4]

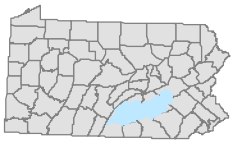


National Wetlands Inventory[5]

Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface.

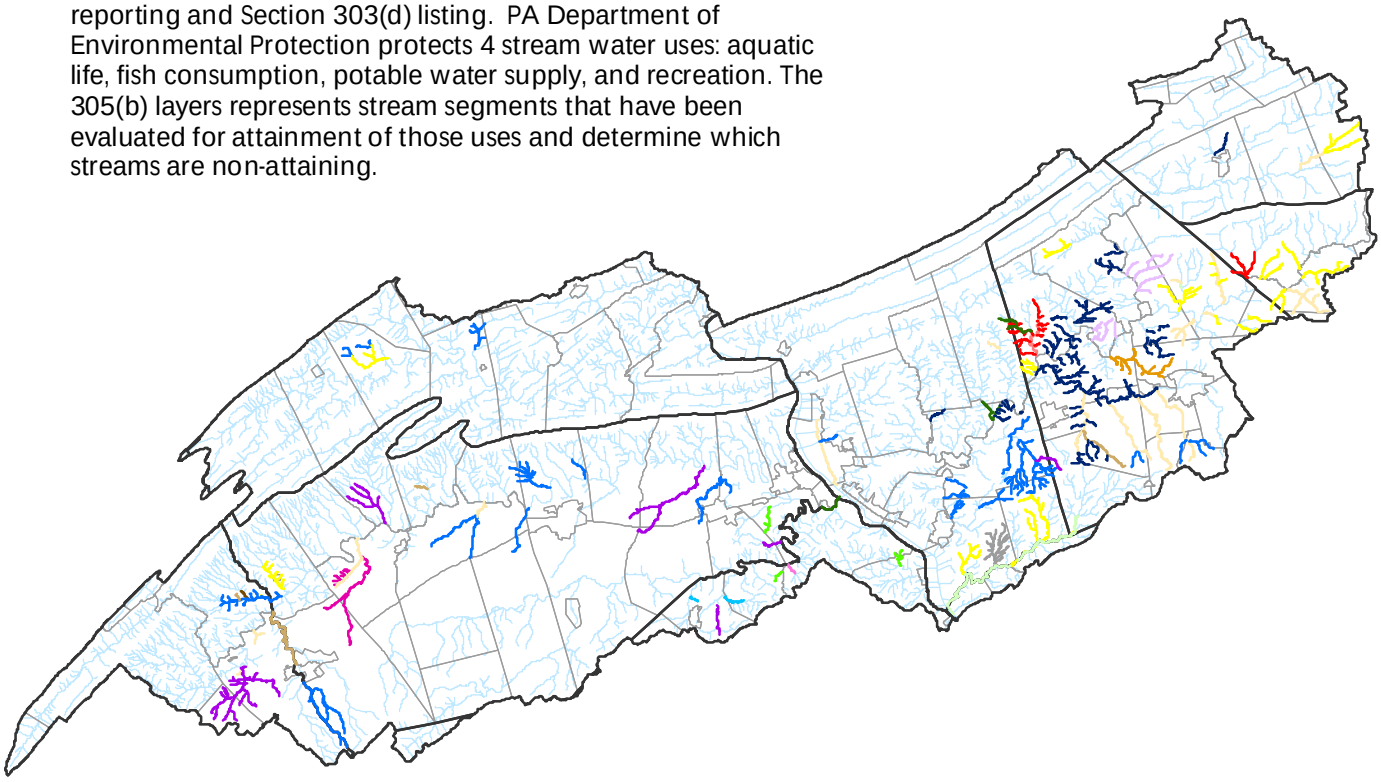
NWI digital data files are records of wetlands location and classification as developed by the U.S. Fish & Wildlife Service. The classification system was adopted as a national classification standard in 1996 by the Federal Geographic Data Committee.





Impaired Streams [6]

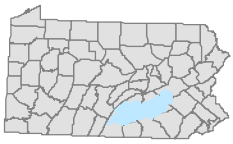
The Streams Integrated List (2006) represents stream assessments in an integrated format for the Clean Water Act Section 305(b) reporting and Section 303(d) listing. PA Department of Environmental Protection protects 4 stream water uses: aquatic life, fish consumption, potable water supply, and recreation. The 305(b) layers represents stream segments that have been evaluated for attainment of those uses and determine which streams are non-attaining.



Causes of Agriculturally Impaired Streams:

- Dissolved Oxygen/Biochemical Oxygen Demand Temperature
- Flow Alterations
- Nutrients
- Nutrients and Flow Alterations
- Nutrients and Organic Enrichment/Low Dissolved Oxygen
- Nutrients and Siltation
- Nutrients and Suspended Solids
- Nutrients, Siltation, and Other Habitat Alteration
- Pathogens
- Siltation
- Siltation and Flow Alteration
- Siltation and Flow Alterations
- Siltation and Organic Enrichment/Low Dissolved Oxygen
- Siltation and Other Habitat Alterations
- Siltation and Pesticides
- Siltation and Turbidity
- Siltation, Organic Enrichment/Low DO, and Other Habitat
- Suspended Solids

- Streams
- Townships
- County Boundary

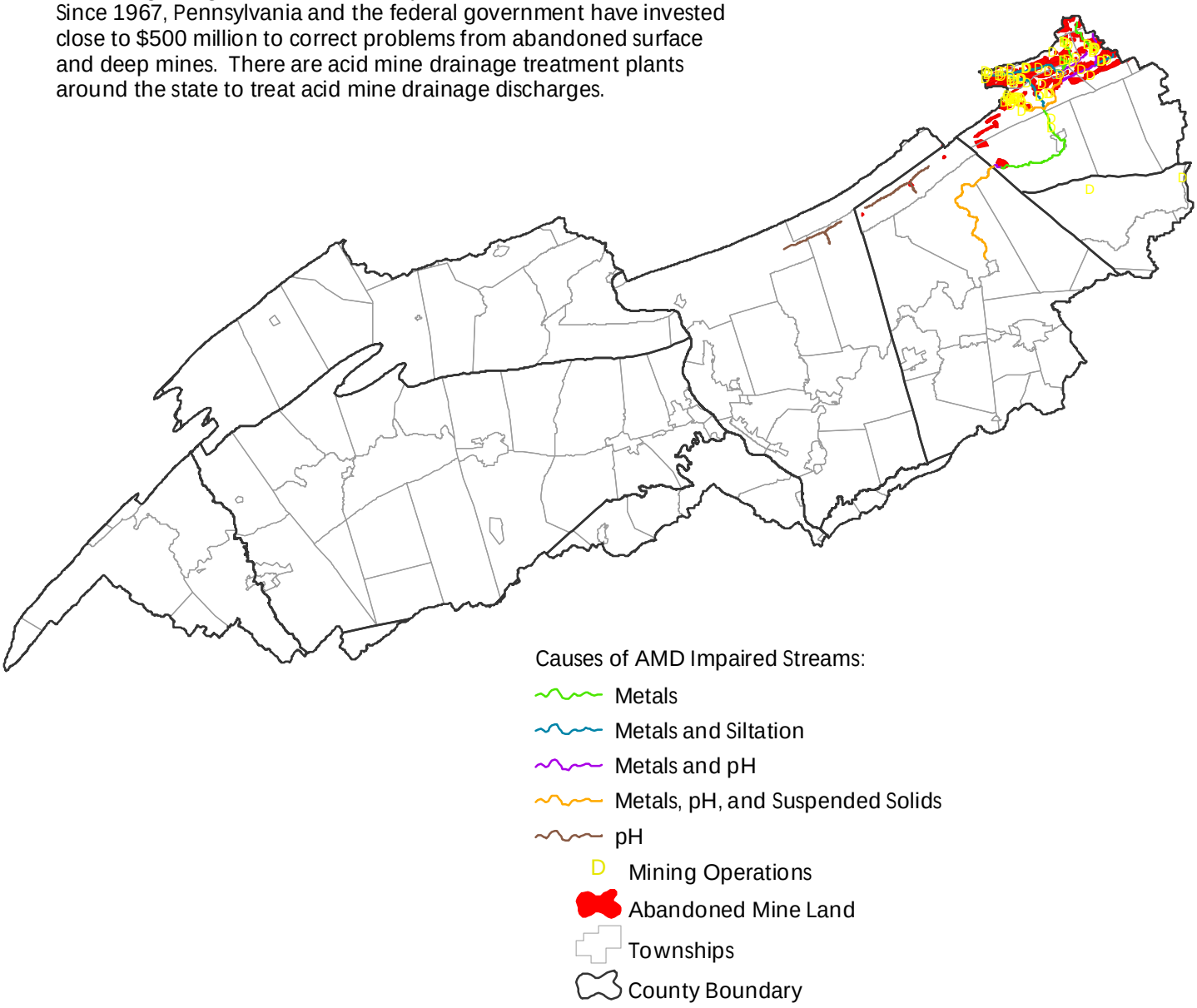


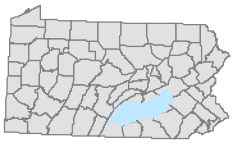
Abandoned Mine Land and Abandoned Mine Drainage Impaired Streams [7]

Coal mining in Pennsylvania began in the mid-1700's. Pennsylvania is the fourth largest coal producer in the United States, producing over 69.5 million tons in 1995 in 878 mining operations.

The environmental legacy of hundreds of years of coal mining in PA includes over 2,400 miles of PA's 84,000 miles of streams effected by acid mine drainage from old coal mining operations. Acid mine drainage in the single largest source of water pollution in the state.

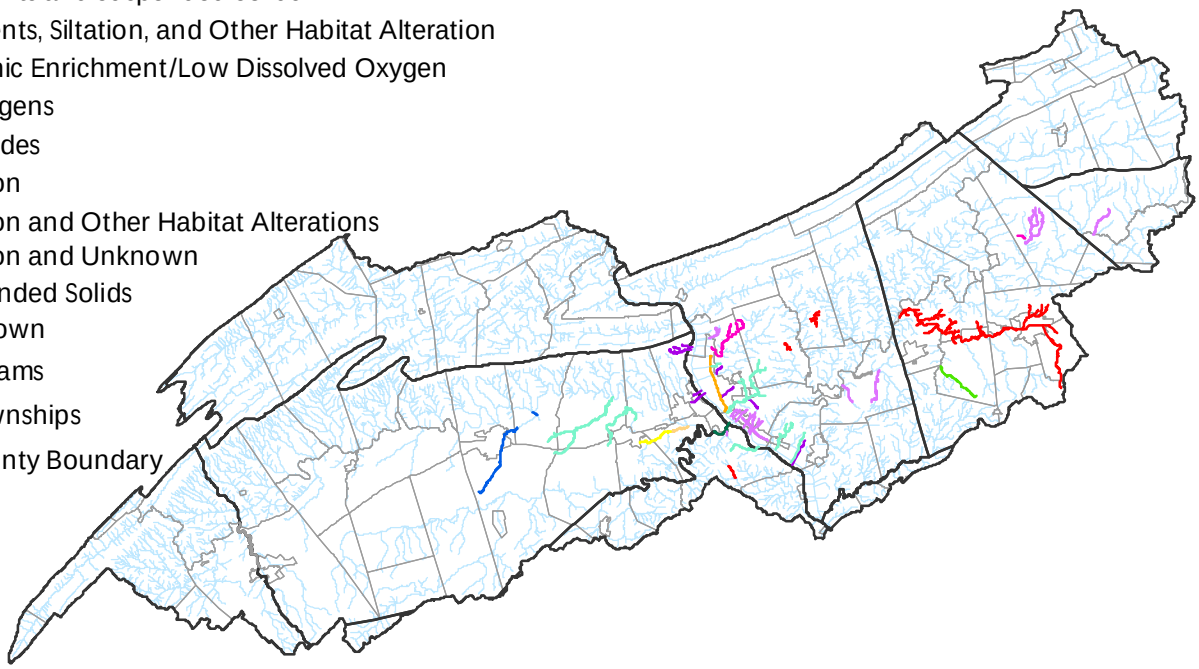
Since 1967, Pennsylvania and the federal government have invested close to $500 million to correct problems from abandoned surface and deep mines. There are acid mine drainage treatment plants around the state to treat acid mine drainage discharges.





