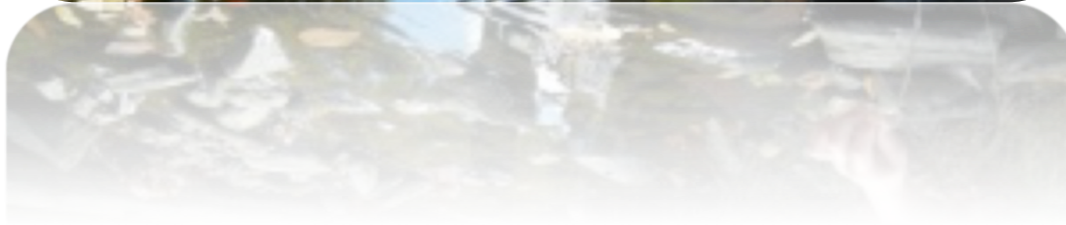
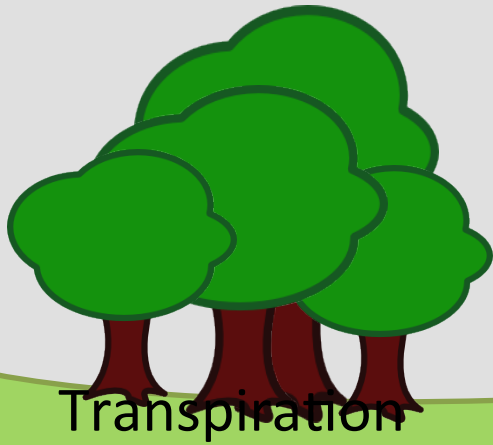




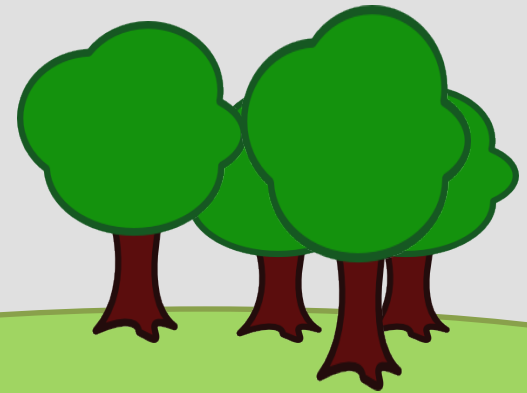
WATERSHED NATURALIST





Infiltration

Infiltration



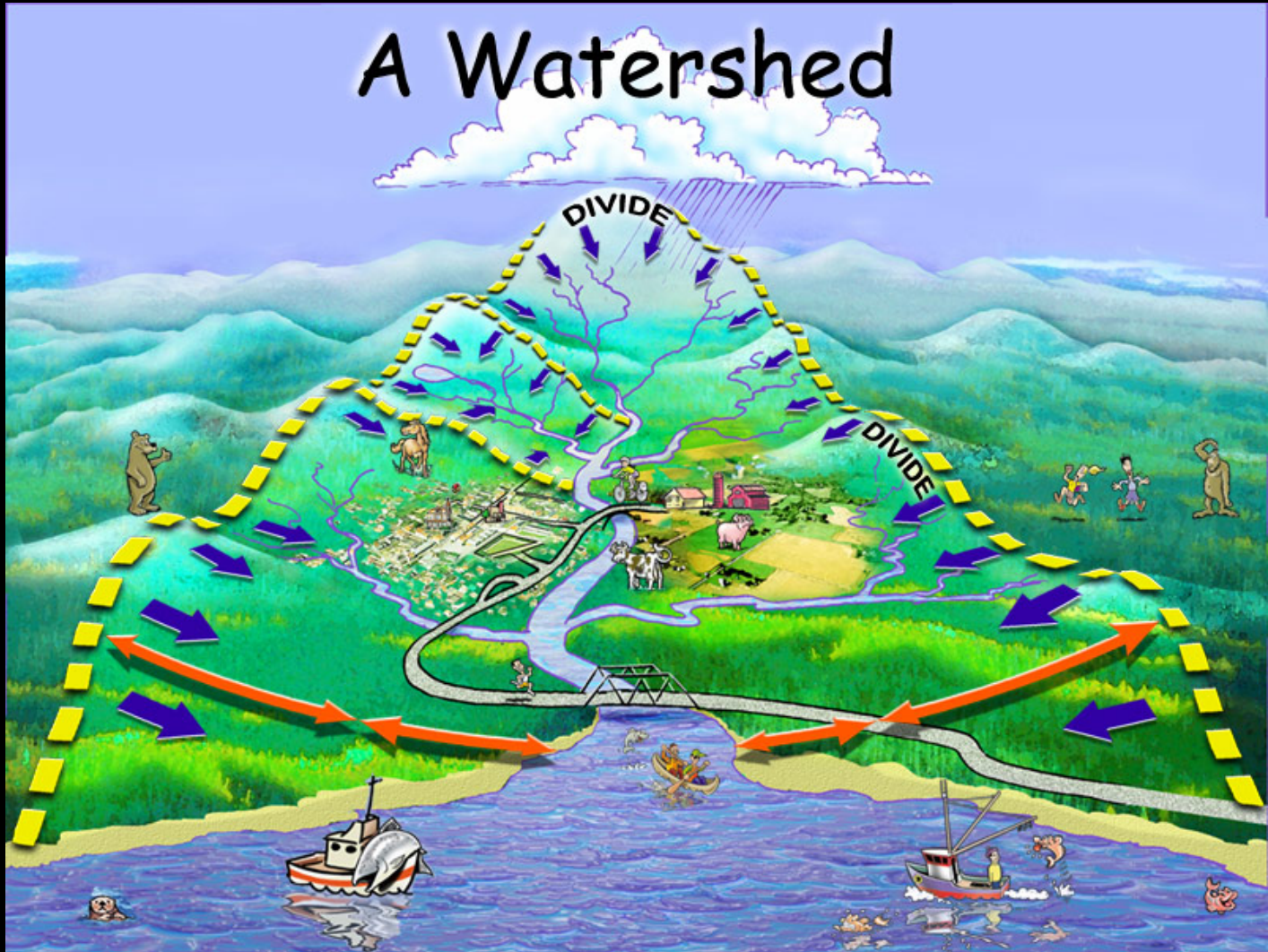
Transpiration

Evaporation

Evaporation

Evaporation

What is a watershed?



