

Perkiomen Recovery Action Mission

Bisesh Joshi, Lydia Franks, Cooper Feeny, Thomas
McGilliard, Noah Brogden

Mission Statement

“The Perkiomen Creek watershed is currently facing problems consisting of flooding, erosion, runoff pollution, invasive vegetation, as well as land development. PRAM’s goal is to reinstate the overall ecosystem of the watershed by improving water quality, mitigating flooding issues, and conserving native species by the year 2040.”



Flooding on the Perkiomen Trail from Hurricane Ida (The Times Herald, 2021).

Background

- The Perkiomen Creek is a tributary of the Schuylkill river in southeastern Pennsylvania, it encompasses 55 municipalities across four counties: Berks, Bucks, Lehigh, and Montgomery.
- The Perkiomen Creek watershed receives a mean annual precipitation of 44 inches, with a mean annual discharge of 519 ft³/s. It's drainage area is 362 square miles, among which:
 - 10.68% urbanized
 - 3.16% wetland
 - 45.56% forested
- The creek and its tributaries supply drinking water for a decent portion of the Philadelphia metropolitan area and southeastern Pennsylvania. It is a very historical area, home to sites such as Valley Forge National Historical Park and supports a diverse array of wildlife.
- Area has been seeing steady population growth for the 50 years, 60,000 over the past decade. Due to more abundant and frequent foot traffic natural areas are more vulnerable and climate change is steadily worsening. This has led to record flood levels for the Perkiomen in 2020 - 2021.

Problem Matrix

Issue	Description	Recommendation
P1: Point and Nonpoint source water pollution	Presence of pesticides and fertilizers from nearby farms as well as chloride brought by road salt. Pollution from point sources, industries, and treatment plans, leaking of sewer pipes. Pollution brought by people as a result of touring/nearby land development.	Discourage off-season and excessive use of fertilizers and pesticides. Implement state and federal policies/standards strictly. Raise awareness programs about best management practices (BMPs). Collaborative action between federal and state authorities, and the local community.
P2: Invasive Vegetation	Reduction/compromising of native vegetation.	Plant more native vegetation, and protect existing native species. Control invasive vegetation growth.
P3: Flooding and erosion	Soil Type. Issues with agricultural practices. Low capacity stormwater waterways. Land development, and increase in impervious areas.	Floodplain and wetland development. Buffer areas and streambank protection. Green Infrastructure. Engineering structures to assist with runoff channeling.

Governing policies and regulations

1. **Clean Water Act**
2. **Nonpoint Source Program**
3. **Invasive Species Control Act**
4. **Flood Control Act**
5. **Soil and Water Conservation Act**
6. **Pennsylvania's Clean Streams Law (for point source)**
7. **Pennsylvania's Nutrient Management Act (for non point source)**
8. **Pennsylvania's Floodplain Management Act**
9. **Executive Order 13112 (Invasive species)**
10. **Watershed Protection and Flood Prevention Program**
11. **Pennsylvania's Environmental Rights Amendment**





Perkiomen Watershed, PA 2023 Attaining and Non Attaining Streams CWA §305(b)