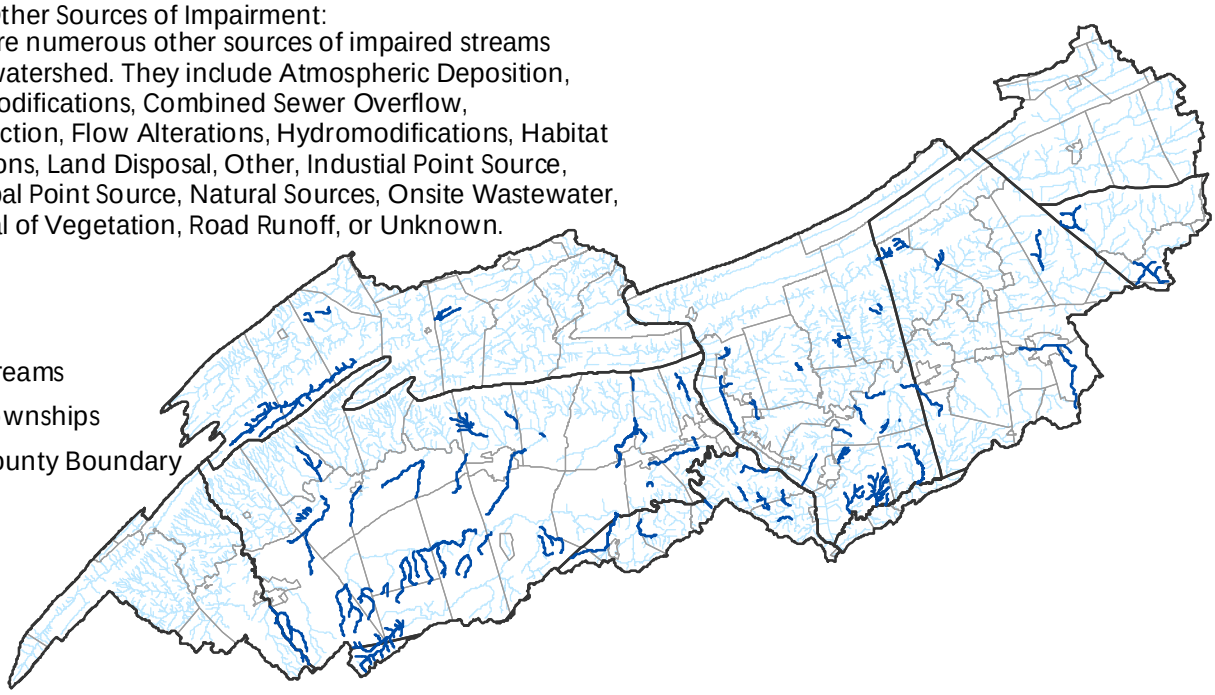
Causes of Urban Runoff/Storm Sewer Impaired Streams:

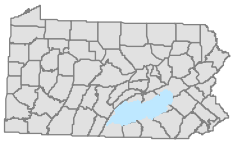
- Flow Alterations
- Nutrients
- Nutrients and Suspended Solids
- Nutrients, Siltation, and Other Habitat Alteration
- Organic Enrichment/Low Dissolved Oxygen
- Pathogens
- Pesticides
- Siltation
- Siltation and Other Habitat Alterations
- Siltation and Unknown
- Suspended Solids
- Unknown
- Streams
- Townships
- County Boundary



Other Sources of Impairment:
There are numerous other sources of impaired streams in this watershed. They include Atmospheric Deposition, Bank Modifications, Combined Sewer Overflow, Construction, Flow Alterations, Hydromodifications, Habitat Alterations, Land Disposal, Other, Industial Point Source, Municipal Point Source, Natural Sources, Onsite Wastewater, Removal of Vegetation, Road Runoff, or Unknown.

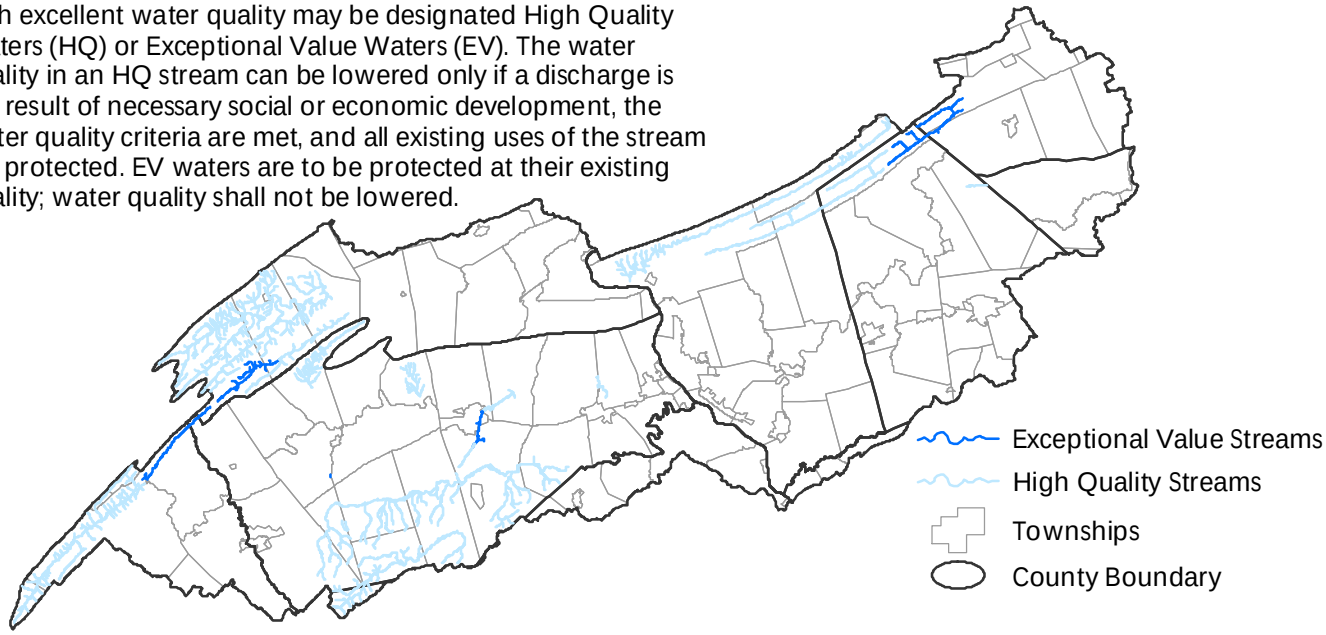
- Streams
- Townships
- County Boundary





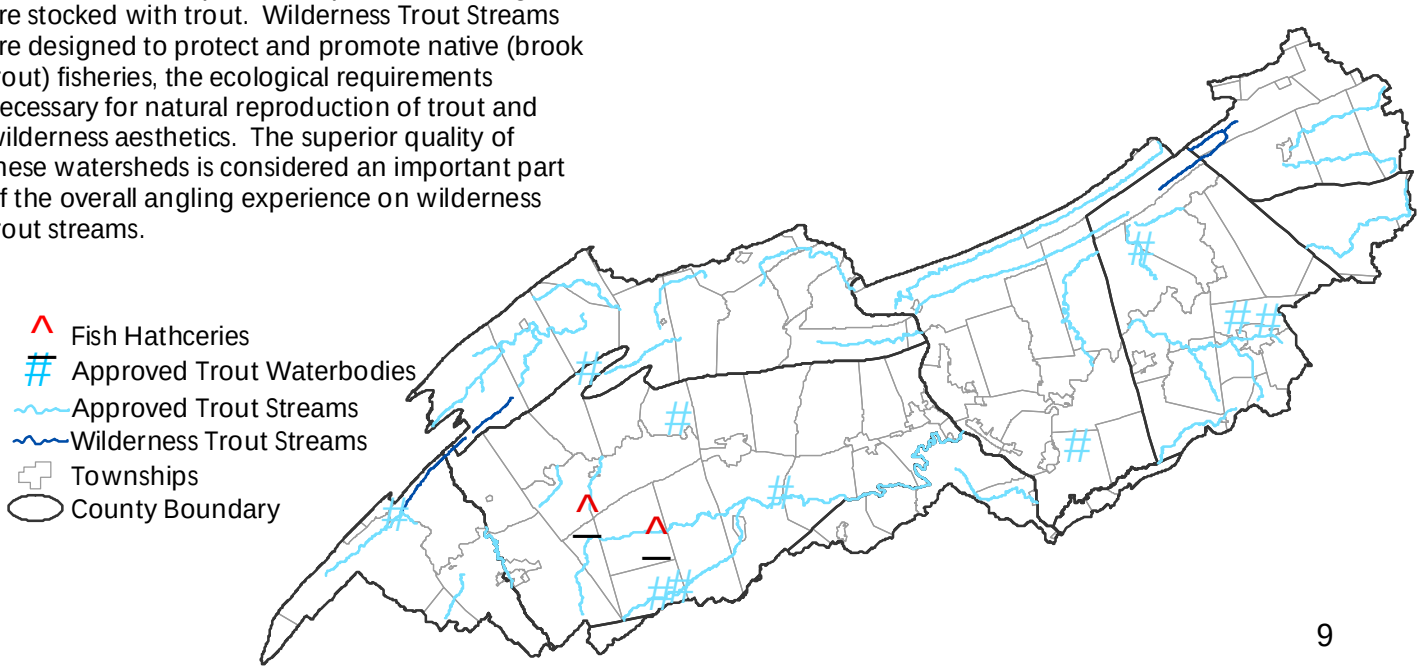
Exceptional Value and High Quality Streams [8]

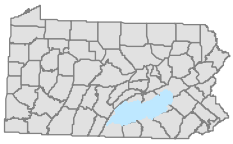
In accordance to Chapter 93 of Pennsylvania Code, streams with excellent water quality may be designated High Quality Waters (HQ) or Exceptional Value Waters (EV). The water quality in an HQ stream can be lowered only if a discharge is the result of necessary social or economic development, the water quality criteria are met, and all existing uses of the stream are protected. EV waters are to be protected at their existing quality; water quality shall not be lowered.