THE RIDGE



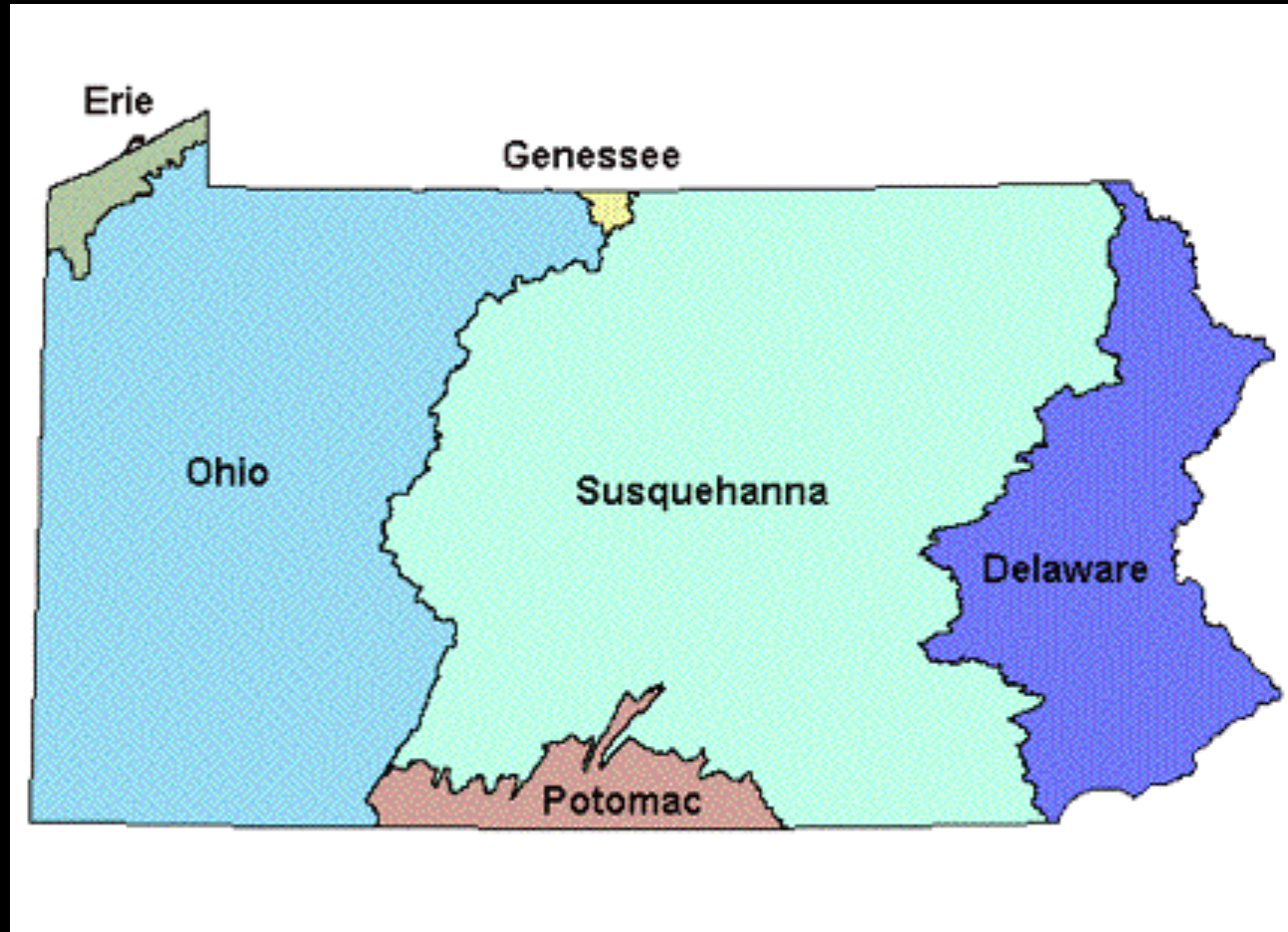
SUNRISE CLEANERS

YOGA
on the Ridge
215
792-6400
yogaontheridge.com
in back

metroPCS SUNRISE CLEANERS

Ridge Ave and Connaroe St

Pennsylvania's Major Watersheds



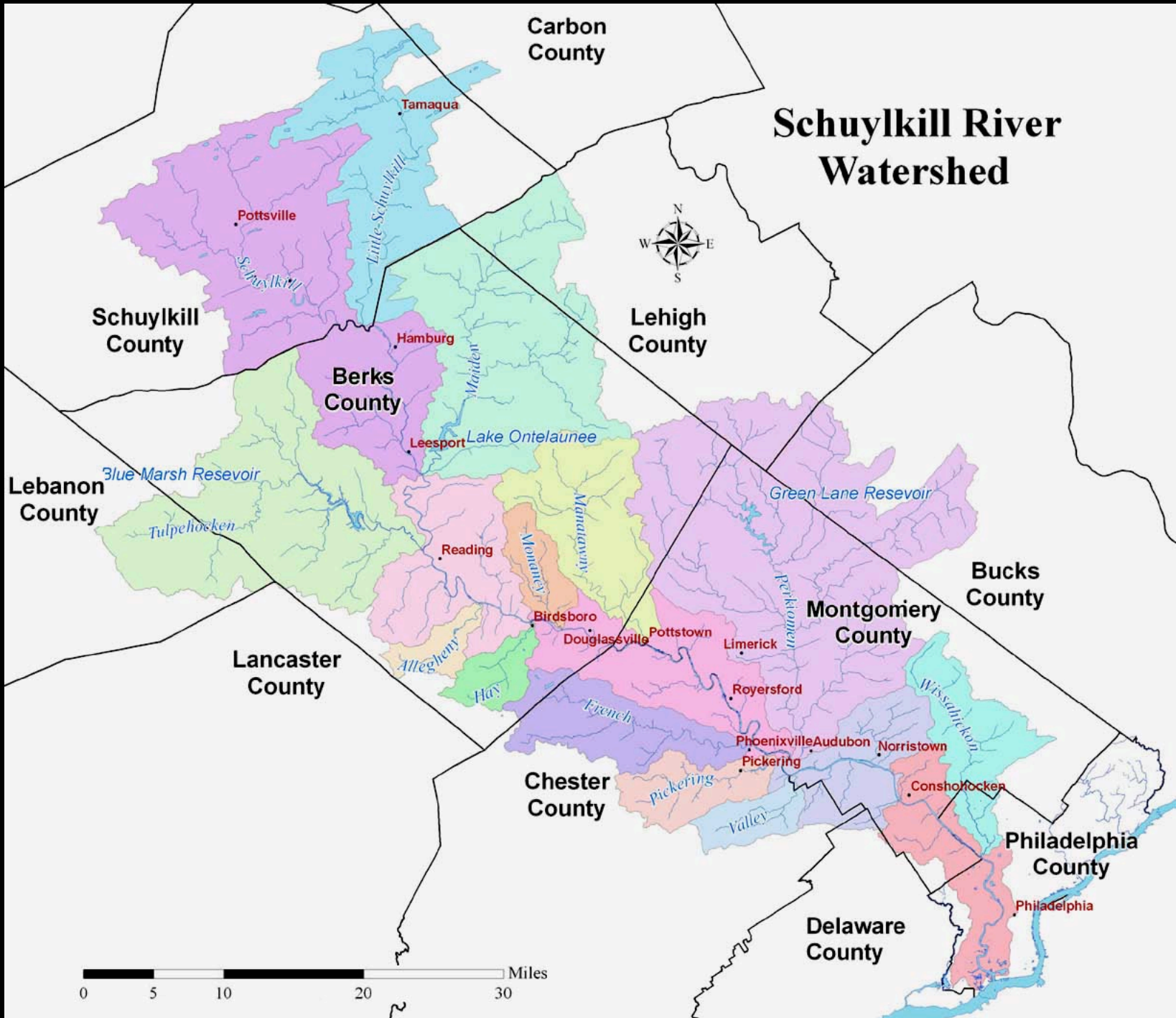
Delaware Watershed



Philadelphia Watersheds

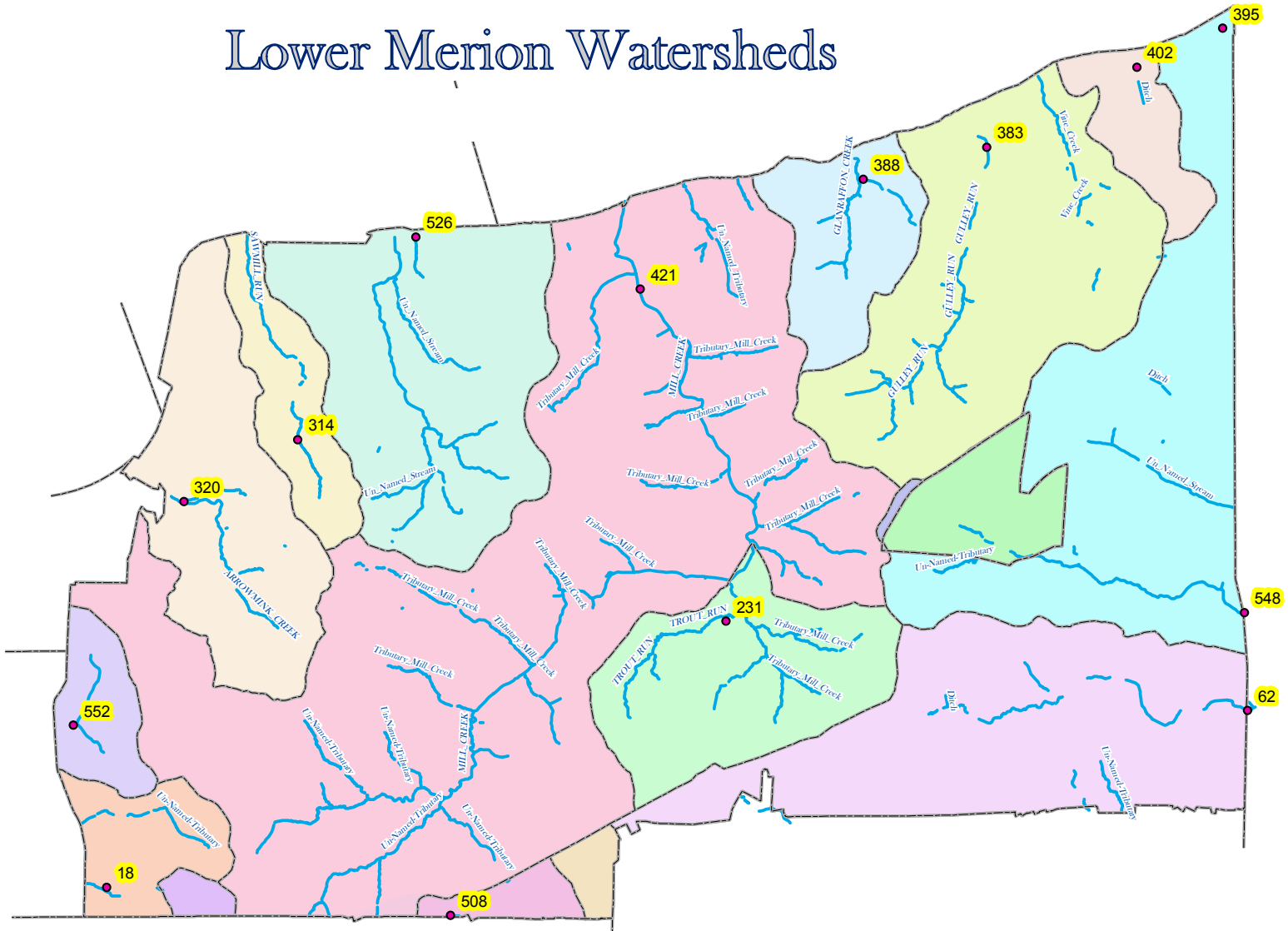


Schuylkill River Watershed



0 5 10 20 30 Miles

Lower Merion Watersheds

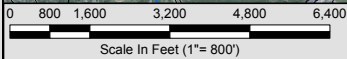
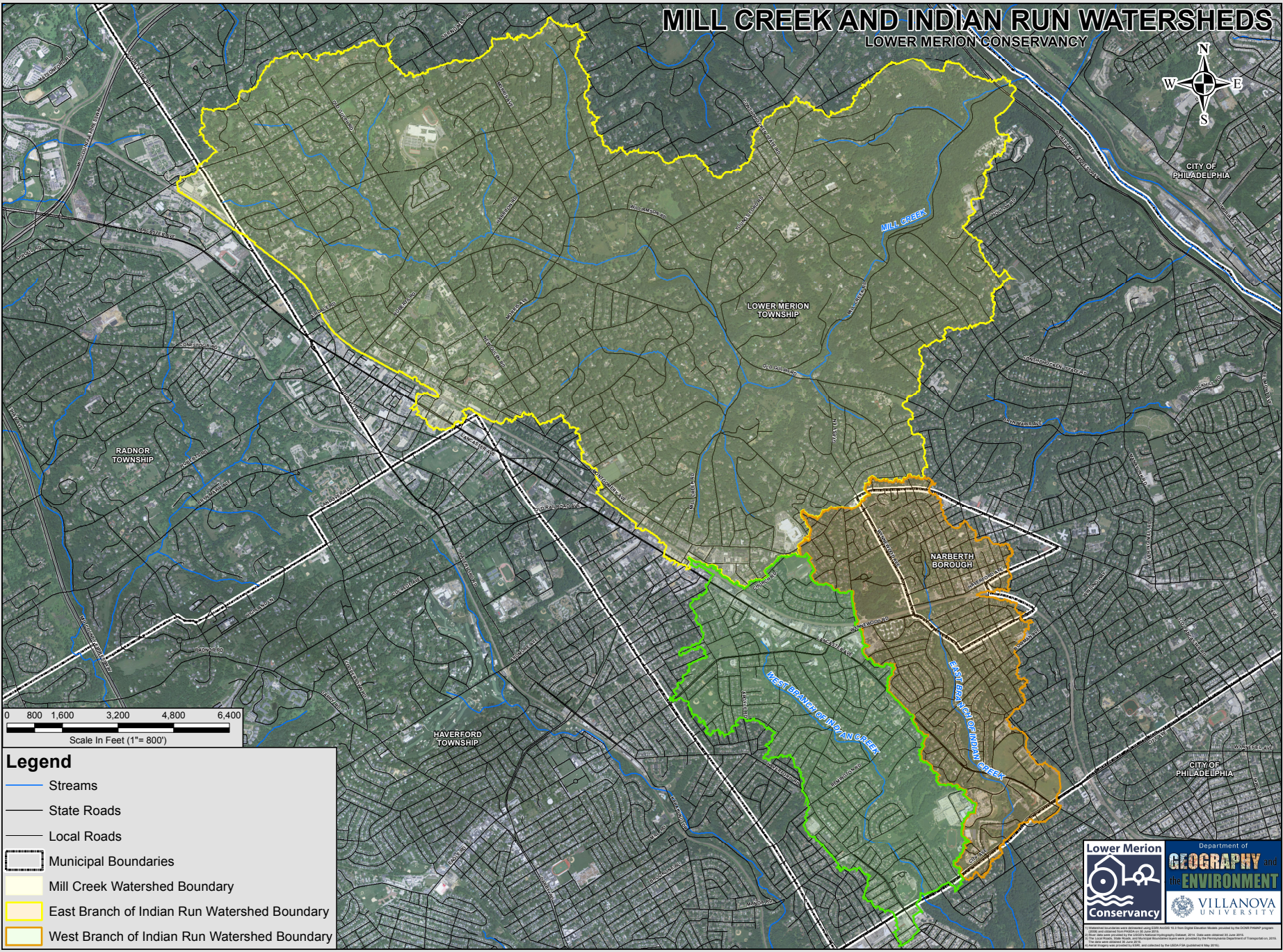


MILL CREEK AND INDIAN RUN WATERSHEDS

LOWER MERION CONSERVANCY



CITY OF PHILADELPHIA



Legend

- Streams
- State Roads
- Local Roads
- Municipal Boundaries
- Mill Creek Watershed Boundary
- East Branch of Indian Run Watershed Boundary
- West Branch of Indian Run Watershed Boundary

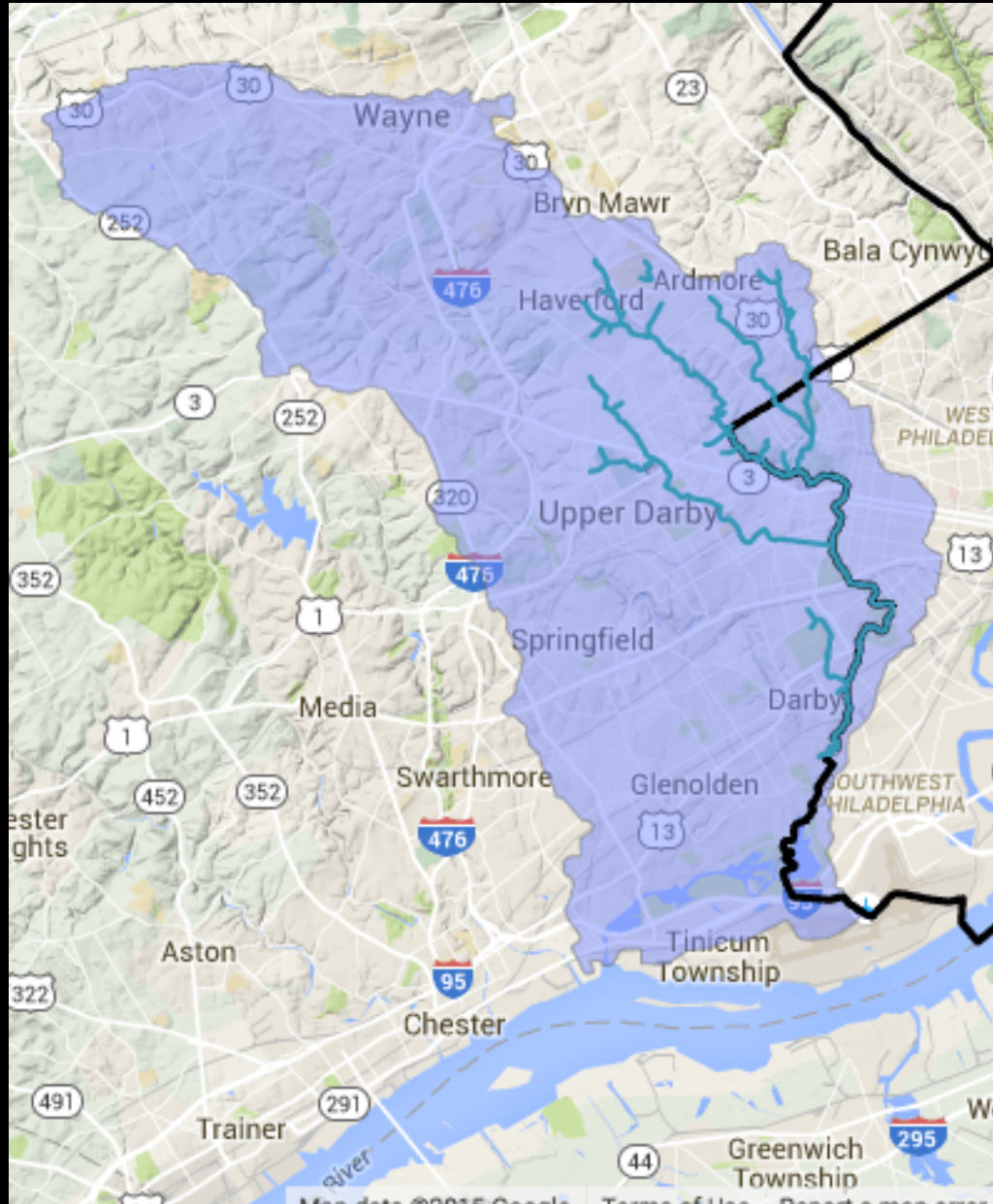
Lower Merion Conservancy