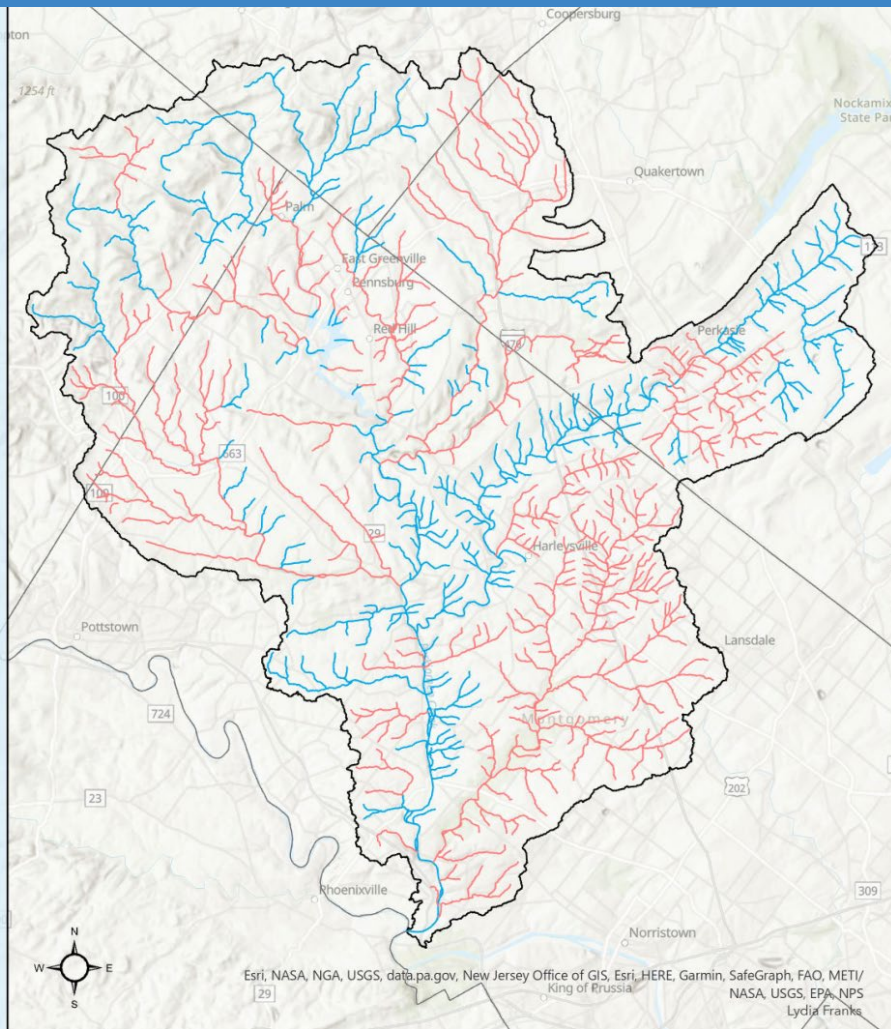
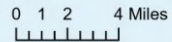
Section 305(b) under the Clean Water Act requires states to submit integrated reports on the conditions of assessed waters, and the programs implemented to control pollution and restore water quality. These reports are used to develop the 303(d) list which, under section 303(d), requires states to list impaired waters and develop and implement TMDLs for these waters.

The Pennsylvania Department of Environmental Protection protects the following uses for waters: recreation, aquatic life, fish consumption, and potable water supply.

Non attaining streams are considered impaired when not supporting any one of the four designated uses. Streams are considered attaining if the waters support at least one of the four uses.

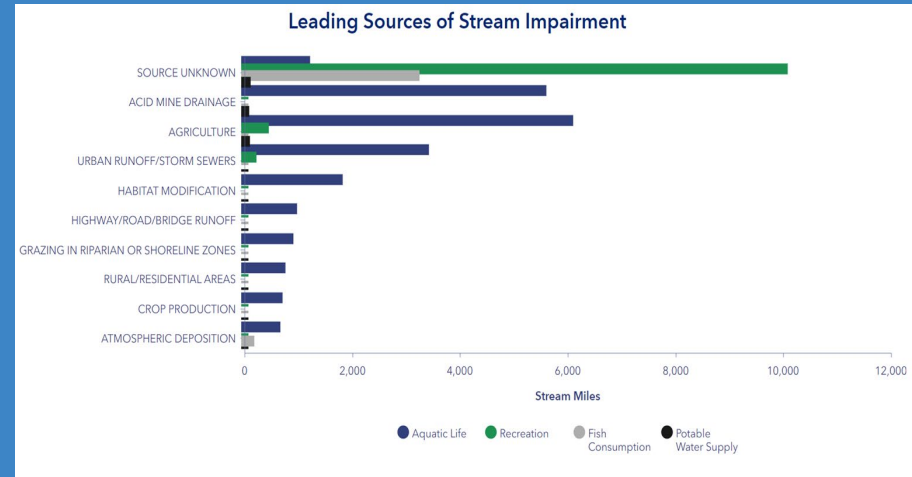
Legend

- | | |
|--|---|
|  Integrated List
Non Attaining |  Watershed
boundary |
|  Integrated List
Attaining |  County Boundary |



Problem #1: Point and Nonpoint Source Pollution

- Formerly natural ground cover has been transformed for human use
- Rise in impervious surfaces
- Combination of increase in impervious surfaces as well as an increase in domestic animals lead to a rise in nitrogen in the water
- Stormwater runoff also contributes heavily to more water pollution
- There is also a large amount of pollution which origin cannot be traced, this being the nonpoint source



Leading sources of stream impairment across the state of Pennsylvania (PA DEP, 2022).