Pennsylvania Trout Waters [9]

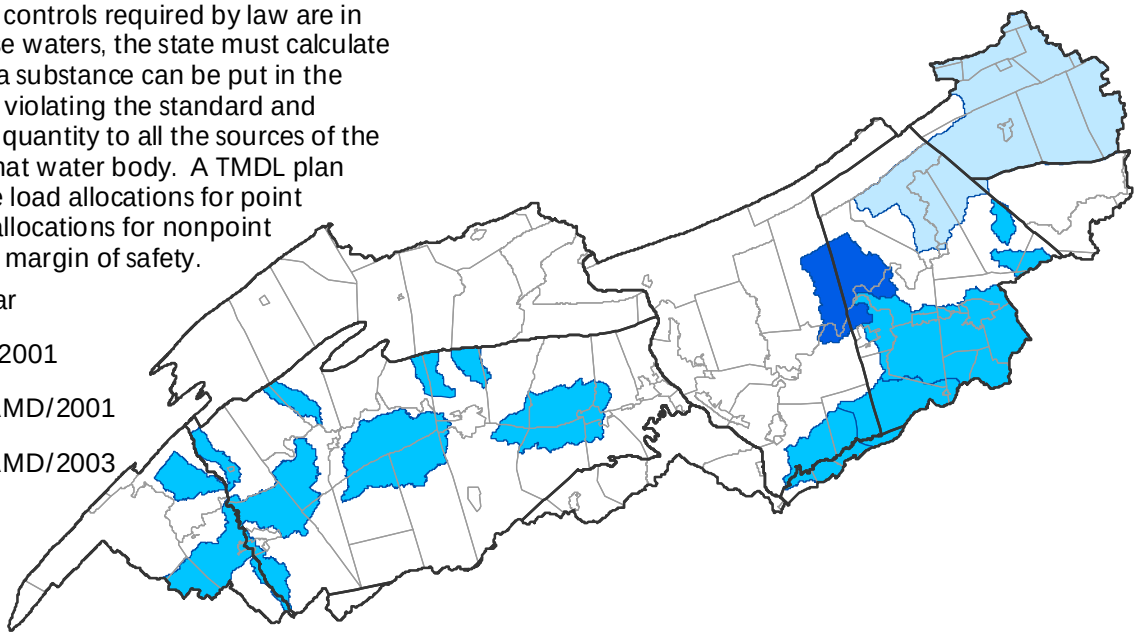
Approved Trout Waterbodies and Approved Trout Streams are waters which contain significant portions that are open to the public for fishing and are stocked with trout. Wilderness Trout Streams are designed to protect and promote native (brook trout) fisheries, the ecological requirements necessary for natural reproduction of trout and wilderness aesthetics. The superior quality of these watersheds is considered an important part of the overall angling experience on wilderness trout streams.





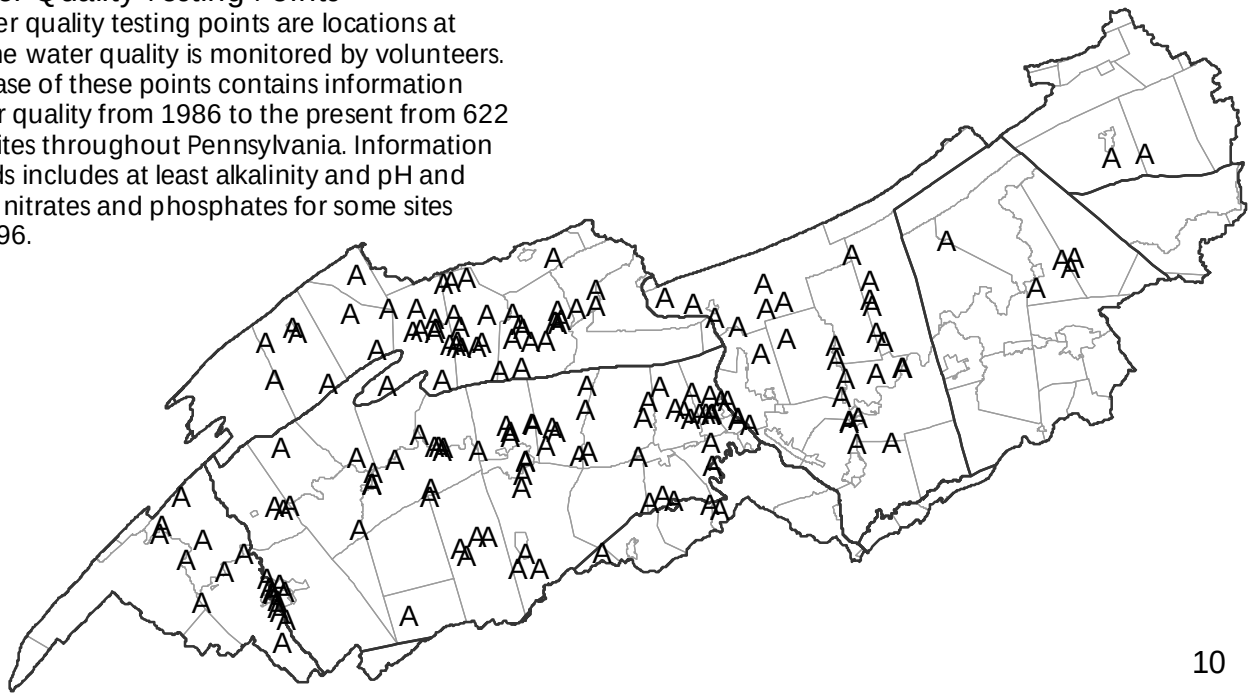
Total Maximum Daily Load[10]

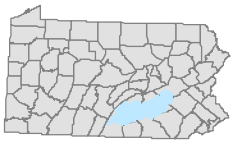
A Total Maximum Daily Load (TMDL) sets a ceiling on the pollutant loads that can enter a water body so the water body will meet water quality standards. The Clean Water Act requires states to list all waters that do not meet their water quality standards even after pollution controls required by law are in place. For these waters, the state must calculate how much of a substance can be put in the water without violating the standard and distribute that quantity to all the sources of the pollutant on that water body. A TMDL plan includes waste load allocations for point sources, load allocations for nonpoint sources, and a margin of safety.



Water Quality Testing Points[11]

The water quality testing points are locations at which the water quality is monitored by volunteers. A database of these points contains information on water quality from 1986 to the present from 622 testing sites throughout Pennsylvania. Information in records includes at least alkalinity and pH and includes nitrates and phosphates for some sites since 1996.





Water Resource Points[12]

A Water Resource is a DEP primary facility type related to the Water Use Planning Program. The sub-facility types related to Water Resources that are included are:

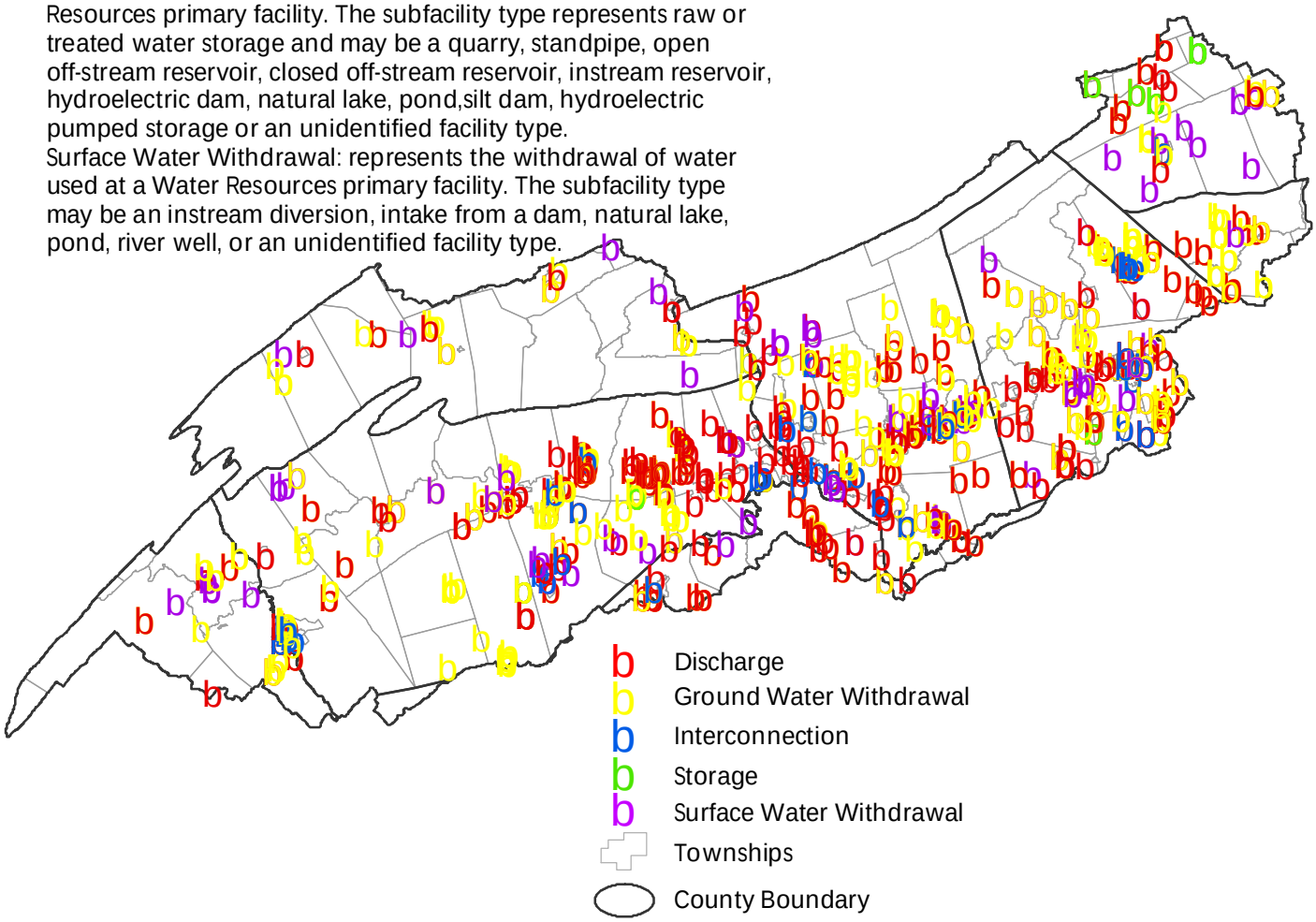
Discharge: represents the return of water used at a Water Resources primary facility. The subfacility type may be a sewage treatment plant, instream discharge, spray irrigation field, groundwater recharge, on-lot septic or an unidentified facility type.

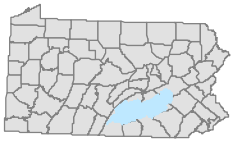
Ground Water Withdrawal: represents the withdrawal of water used at a Water Resources primary facility. The subfacility type may be a well, spring, quarry, infiltration gallery, deep mine, surface mine or an unidentified facility type.

Interconnection: represents the point of interconnection between Water Resources primary facilities. The subfacility type may be for an interconnection between two public water supply agencies or between a public water supply agency and a commercial or industrial water user.

Storage: represents the storage of water used at a Water Resources primary facility. The subfacility type represents raw or treated water storage and may be a quarry, standpipe, open off-stream reservoir, closed off-stream reservoir, instream reservoir, hydroelectric dam, natural lake, pond,silt dam, hydroelectric pumped storage or an unidentified facility type.

Surface Water Withdrawal: represents the withdrawal of water used at a Water Resources primary facility. The subfacility type may be an instream diversion, intake from a dam, natural lake, pond, river well, or an unidentified facility type.