Department of **GEOGRAPHY** and the **ENVIRONMENT**

VILLANOVA UNIVERSITY

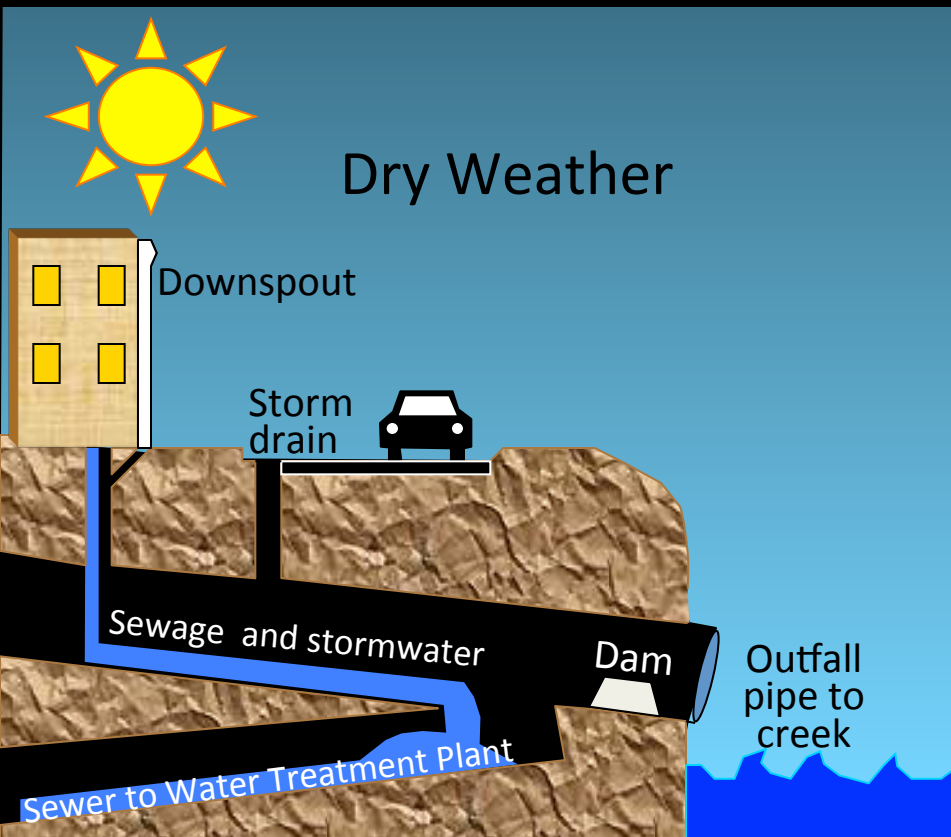
Unauthorized reproduction or reuse of any content herein is prohibited. © 2018, U.S. Topographic Data Service provided by the USGS National Program. The data were obtained for the purpose of this map. All other content is the property of the Lower Merion Conservancy. This map was prepared by the Department of Geography and the Department of Environmental Science at Villanova University. The map was prepared in 2018 and is subject to change without notice. The map is provided as a guide only and is not intended to be used for any other purpose. The map is provided as a guide only and is not intended to be used for any other purpose. The map is provided as a guide only and is not intended to be used for any other purpose.