Goal #1: Source and Transport Control of Pollutants

We recommend the following

- Identification of treatment plants not following guidelines set by the EPA and DEP
- Organizing awareness programs within local communities to encourage strict water policy implementation
- Maximize natural/green cover to delay transport of pollutants to the water
- Keep domestic animals away from natural and man made streams when possible
- Incentivize the MS4 Program and similar government mandates, convincing communities to develop sustainable stormwater management plans



Image of the Lower Perkiomen Valley Regional Sewage Authority (LPVRS, 2022)

Problem #2 Invasive Vegetation

Invasive species in the Perkiomen cause a decrease in biodiversity as well as a decrease in populations of native organisms that have, for some time, acted as the natural overseers of the watershed's natural processes.

Invasive species include:

- Lesser Celandine
- Spotted Knapweed
- Arthraxon Grass
- Multiflora Rose
- Purple Loosestrife
- Crown Vetch
- Japanese Hops
- Canada Thistle
- **European Water Chestnut**
- **Narrow-Leaved Cattail**



European Water Chestnut (PWC, n.d.)



Multiflora Rose



Lesser Celandine



Narrow-Leaved Cattail (PA DCNR, n.d.)

Goal #2 Adopting Control Measures

Adopting an invasive species management plan including a combination of mechanical, biological, and chemical control techniques.

Promote the planting of native species in the area as to bolster the strength of said species.

Organize educational programs as well as outreach programs to raise awareness on the issues in the local, and surrounding communities.

Problem #3 Flooding & Erosion

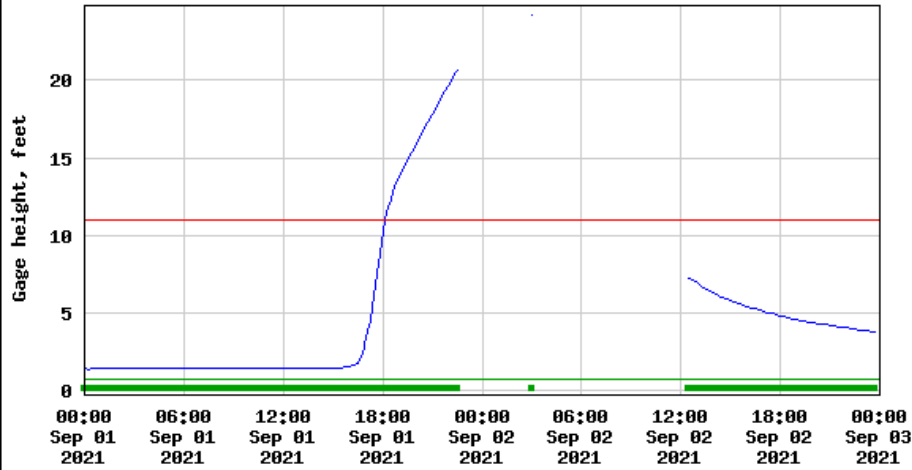
- Multiple flood events have been experienced in recent years especially Hurricanes Ida and Isaias in 2020. Several reasons include:
 - Urbanization
 - Deforestation
 - Extreme weather events
 - Climate change
- Human activities such as deforestation and urbanization have lead to an increase in impervious surfaces with the main culprit being roads, which has lead to excess runoff causing erosion and flooding.
- As a result from flooding and erosion much damage has been sustained to public and private property, if not mitigated properly it will also have detrimental effects on local ecosystems, food security, and the economy.