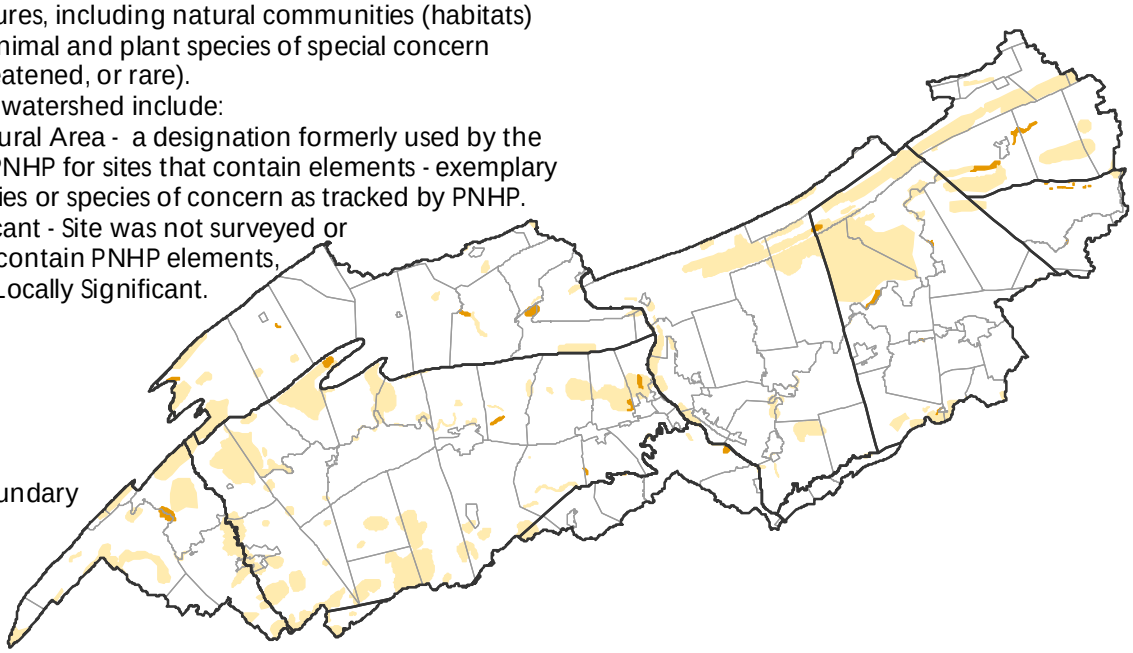
Natural Heritage Inventory Sites [13]

These areas are intended to identify outstanding floral, faunal, and geologic features, including natural communities (habitats) and locations of animal and plant species of special concern (endangered, threatened, or rare).

Area Types in this watershed include:

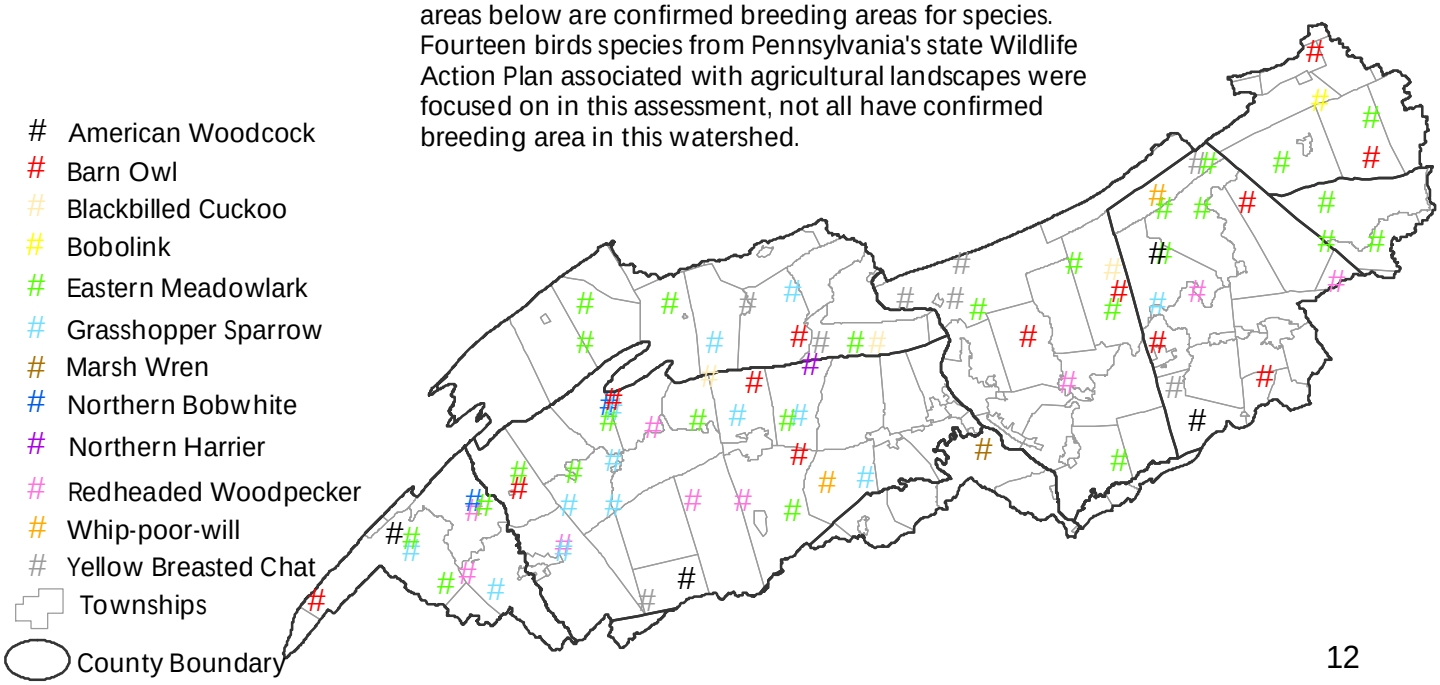
CNA - County Natural Area - a designation formerly used by the Eastern Office of PNHP for sites that contain elements - exemplary natural communities or species of concern as tracked by PNHP.

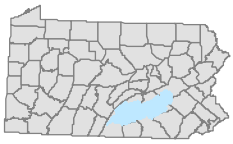
LS - Locally Significant - Site was not surveyed or was not found to contain PNHP elements, but is considered Locally Significant.



Pennsylvania Breeding Bird Atlas [14]

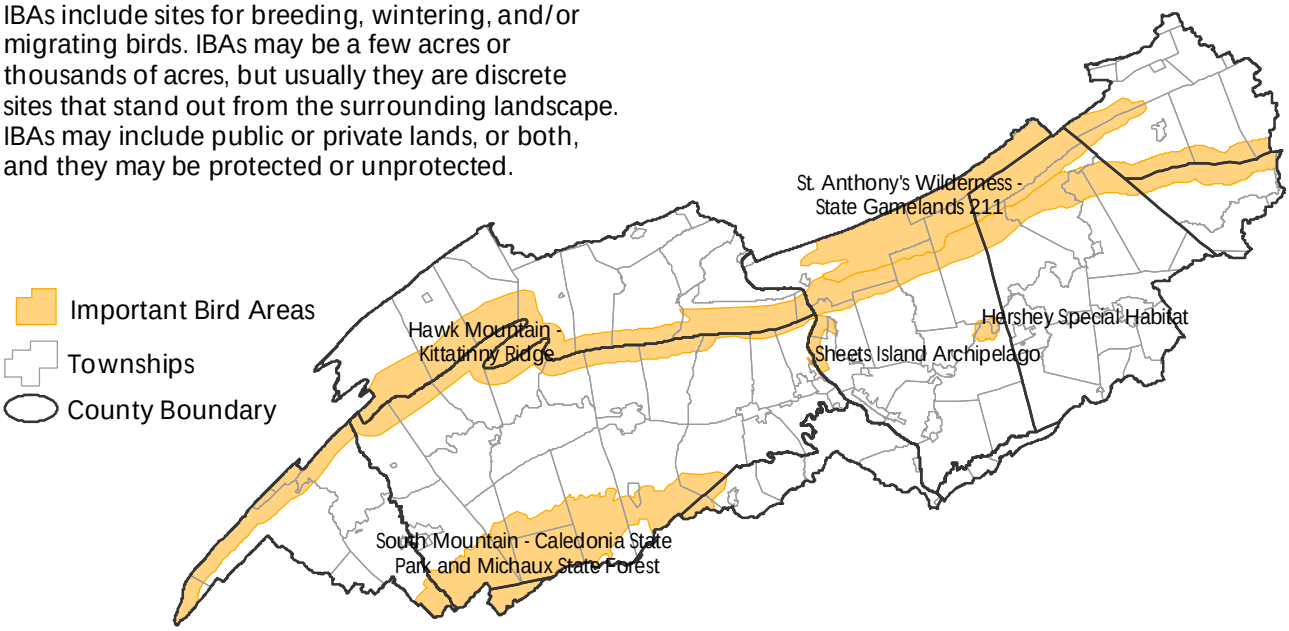
The 1st Pennsylvania Breeding Bird Atlas (1992) assesses the distribution of breeding birds across the state. The areas below are confirmed breeding areas for species. Fourteen birds species from Pennsylvania's state Wildlife Action Plan associated with agricultural landscapes were focused on in this assessment, not all have confirmed breeding area in this watershed.





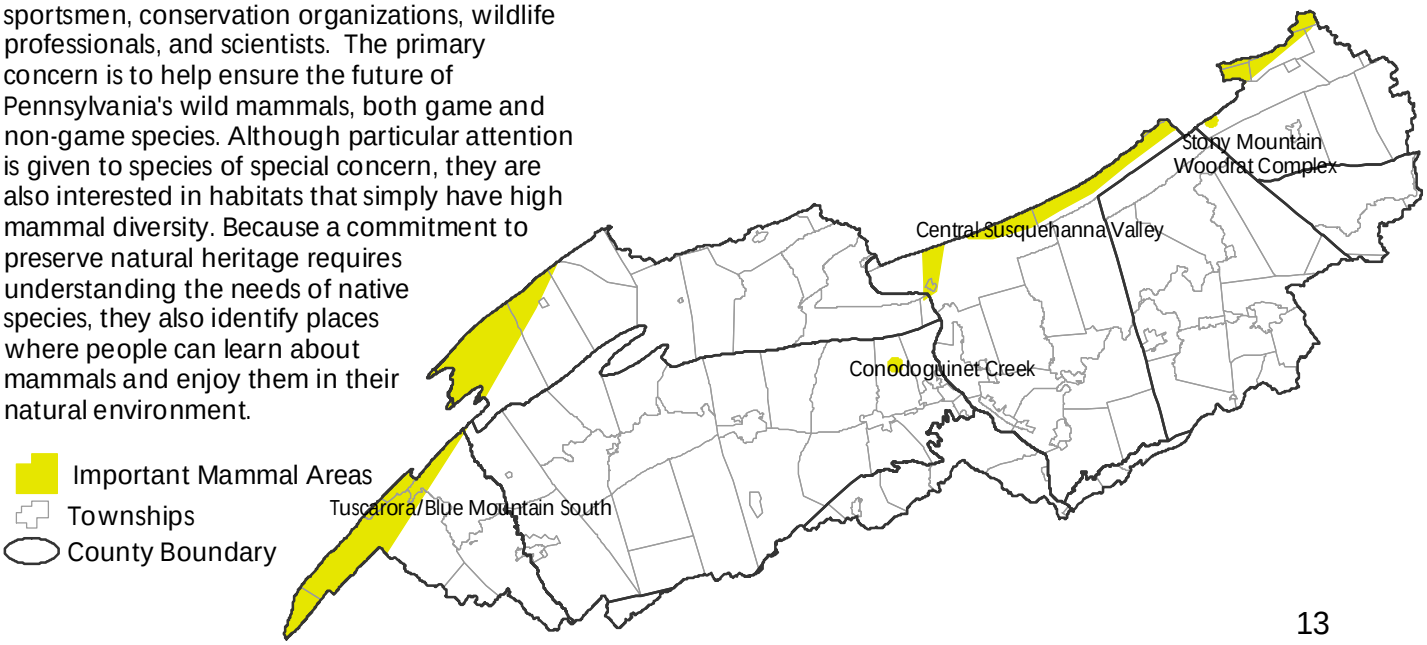
Important Bird Areas[15]

Important Bird Areas (IBA) are sites that provide essential habitat for one or more species of bird. IBAs include sites for breeding, wintering, and/or migrating birds. IBAs may be a few acres or thousands of acres, but usually they are discrete sites that stand out from the surrounding landscape. IBAs may include public or private lands, or both, and they may be protected or unprotected.