Darby-Cobbs Watershed



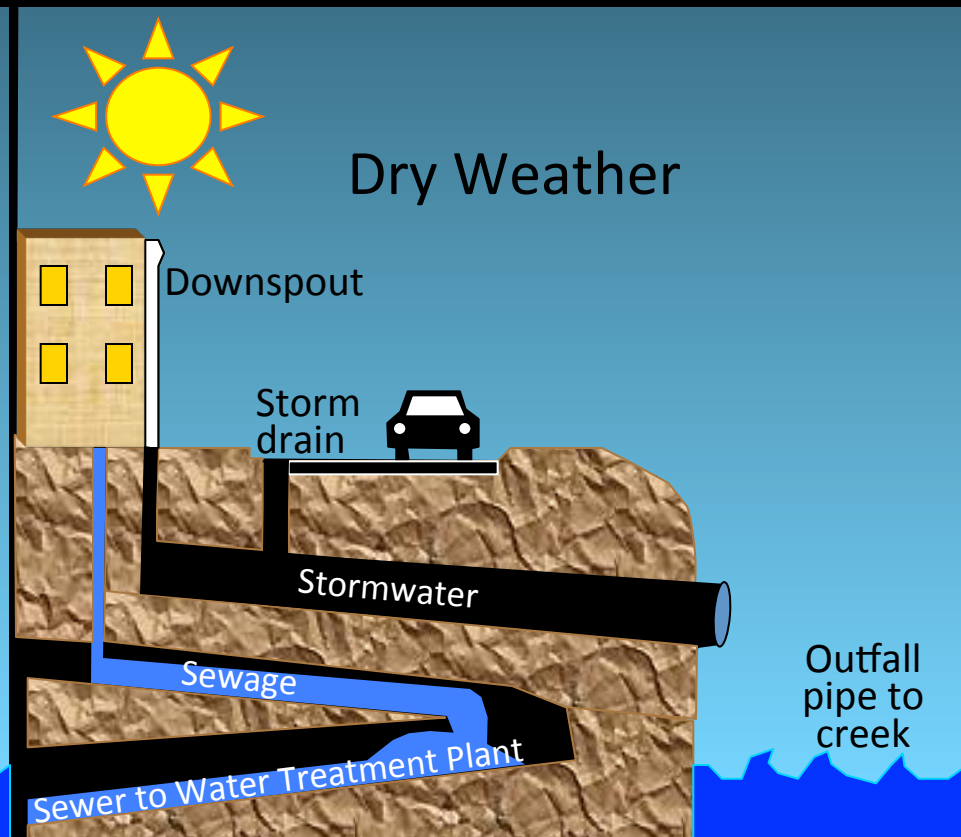
Types of Sewers in Philadelphia

Combined Sewer



60% of Philadelphia

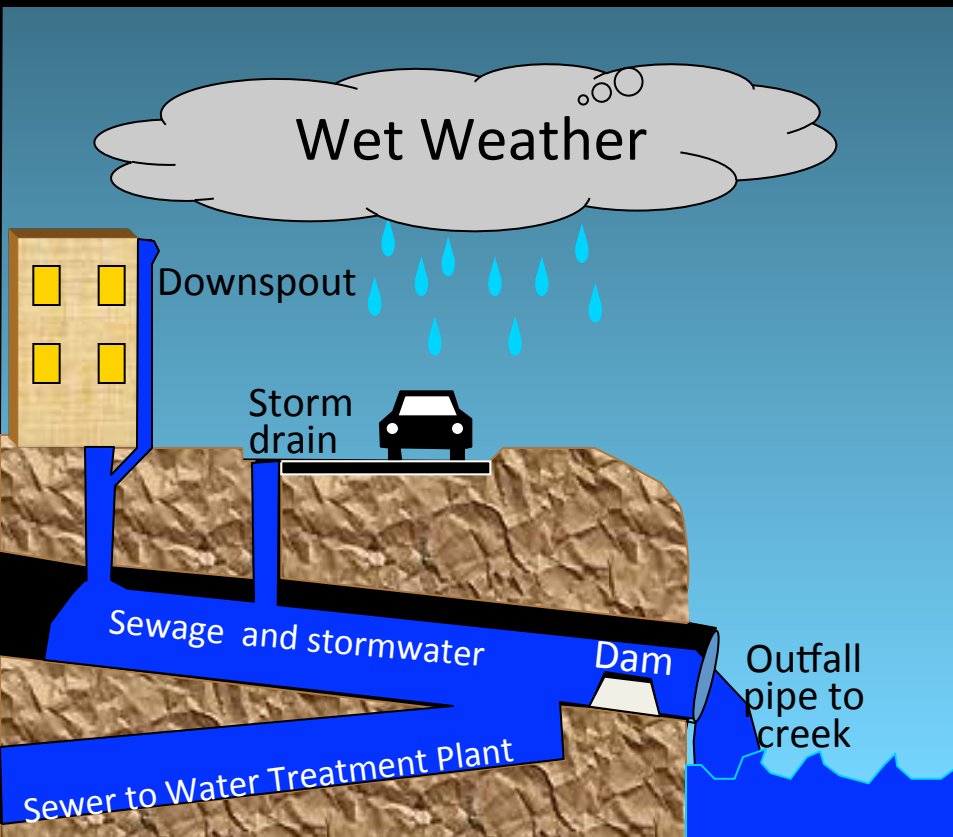
Separate Sewer



40% of Philadelphia

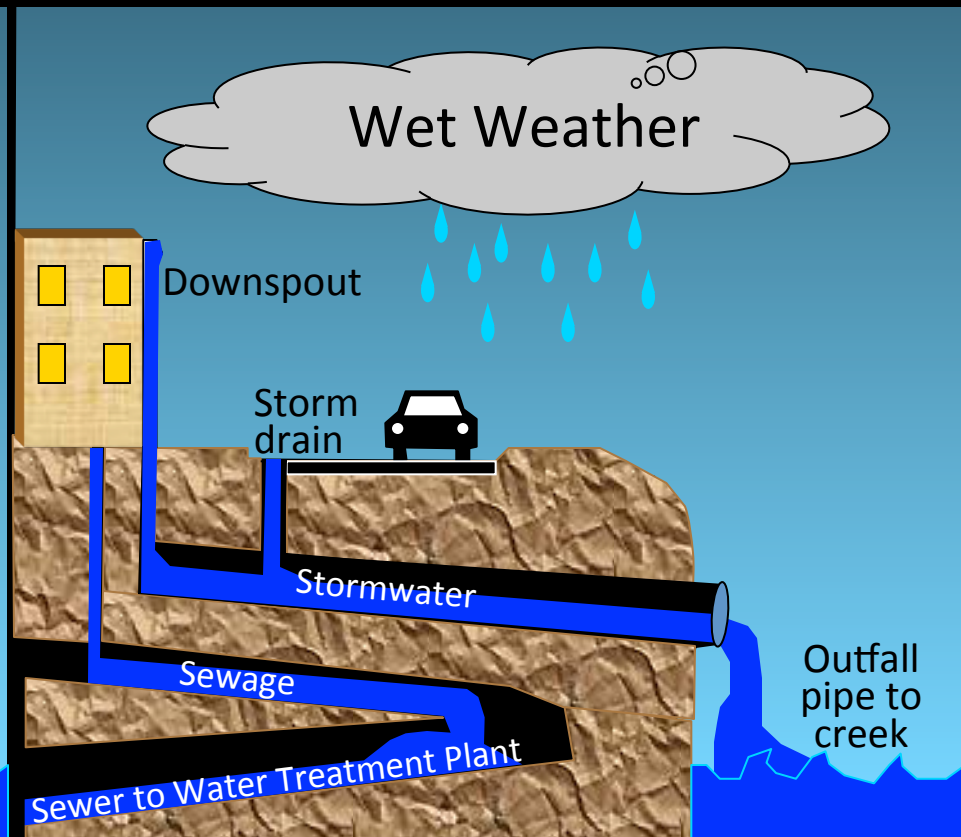
Types of Sewers in Philadelphia

Combined Sewer



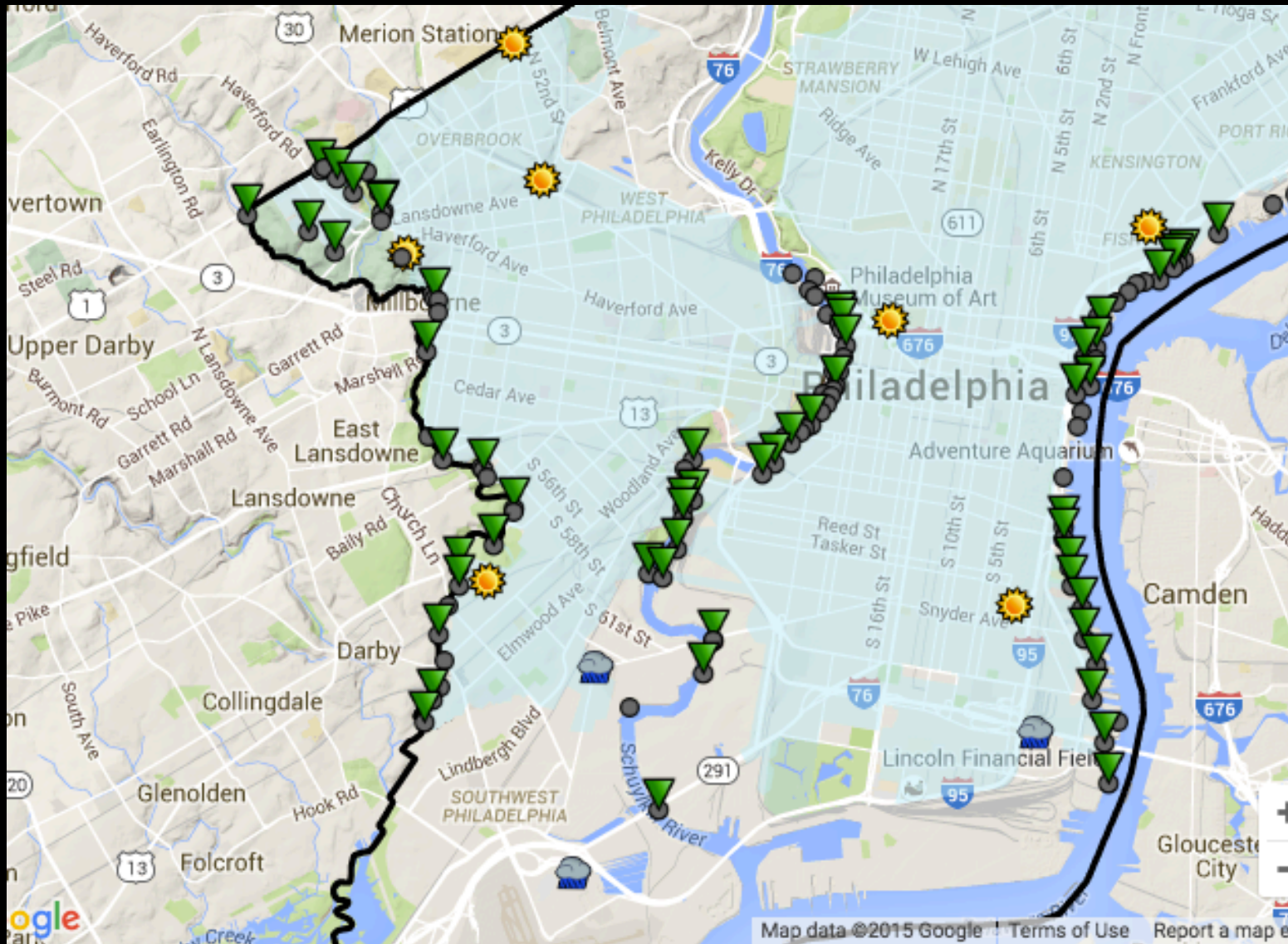
60% of Philadelphia

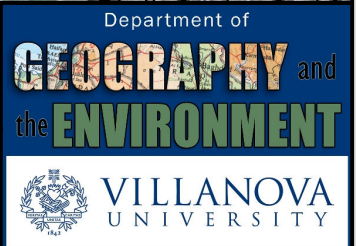
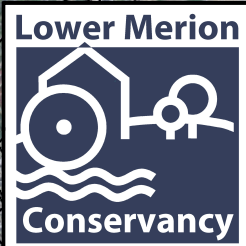
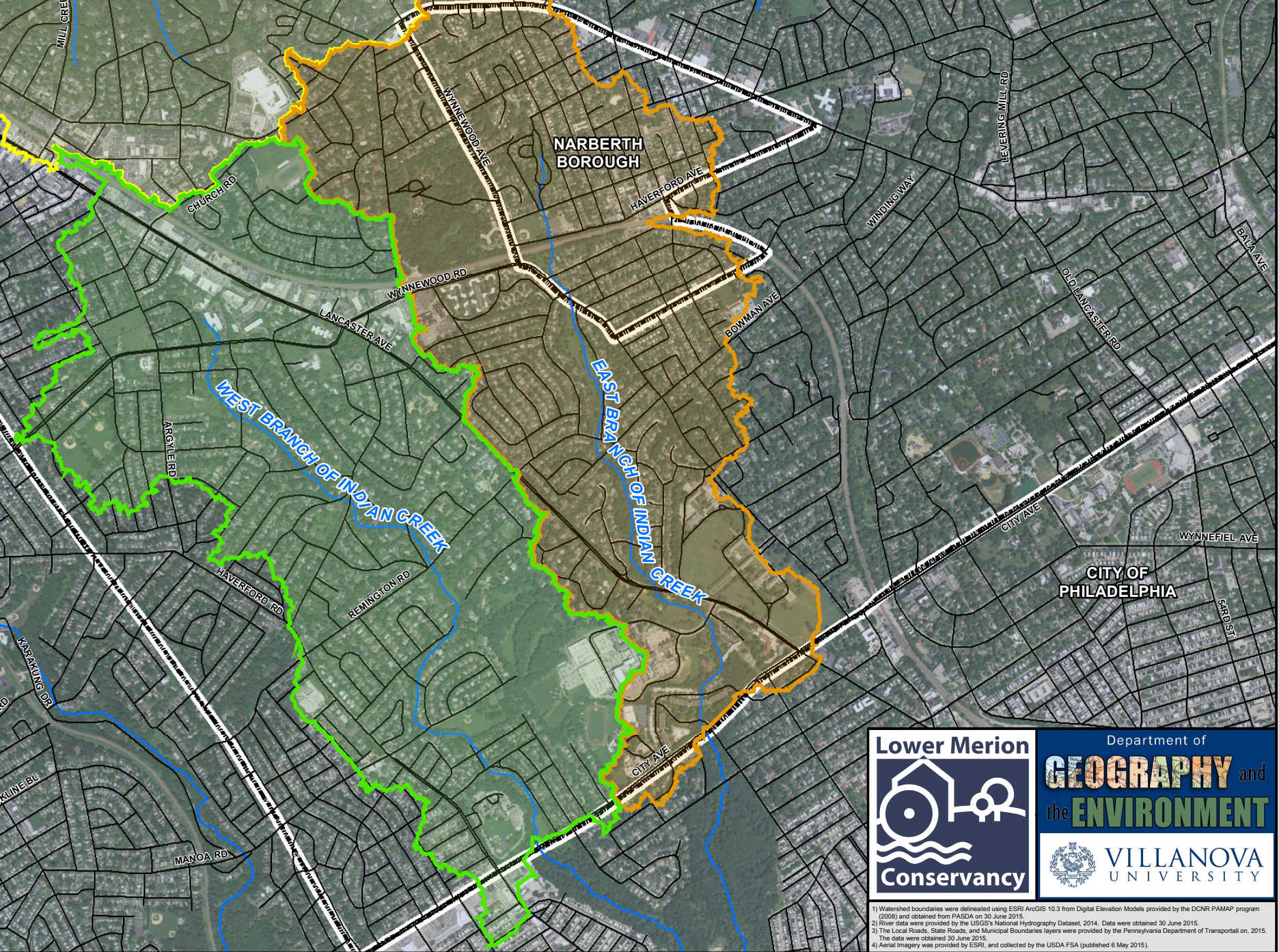
Separate Sewer



40% of Philadelphia

Cobbs Creek CSO





1) Watershed boundaries were delineated using ESRI ArcGIS 10.3 from Digital Elevation Models provided by the DCNR PAMAP program (2009) and obtained from PASDA on 30 June 2015.
 2) River data were provided by the USGS's National Hydrography Dataset, 2014. Data were obtained 30 June 2015.
 3) The Local Roads, State Roads, and Municipal Boundaries layers were provided by the Pennsylvania Department of Transportation on 15 June 2015.
 4) Aerial Imagery was provided by ESRI, and collected by the USDA FSA (published 6 May 2015).