(Lydia Franks)



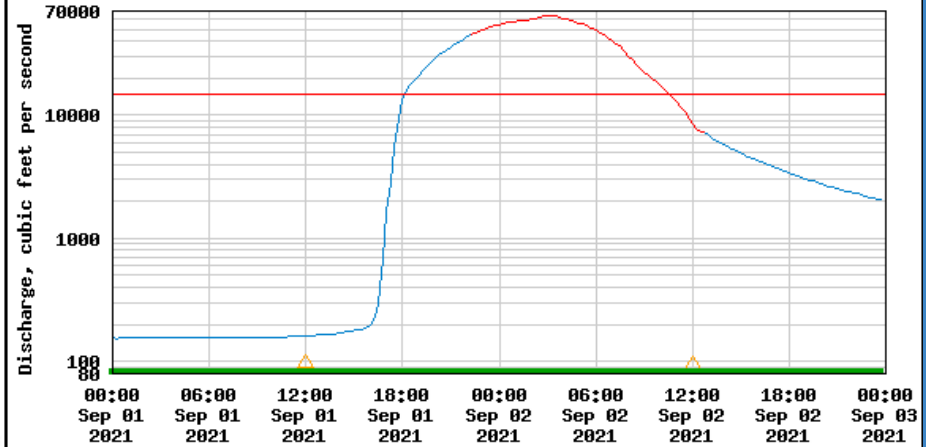
USGS 01473000 Perkiomen Creek at Graterford, PA



- a.
- Gage height
 - Floodstage
 - Period of approved data
 - Operational limit (minimum)



USGS 01473000 Perkiomen Creek at Graterford, PA



- b.
- △ Median daily statistic (66 years)
 - Discharge
 - Discharge at floodstage
 - Estimated discharge

USGS Stream gauge during 2021 historic flooding of the Perkiomen Creek. Gauge height at Graterford station surpassing flood stage and exceeding the gauge (a) and discharge at Graterford station surpassing flood stage and cresting at 70,000 cubic feet per second (b) (USGS, 2023).

Goal #3 Green Infrastructure & Engineering Control Measures

Adopting green infrastructure practices such as green roofs, rain gardens, and permeable pavements help reduce flash flooding and allowing proper groundwater recharge rates.

Additionally, implementing stricter land use policies for managing stormwater and encouraging sustainable development efforts.

Managing stormwater runoff will assist with erosion problems significantly but agricultural operations also must be considered. Solutions include:

- Cover crops and/or vegetative cover
- Reduced tillage
- Mulching
- Sediment fences



Economic Aspect

- Developing and implementing these solutions should be ventured through economically efficient ways.
- Upfront costs, maintenance costs, opportunity costs, and regulatory costs for individual control measures and their benefits
Eg. The loss of economic value due to the collapse of the fishing industry and treatment costs for drinking water may be compelling reasons to implement water pollution mitigation measures
- Other tangible and intangible benefits that these measures would yield in long run
Eg. Prevention of property loss and death due to flood mitigation measures, and reinstatement of a healthy ecosystem that would house native floras and faunas due to invasive species control measures

Summary of Goals

- Water quality enhancement by enacting and implementing numerical standards (concentrations of N&P, TMDL, etc.).
- Flood and erosion control via engineering control structures, green infrastructures, and best management practices.
- Controlling the invasive species and promoting native species in landscaping and wetland management.
- Proper coordination between stakeholders: federal partner, state partner and local community.

Recommendations

Nonpoint/point source pollution

- Develop a focused plan in collaboration with EPA, State, and local authorities to strictly maintain point source discharge within numerical standards.
- Incentivise local farmers/landowners for nonpoint source pollution reduction based on the effectiveness of their best management plans.
- Organize educational and outreach programs.

Invasive species control

- Develop proper landscaping plans and floodplain development plans promoting native species.
- Identify and control invasive species by mechanical, chemical, and biological measures.

Recommendations

Flooding and erosion control

- Develop state-level plans and policies championing green infrastructure.
- Adopt engineering /bioengineering measures for developing buffer areas and streambank protection.
- Develop wetlands and restoration flood plains.
- Promote vegetation cover/crop cover, tillages, and sediment fences for sediment loss from agricultural lands.

Ongoing conservation efforts

Perkiomen Watershed Conservancy is working on

- MS4 (Municipal Separate Storm Sewer System) Program
- Native Plant Project
- Plant-A-Thon
- European Water Chestnut Removal

References

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