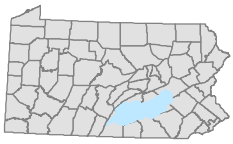


Important Mammal Areas[16]

The Important Mammal Areas Project is being carried out by a broad based alliance of sportsmen, conservation organizations, wildlife professionals, and scientists. The primary concern is to help ensure the future of Pennsylvania's wild mammals, both game and non-game species. Although particular attention is given to species of special concern, they are also interested in habitats that simply have high mammal diversity. Because a commitment to preserve natural heritage requires understanding the needs of native species, they also identify places where people can learn about mammals and enjoy them in their natural environment.

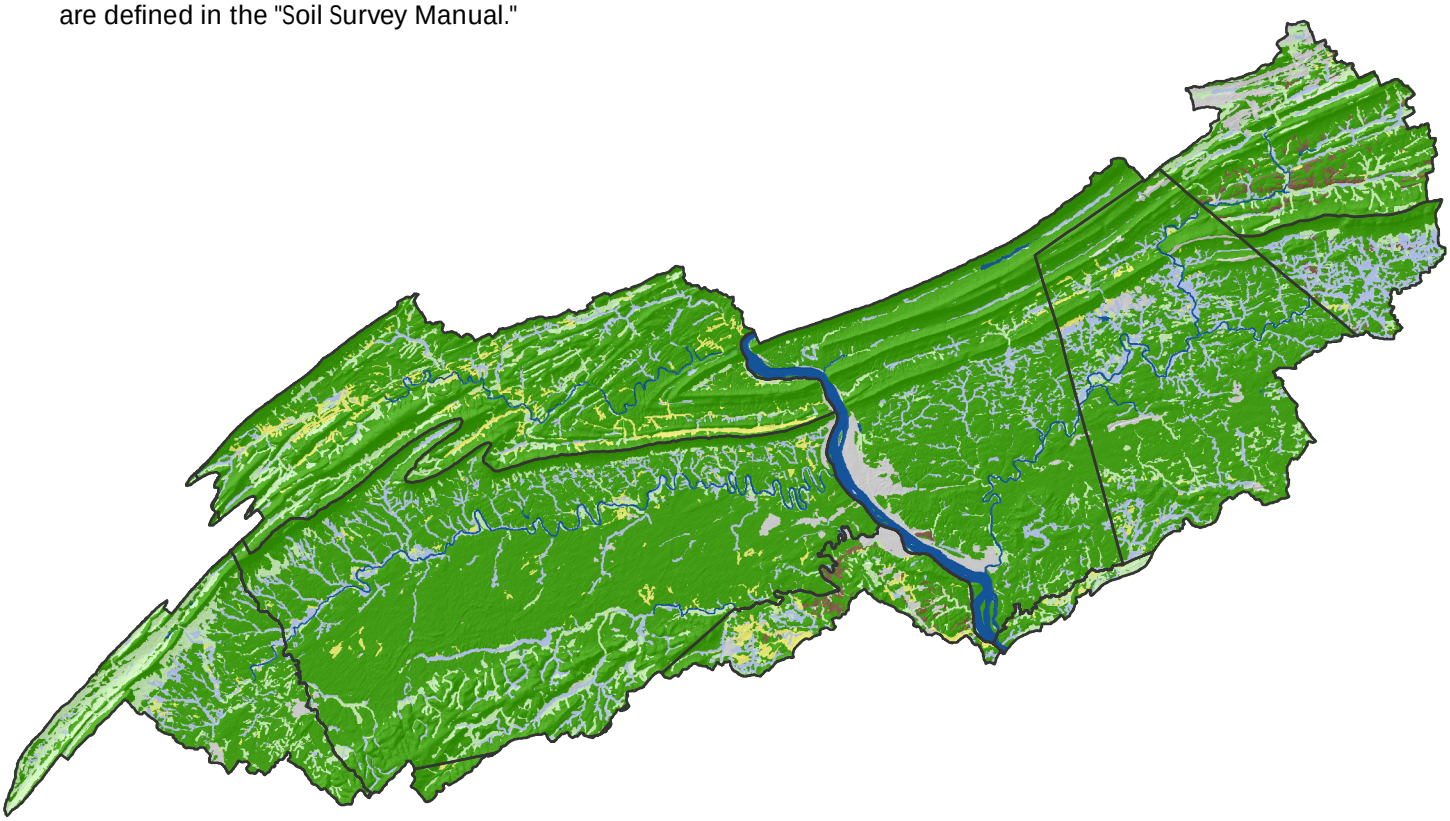


Soils[17]



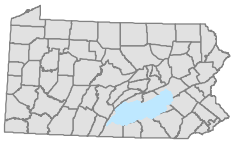
Drainage Classification

Drainage class (natural) refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized -- excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."



Drainage Classification

	% Area
Excessively - Somewhat excessively drained	.7
Well drained	76.5
Moderately well drained	9.5
Somewhat poorly drained	2.3
Poorly - Very poorly drained	6.7
Water	1.6
Unclassified	2.7
County Boundary	

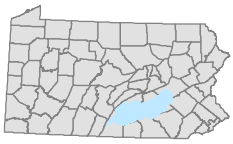


Farmland Classification

Farmland classification identifies soil map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. Farmland classification identifies the location and extent of the most suitable land for producing food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the Federal Register, Vol. 43, No. 21, January 31, 1978.

Farmland Classification

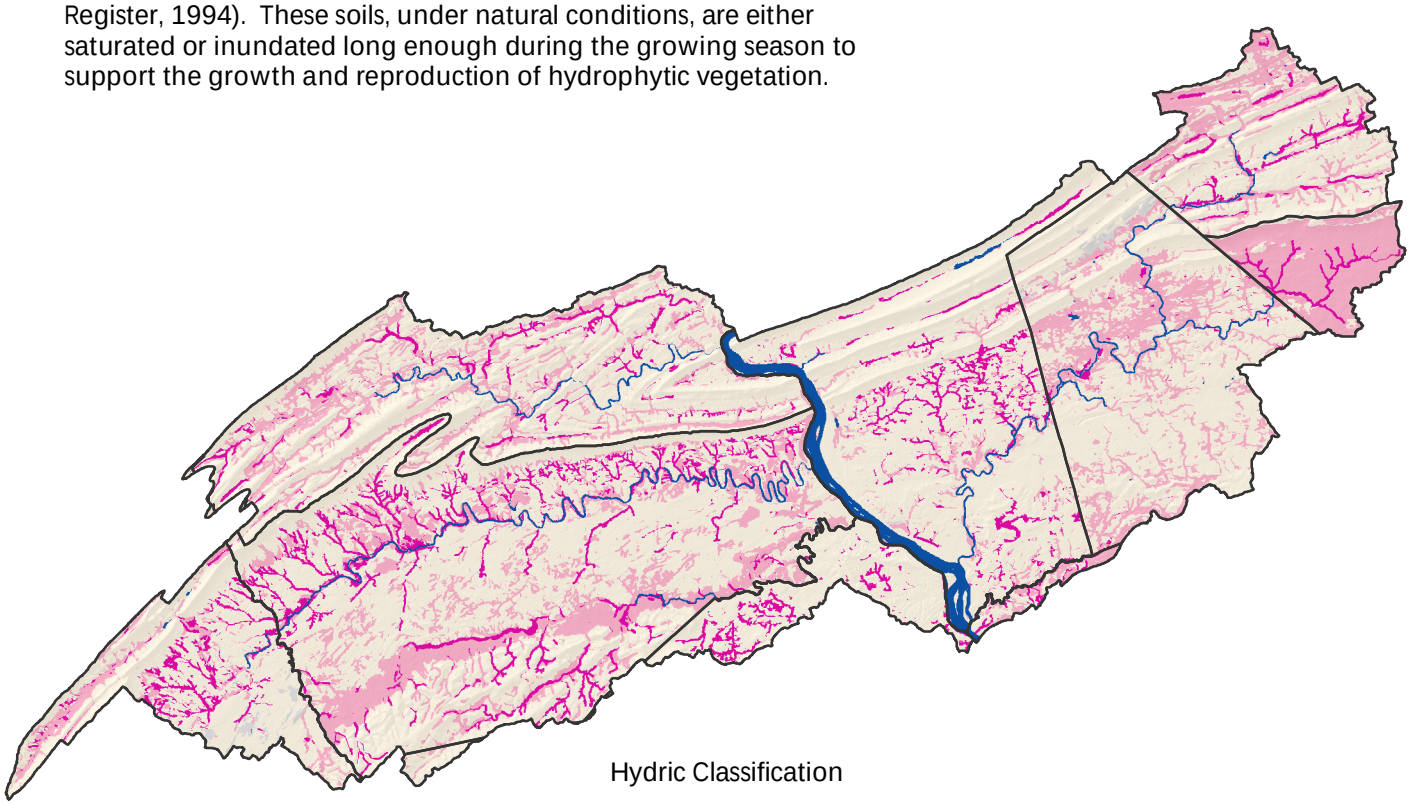
	% Area
All areas are prime farmland	24.2
Farmland of statewide importance	25.3
Not prime farmland or statewide importance	50.5
County Boundary	



Hydric Soil Classification

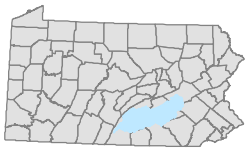
This rating provides an indication of the proportion of the map unit that meets criteria for hydric soils. Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.