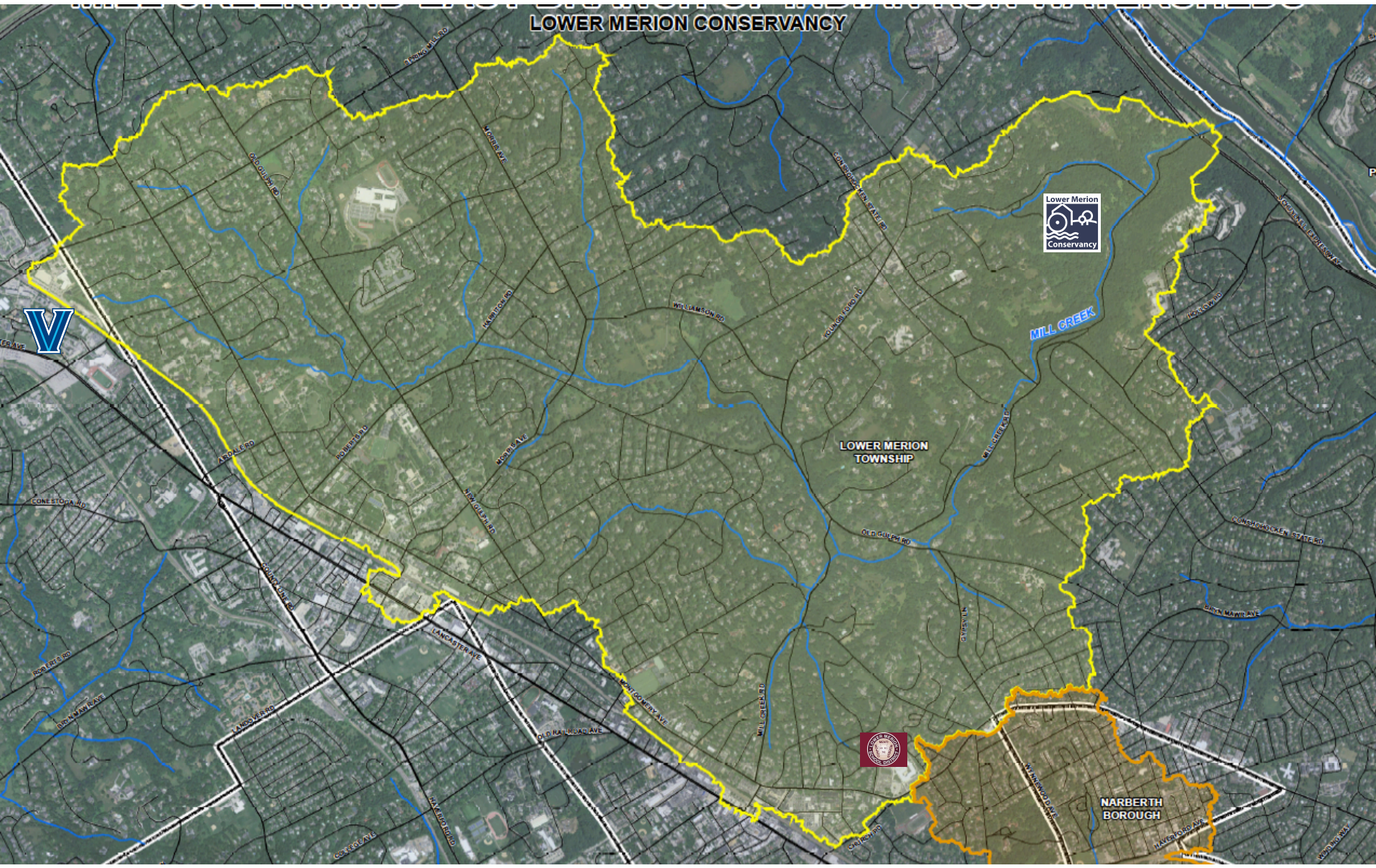
LOWER MERION CONSERVANCY



LOWER MERION
TOWNSHIP

MILL CREEK

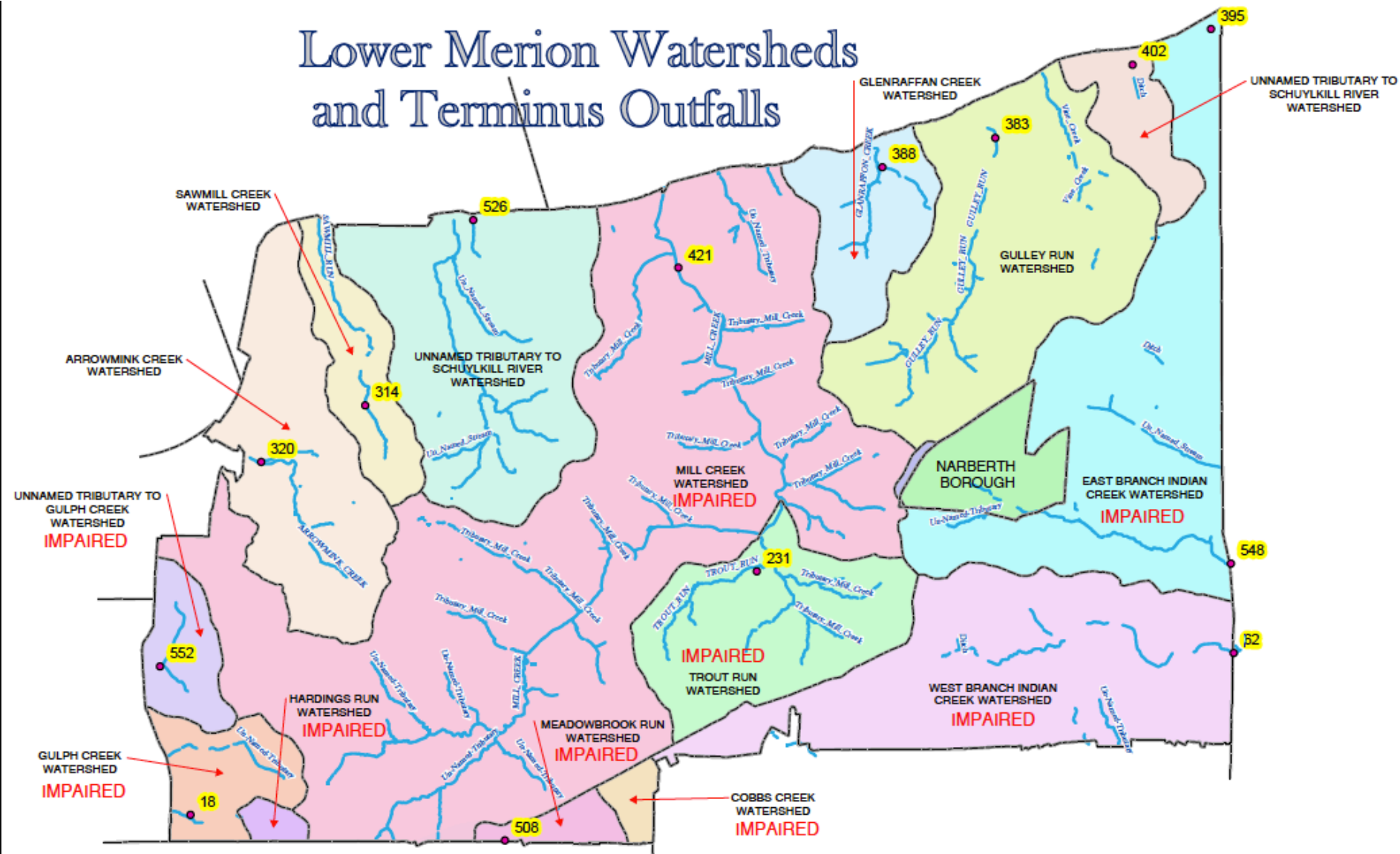
NARBERTH
BOROUGH



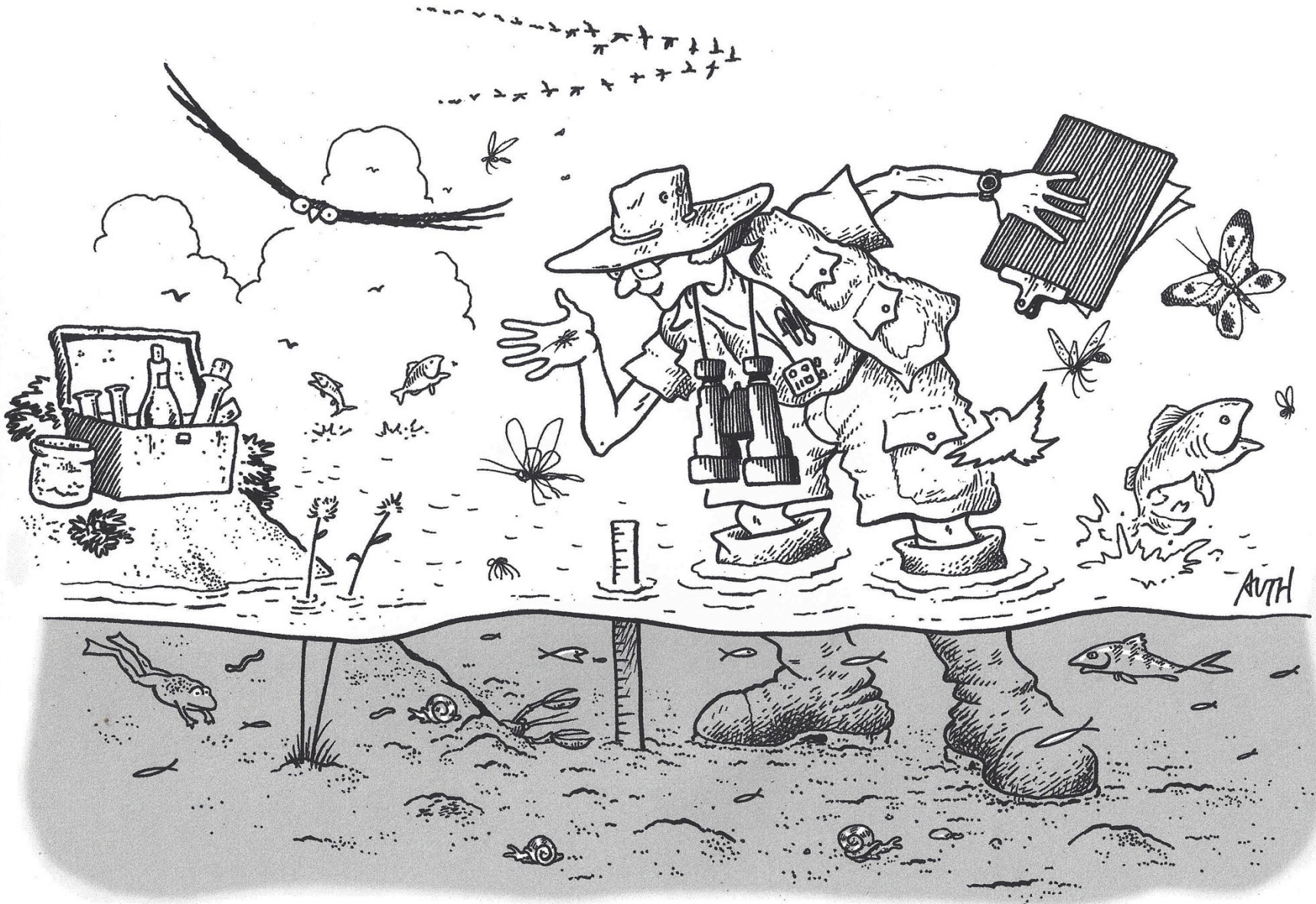
How clean are our streams?