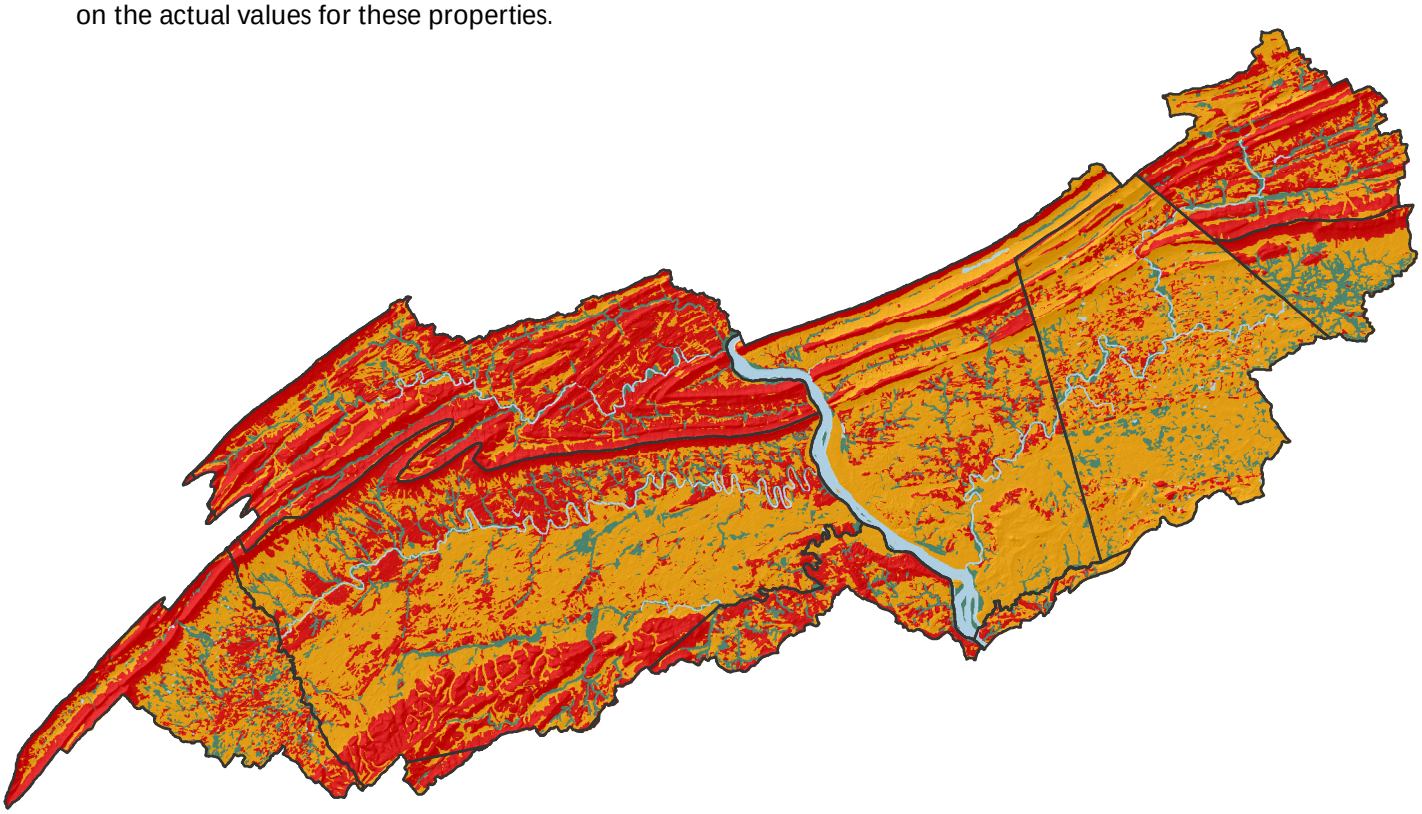
Hydric Classification

	% Area
Not Hydric	71.9
Partially Hydric	21.1
All Hydric	5.0
Water	1.6
Unclassified	.4
County Boundary	



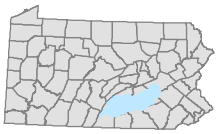
Highly Erodible Land

A soil map with an erodibilty index (EI) of 8 or greater is considered to be highly erodible land (HEL). The EI for a soil map unit is determined by dividing the potential erodibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of January 1, 1990. Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any specific map unit depends on the actual values for these properties.



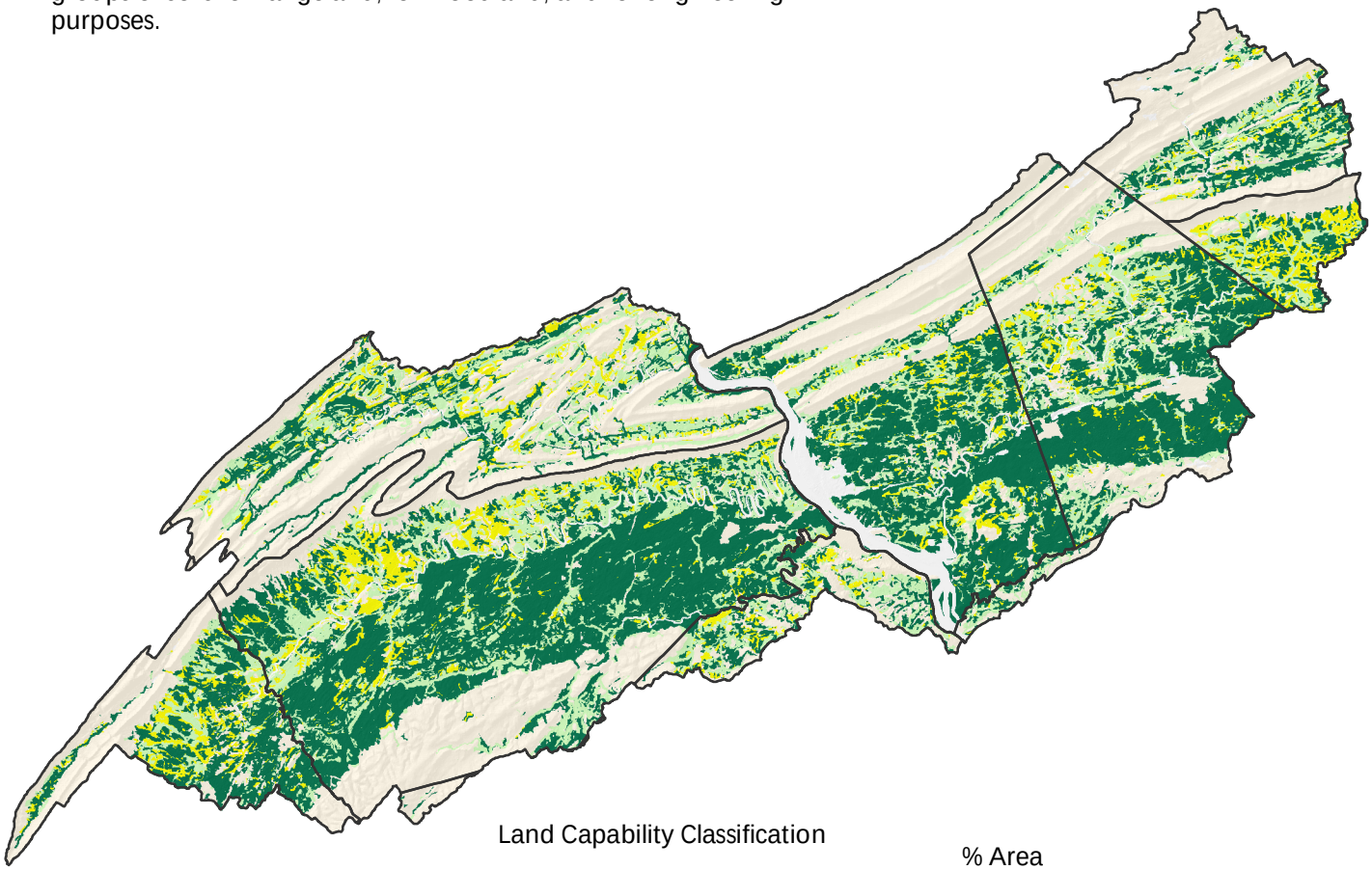
Erosion Classification

	% Area
Not highly erodible land	8.4
Potentially highly erodible land	50.6
Highly erodible land	39.4
Water	1.6
County Boundary	

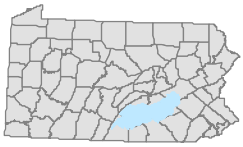


Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

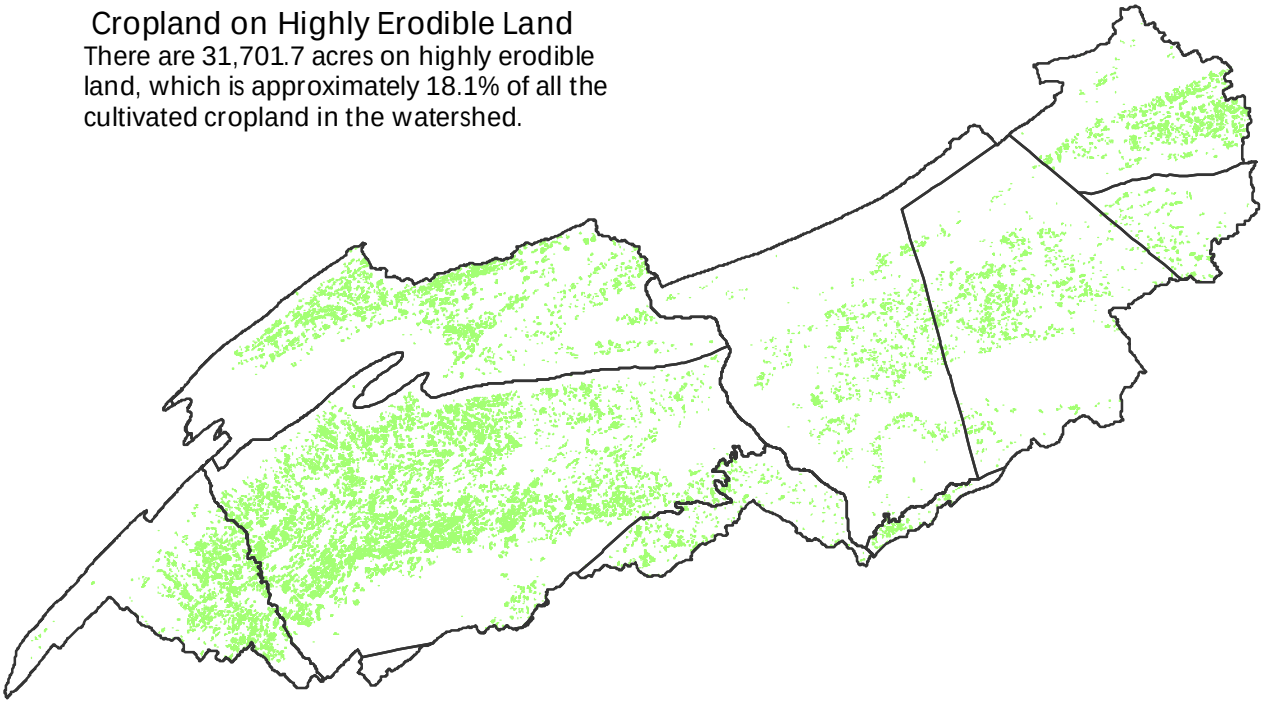


Land Capability Classification	% Area
Well Suited (Capability Class 1 -2)	34.2
Moderately well suited (Capability Class 3)	18.4
Poorly suited (Capability Class 4 -5)	8.0
Unsuited (Capability Class 6 - 8)	36.8
Unclassified	2.6
County Boundary	