Lower Merion Watersheds and Terminus Outfalls



StreamWatch

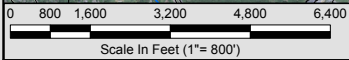
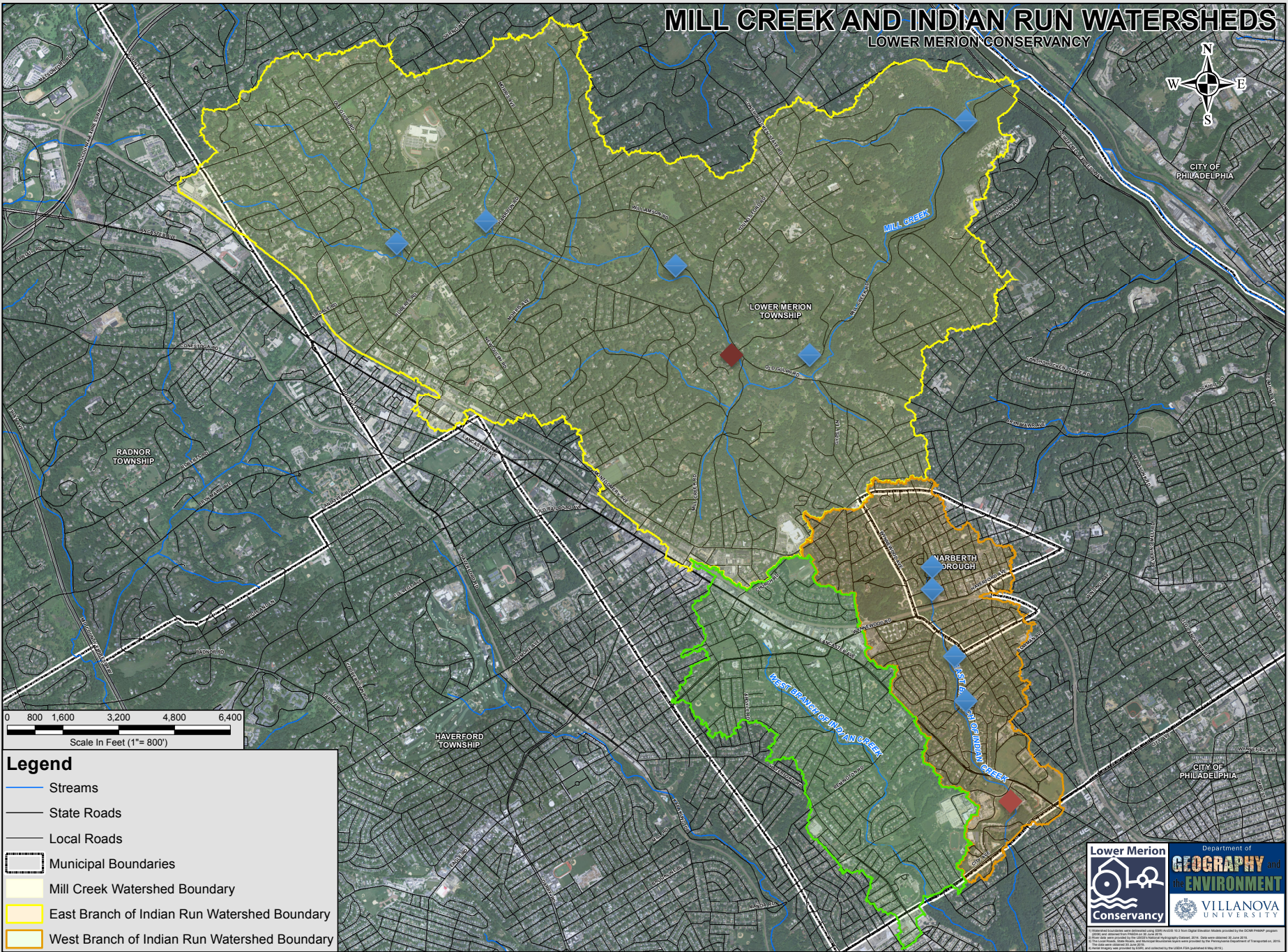


MILL CREEK AND INDIAN RUN WATERSHEDS

LOWER MERION CONSERVANCY



CITY OF PHILADELPHIA



Legend

-  Streams
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-  Local Roads
-  Municipal Boundaries
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Lower Merion
Conservancy

Department of
GEOGRAPHY and
the **ENVIRONMENT**

VILLANOVA
UNIVERSITY

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Chemical Tests

- Chloride

- Measures salinity in water
- Chloride in stream water can reduce amount of available oxygen in the water for animals

- pH

- Measures how acidic or basic water is
- Organisms very sensitive to pH
- Indicates presence of pollutants and heavy metals

- Dissolved Oxygen

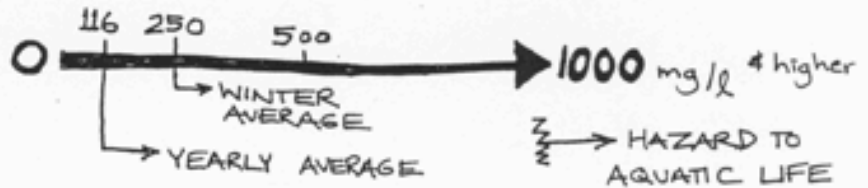
- The amount of available oxygen in water
- Aquatic organisms, especially fish, need oxygen to breath just like terrestrial animals
- The warmer the water, the less oxygen
- Stormwater runoff leads to increased water temperatures

- Nitrate

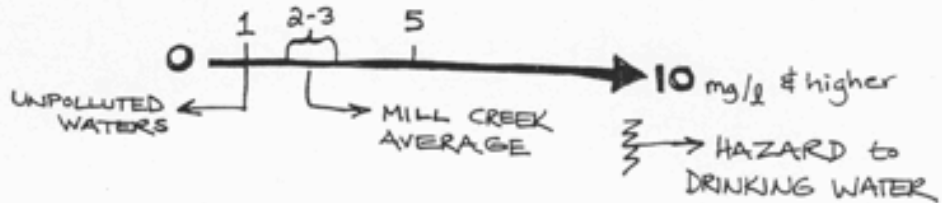
- Nitrates are main component of many lawn fertilizers
- When it rains, nitrates wash off of lawns and gardens into streams
- Nitrates can encourage excessive aquatic plant growth – (algal bloom)
- Excessive plant growth requires more oxygen, which results in lack of oxygen otherwise used by aquatic organisms

INTERPRETING STREAM DATA

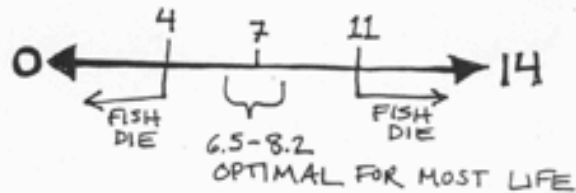
Chloride
Too much is bad.



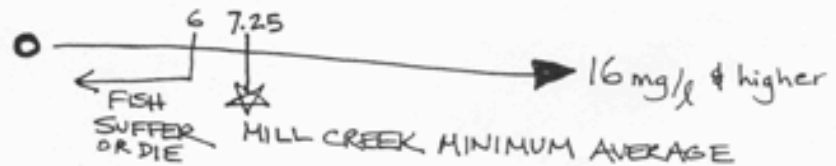
Nitrates
Too much is bad.



pH
Water must be in a certain range.

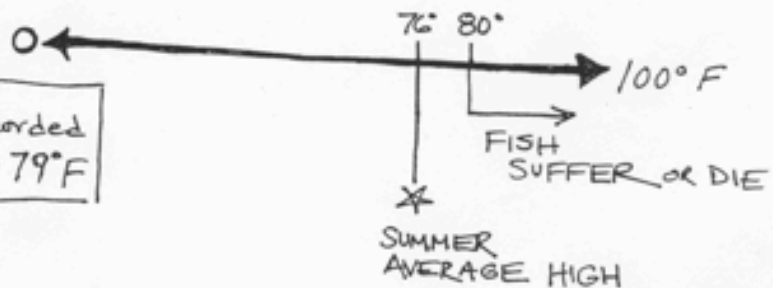


Dissolved Oxygen
Too little is bad.



Temperature
Too high is bad.