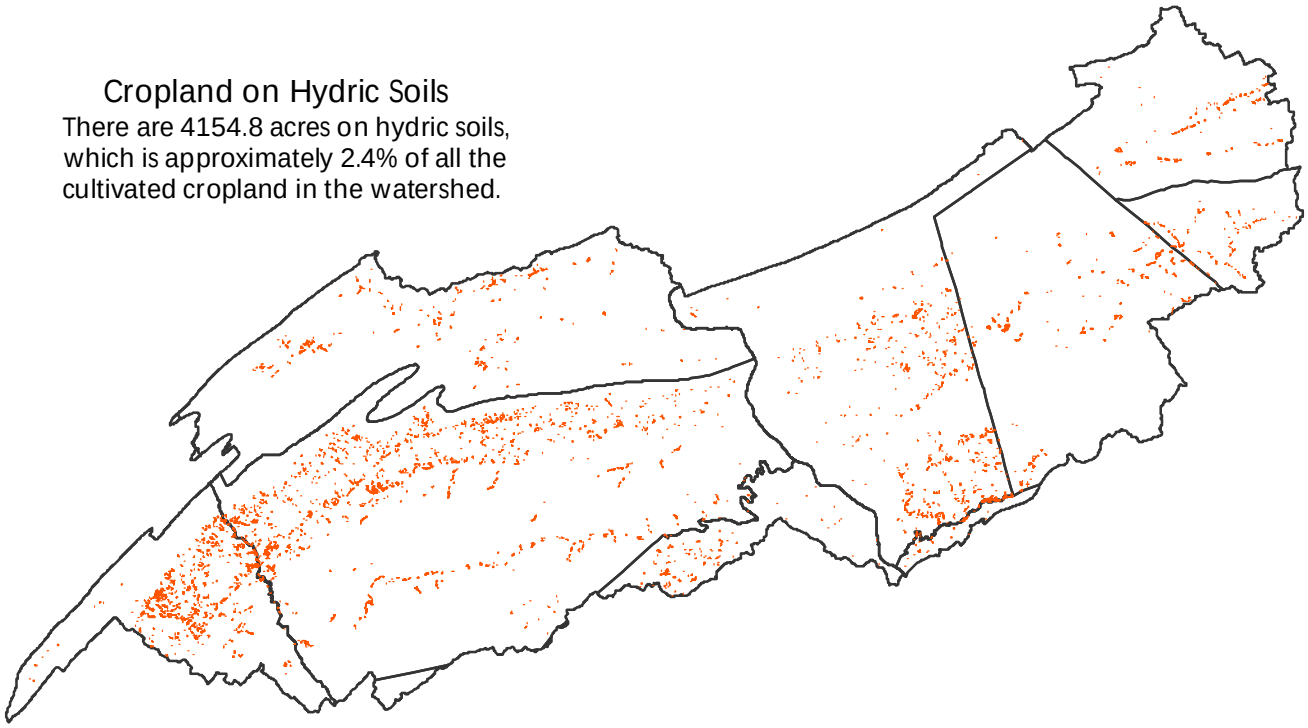
Cropland on Highly Erodible Land

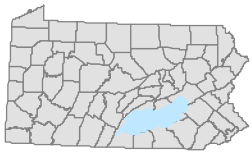
There are 31,701.7 acres on highly erodible land, which is approximately 18.1% of all the cultivated cropland in the watershed.



Cropland on Hydric Soils

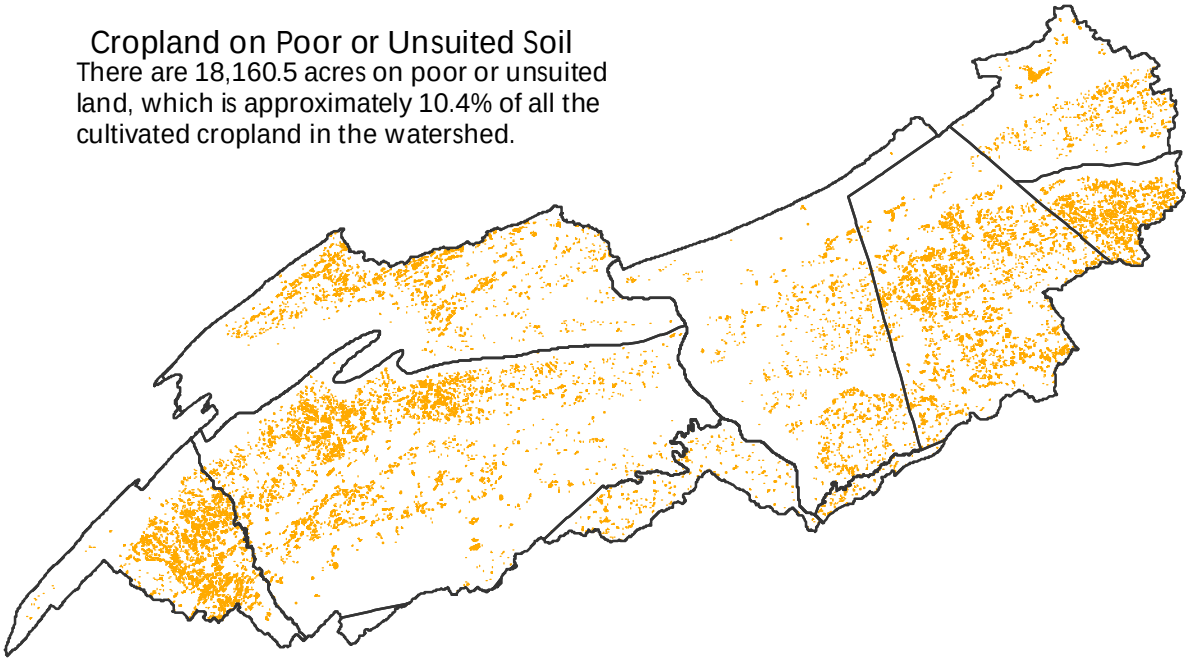
There are 4154.8 acres on hydric soils, which is approximately 2.4% of all the cultivated cropland in the watershed.



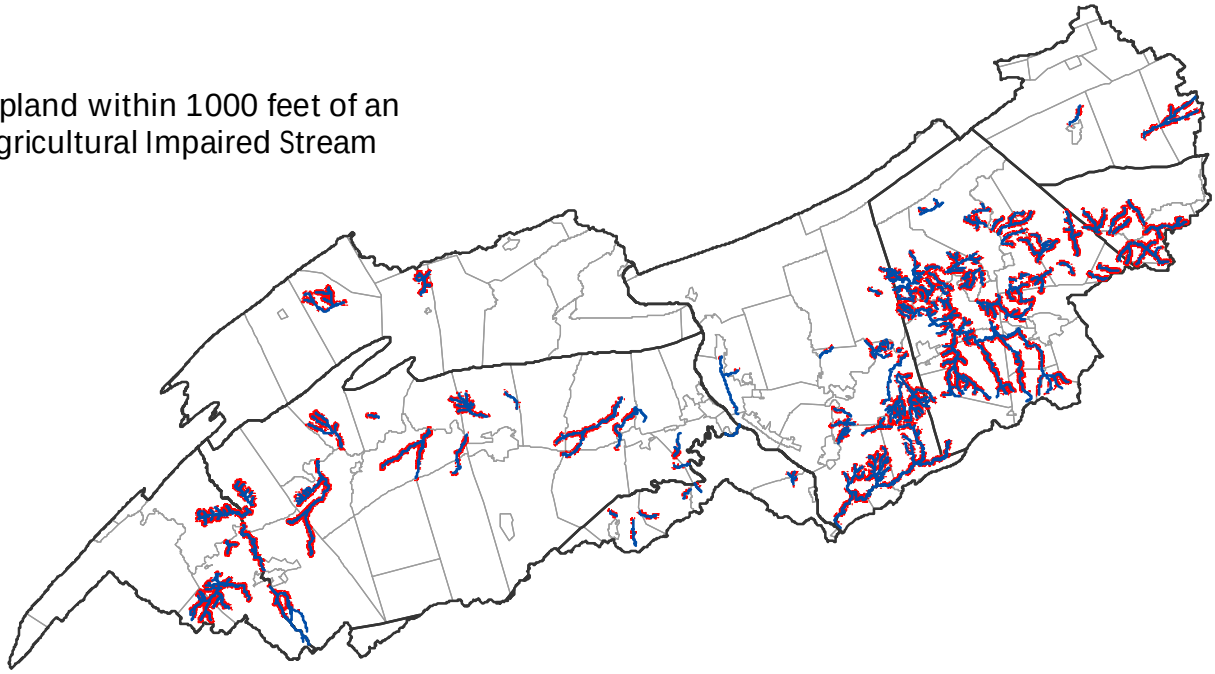


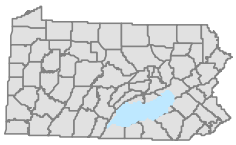
Cropland on Poor or Unsuited Soil

There are 18,160.5 acres on poor or unsuited land, which is approximately 10.4% of all the cultivated cropland in the watershed.



Cropland within 1000 feet of an Agricultural Impaired Stream





Resource Concerns

Major resource concerns in the area include:

- erosion
- maintenance of organic matter on cropland
- soil productivity
- sedimentation
- degradation of stream quality
- conversion of non-urban land to urban

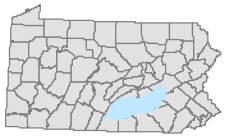
Conservation Practices

Common conservation practices for cropland:

- crop rotation
- contour farming
- nutrient management
- riparian forest buffers
- cover crops
- diversions
- grassed waterways
- field borders
- conservation tillage
- residue management
- stripcropping
- terraces

Common pasture management practices:

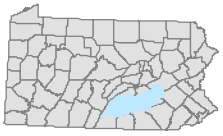
- prescibed grazing
- nutrient management
- pest management



PRS Performance Measures[18]

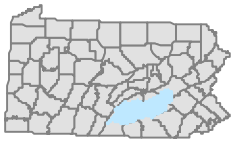
	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	Total
Total Conservation Systems Planned (acres)	8746	15,449	14,769	10,548	12332	NA	6868	4570	73,282
Total Conservation Systems Applied (acres)	3030	6716	10,758	8204	5714	NA	6248	3105	43,775
Key Conservation Treatments									
Waste Storage Facility (number)	10	43	91	23	12	2	18	10	209
Riparian Forest Buffer (acres)	24	180	29	121	436	307	125	222	1,444
Erosion Control Total Soils Saved (tons/year)	2718	7423	5671	7464	5477	NA	NA	NA	28,753
Nutrient Management (acres)	2471	11,803	14,297	12,088	5408	945	3199	1076	51,287
Pest Management (acres)	0	553	0	681	148	316	2042	117	3,857
Prescribed Grazing (acres)	532	110	107	510	303	44	1143	446	3,195
Tree and Shrub Establishment (acres)	10	65	6	55	43	49	2	13	243
Residue Management (acres)	3459	5854	2699	2731	2238	1529	21,144	4820	44,474
Wildlife Habitat (acres)	369	152	444	2494	2192	274	3135	1962	11,022
Wetlands Created, Restored, or Established	33	10	0	30	37	0	54	22	186
Acres in Conservation Programs									
Conservation Technical Assistance									
Planned	4806	6163	9373	5277	8989	NA	5453	3552	43,613
Applied	2077	4162	8179	3939	2592	NA	4926	1794	27,669
Conservation Reserve Program									
Planned	1577	0	1090	3898	2259	NA	527	534	9,885
Applied	537	205	263	2826	2226	NA	631	358	7,046
Environmental Quality Incentive Program									
Planned	0	756	1141	1078	231	NA	1053	227	4,486
Applied	0	756	1032	1034	324	NA	608	247	4,001
Farmland Protection Policy/Farm and Ranch Lands Protection Program									
Planned	371	81	563	0	0	NA	0	0	1,015
Applied	0	81	582	0	0	NA	0	0	663
Forestry Incentive Program									
Planned	0	0	82	0	0	NA	0	0	82
Applied	0	0	74	0	0	NA	0	0	74
Grasslands Reserve Program									
Planned				0	44	NA	0	0	44
Applied				0	1	NA	0	0	1
Grazing Lands Conservation Initiative									
Planned	0	0	0						0
Applied	0	0	56						56
Wildlife Habitat Incentive Program									
Planned	57	0	17	36	0	NA	38	39	187
Applied	0	0	0	36	0	NA	21	25	82
Wetlands Reserve Program									
Planned	1460	0	0	0	0	NA	0	0	1,460
Applied	250	0	0	0	0	NA	0	0	250
Conservation Security Program									
Planned							367		367
Applied							0		0

NA - Reporting was unavailabel by Hydrologic Unit Code



Social and Census Data[19]

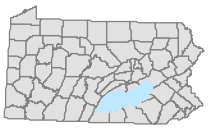
	Adams	Berks	Cumberland	Dauphin	Franklin	Lancaster	Lebanon	Perry	Schuylkill	York	Total
Farms (number)	15	124	1105	492	252	64	842	416	150	199	3,659
Land in farms (acres)	2,173	14,882	141,727	54,805	43,566	4,942	95,425	71,388	19,859	22,256	471,023
Total cropland (acres)	1,620	11,952	114,116	44,312	34,018	3,996	78,243	49,508	14,024	17,378	369,167
Principal operator by primary occupation - Farming (number)	8	78	670	365	174	47	530	253	74	96	2,295
Farms by Size											
1 to 9 acres	1	16	117	47	21	8	117	25	14	21	387
10 to 49 acres	6	44	303	185	57	20	274	87	50	101	1,127
50 to 179 acres	5	40	463	183	92	30	297	176	60	52	1,398
180 to 499 acres	2	19	171	62	67	4	142	105	17	16	605
500 to 999 acres	1	5	43	9	12	1	11	17	6	4	109
1,000 acres or more	0	1	8	5	3	0	2	5	2	4	30
Livestock and Poultry											
Cattle and calves inventory (farms)	5	52	562	179	161	38	435	204	34	63	1,733
Cattle and calves inventory - Beef cows (farms)	3	15	196	75	52	7	113	90	16	35	602
Cattle and calves inventory - Milk cows (farms)	1	22	261	57	87	23	221	67	9	13	761
Hogs and pigs inventory (farms)	1	7	63	17	17	5	93	30	6	10	249
Sheep and lambs inventory (farms)	1	7	66	25	13	5	48	18	4	15	202
Layers 20 weeks old and older inventory (farms)	1	10	95	36	27	7	82	33	12	16	319
Broilers and other meat-type chickens sold (farms)	0	4	23	9	5	4	34	8	4	2	93
Crops Harvested											
Corn for grain (acres)	244	2,508	19,110	7,215	3,433	838	19,340	4,586	3,099	5,793	66,166
Corn for silage or greenchop (acres)	105	1,871	21,884	4,295	9,256	1,133	17,788	6,220	803	908	64,263
Wheat for grain, all (acres)	165	671	7,546	3,089	1,345	130	5,188	2,214	899	1,820	23,067
Oats for grain (acres)	7	241	1,572	947	226	7	469	1,033	551	128	5,181
Barley for grain (acres)	15	271	3,126	756	1,039	109	2,695	808	136	356	9,311
Soybeans for beans (acres)	182	1,698	10,933	6,479	2,476	339	11,521	3,842	1,425	3,148	42,043
Forage - land used for all hay and all haylage, grass silage, and greenchop (acres)	488	2,478	35,788	12,953	12,139	1,127	18,521	19,805	3,213	3,149	109,661
Vegetables harvested for sale (acres)	6	70	883	273	125	69	1,122	195	221	262	3,226
Land in orchards (acres)	207	91	409	147	695	12	114	39	102	129	1,945
Total cropland harvested (acres)	1,393	10,633	97,918	36,414	29,348	3,579	72,822	38,452	11,407	15,346	317,312
Farm Operator by Ethnicity											
White	22	189	1573	684	376	92	1241	584	213	289	5,263
Black or African American	0	0	4	5	1	0	2	0	0	1	13
Asian	0	0	1	0	1	0	0	0	0	0	2
Hispanic	0	1	27	1	2	1	10	0	0	2	44
American Indian/Alaskan Native	0	0	6	1	0	0	6	0	0	1	14
Pacific Islander	0	0	0	0	0	0	0	0	0	0	0
Women	6	52	412	188	89	22	329	150	48	87	1,383



Partnership Groups:

A cooperative project involving NRCS and conservation partners, including:

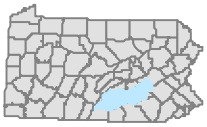
- State Conservation Commission
- Pennsylvania Department of Environmental Protection
- Pennsylvania Game Commission
- Pennsylvania Grazing/Forage Lands Conservation Coalition
- Pennsylvania Fish & Boat Commission



Footnotes/Bibliography

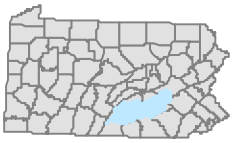
All data is provided "as is". There is no warranties, express or implied, including the warranty of fitness for a particular purpose, accompanying this document. Use for planning purpose only.

1. Common Resource Area
   Common Resource Area (CRA) delineation is defined as a geographical area where resource concerns, problems, or treatment needs are similar. More information can be found online at http://soils.usda.gov/survey/geography/cra.html
2. National Elevation Dataset (NED)
   The NED is a seamless mosaic of the best-available elevation data. The primary source data were the USGS 7.5-minute (30-meter or 10-meter resolution) DEM's. A hillshade grid was also created using the DEM and used to creare a 3-D effect. More inforamtion on NED can be found online at http://ned.usgs.gov/
3. Land Use / Land Cover 2001
   Land Use / Land Cover map was created using the National Land Cover Dataset. The National Land Cover Dataset was compiled from Landsat satellite TM imagery with a spatial resolution of 30 meters and supplemented by various ancillary data (where available). More inforamtion can be found online at http://landcover.usgs.gov/
4. Average Annual Precipitation
   The average annual precipitation data for this map layer were produced through a partnership between NRCS and the Spatial Climate Analysis Service at Oregon State University (OSU). The average annual precipitation is from 1961 through 1990. More information can be found online at http://www.ncgc.nrcs.usda.gov/products/datasets/climate/index.html
5. National Wetlands Inventory (NWI)
   The NWI maps do not show all wetlands since the maps are derived from aerial photointerpretation with varying limitations due to scale, photo quality, inventory techniques, and other factors. More information can be found online at http://www.fws.gov/nwi/
6. Impaired Streams
   Impaired Streams were derived from Pennsylavania Department of Protection Office of Water Management, 2006 list on Non-Attaining Streams. More information can be found on DEP website at http://www.depweb.state.pa.us/dep/site/default.asp
7. Abandoned Mine Land
   Abandoned Mine Land data was received from the Office of Surface Mining. The data set shows the approximate location of Abandoned Mine Land Problem Areas containing public health, safety, and public welfare problems created by past coal mining. More information can be found online at http://www.osmre.gov/osmaml.htm
8. Exceptional Value and High Quality Streams
   Exceptional Value and High Quality Streams were taken from the Chapter 93 data layer received from Pennsylvania Department of Environmental Protection. For more information on what qualifies a stream as exceptional value or high quality or any information on Chapter 93 streams go to http://www.pacode.com/secure/data/025/chapter93/chap93toc.html



Footnotes/Bibliography

9. Pennsylvania Trout Waters
   Pennsylvania Trout Water data is compiled by the Pennsylvania Fish and Boat Commission. This layer was created based on the 1:24000 National Hydropahy Dataset (NHD) water bodies layer. More information can be found online at http://www.fish.state.pa.us/fishpub/summary/troutwaters.html
10. Total Maximun Daily Load (TMDL)
    TMDL is the sum of the individual waste load allocations and load allocations which would not produce a violation of water quality standards. The data used is from 2003, the PA Department of Environmental Protection is currently working on updating the GIS data available. More information can be found on TMDL locations in PA at http://www.dep.state.pa.us/watermanagement_apps/tmdl/, and/or nationally at http://www.epa.gov/owow/tmdl/
11. Water Quality Testing Points
    Water Quality Testing Points monitor water quality with emphasis on stream acidity in Pennsylvania with an assoiciated database. The database contains more than 33,466 records on water quality from 1986 to the present from 622 testing sites throughout Pennsylvania. Information in the records includes alkalinity and Ph and includes nitrates and phosphates for some sites since 1996.
    The information is maintained by the Alliance for Aquatic Resource Monitoring. More information can be found online at http://alpha.dickinson.edu/storg/allarm/allarm%20projects/database.htm
12. Water Resource Points
    A Water Resource is a DEP primary facility type related to the Water Use Planning Program. More information can be found http://www.depweb.state.pa.us/dep/site/default.asp
13. Natural Heritage Inventory Sites
    The Natural Areas polygons were developed by the Pennsylvania Natural Heritage Program (PNHP) County Natural Heritage Inventory (CNHI) Program. Natural Areas were identified using map and air photo interpretation, aerial rconnaissance, and field surveys. More information and county reports can be found online at http://www.naturalheritage.state.pa.us/
14. Pennsylvania Breeding Bird Atlas
    Data was taken for the 1st Pennsylvania Breeding Bird Atlas (1992). For this watershed assessment, fourteen bird species were chosen to be focused on. More information about all bird species can be obtained at http://www.carnegiemnh.org/atlas/home.htm
15. Important Bird Areas
    The Important Bird Areas Program (IBA) is a global effort to identify and conserve areas that are vital to birds and other biodiversity. For more information nationally and/or on the state level go to http://www.audubon.org/bird/iba/
16. Important Mammal Areas
    Important Mammal Areas Project, IMAP, the first program of it's kind, was created by the Mammal Technical Committee of the Pennsylvania Biological Survey (PaBS). For more inforamtion go online to http://www.pawildlife.org/imap.htm



Footnotes/Bibliography

17. Soils

    Soil Survey spatial and tabular data were used for the following survey areas:

    Adams County (PA001)
    Berks County (PA011)
    Cumberland County (PA041)
    Dauphin County (PA043)
    Franklin County (PA055)
    Lancaster County (PA071)
    Lebanon County (PA075)
    Perry County (PA099)
    Schuylkill County (PA107)
    York County (PA133)

    Spatial and tabular data an be downloaded at http://soildatamart.nrcs.usda.gov/

18. Performance Results System (PRS)

    PRS data was extracted from PRS by year, conservation system, conservation practice, and proagrams by hydrologic unit code. More information can be found online at the PRS homepage http://ias.sc.egov.usda.gov/prshome/

19. Social and Census Data

    Ag census data and ethnicity data were downloaded from the National Agricultural Statistics Service (NASS). The data was adjusted by percent of Hydrologic unit in the county. More inforamtion can be found online at http://www.nass.usda.gov/Census_of_Agriculture/index.asp

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