For Mill Creek
we have recorded
32°F - 79°F



20
years
of Mill
Creek
Data



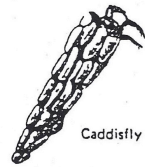
Mill Creek Insects



WHICH STREAM CRITTERS DID YOU FIND?

FIND?
→ CIRCLE THEM

CLASS 1



Caddisfly



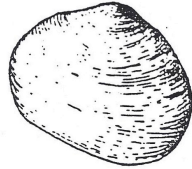
Mayfly



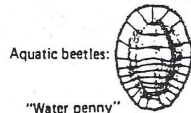
Stonefly



Hellgrammite



Freshwater clam



Aquatic beetles:

"Water penny"



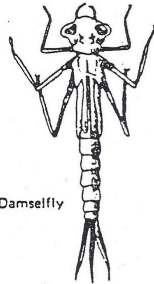
Riffles beetle



CLEAN WATER



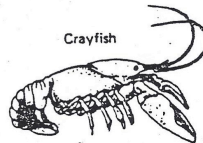
CLASS 2



Damselfly



Dragonfly



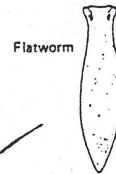
Crayfish



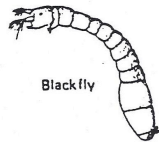
Gill snail



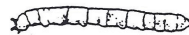
Fingernail clam



Flatworm



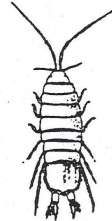
Blackfly



Crane fly



Horsefly



Aquatic sowbug

CLASS 3

Air-breathing snail



Limpet



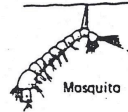
Moth fly



Leech



Mosquito



Midge



Rat-tailed maggot

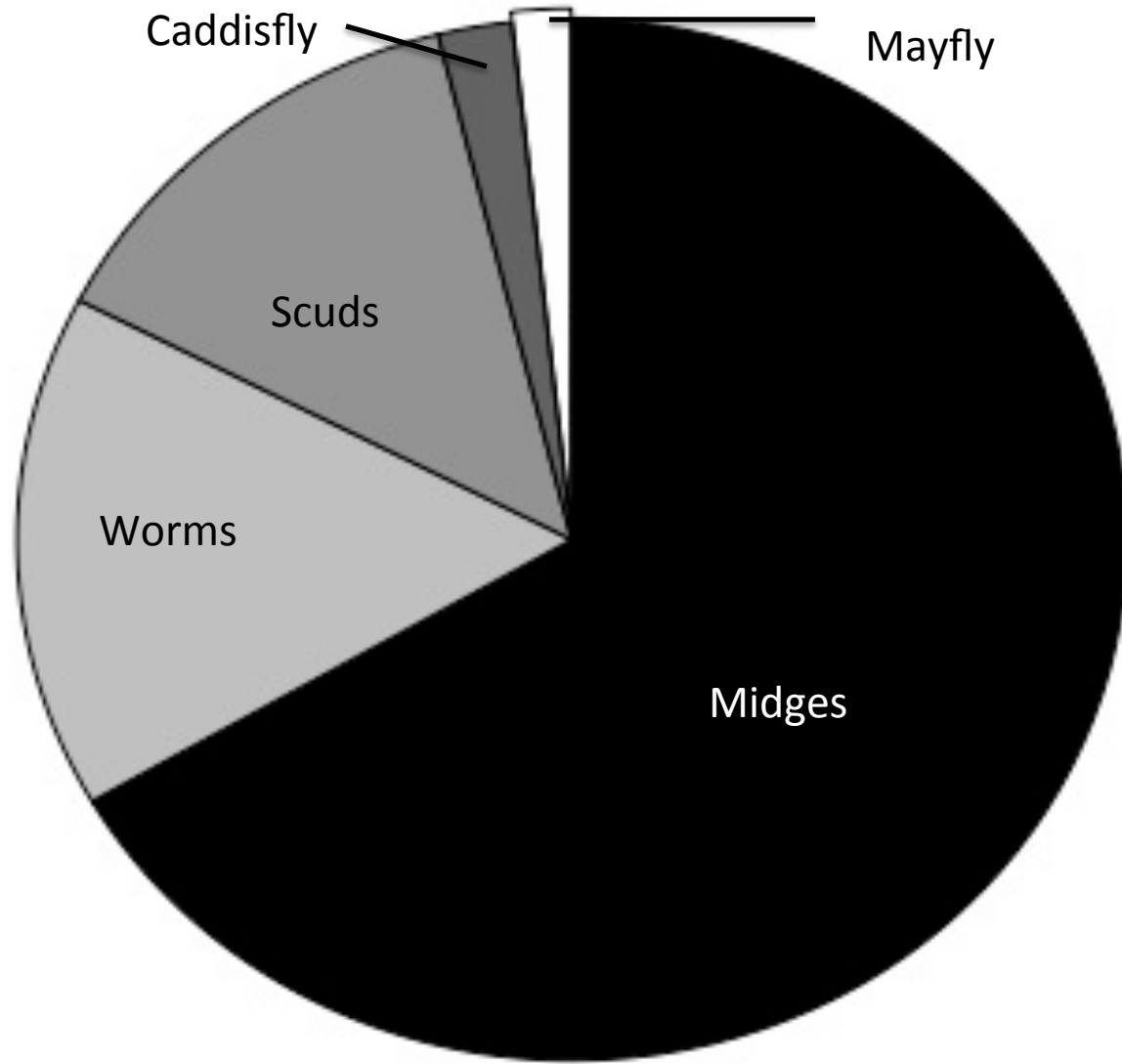
Aquatic earthworms



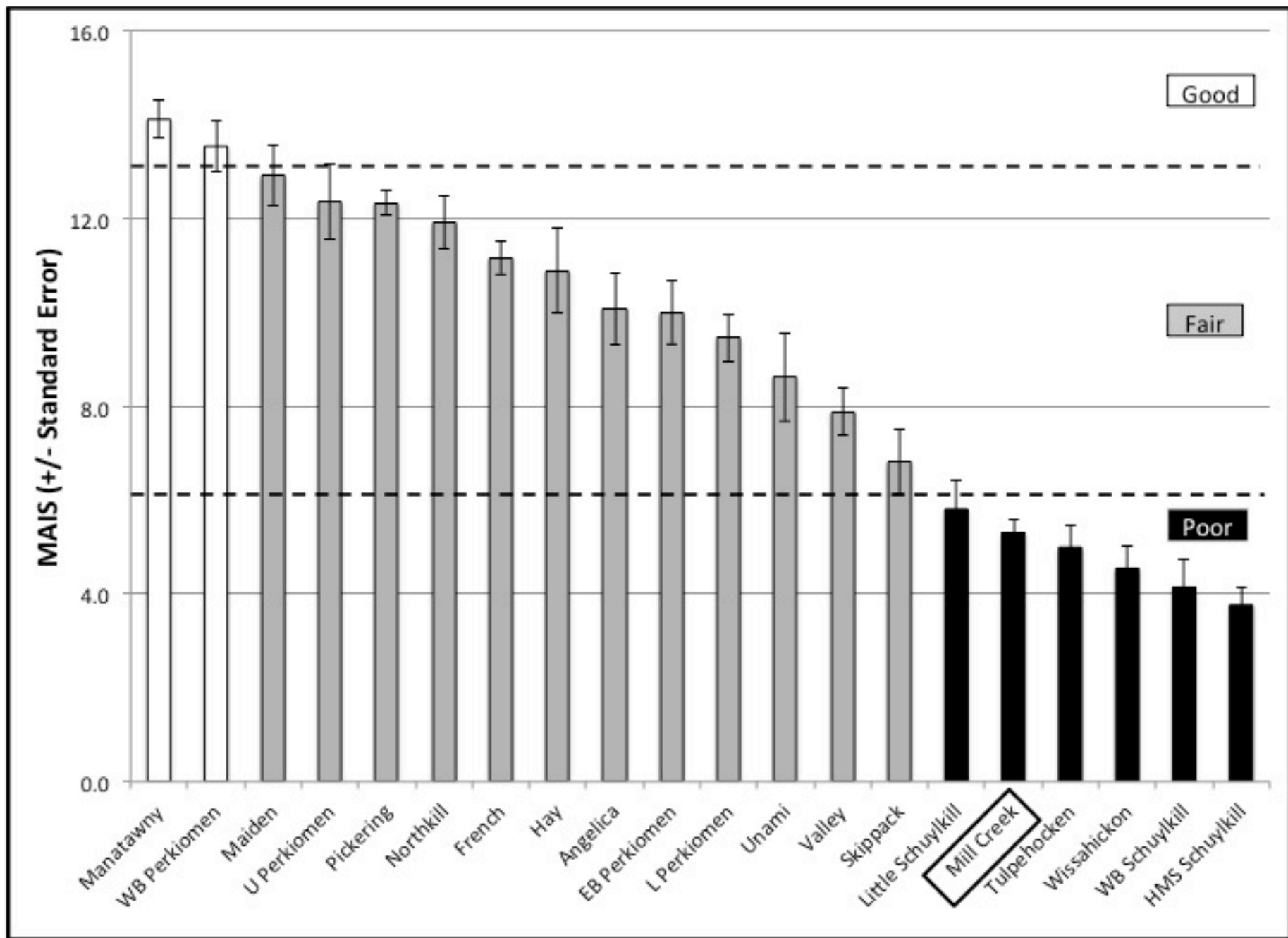
NOT VERY CLEAN WATER



Top 5 Macro in Mill Creek

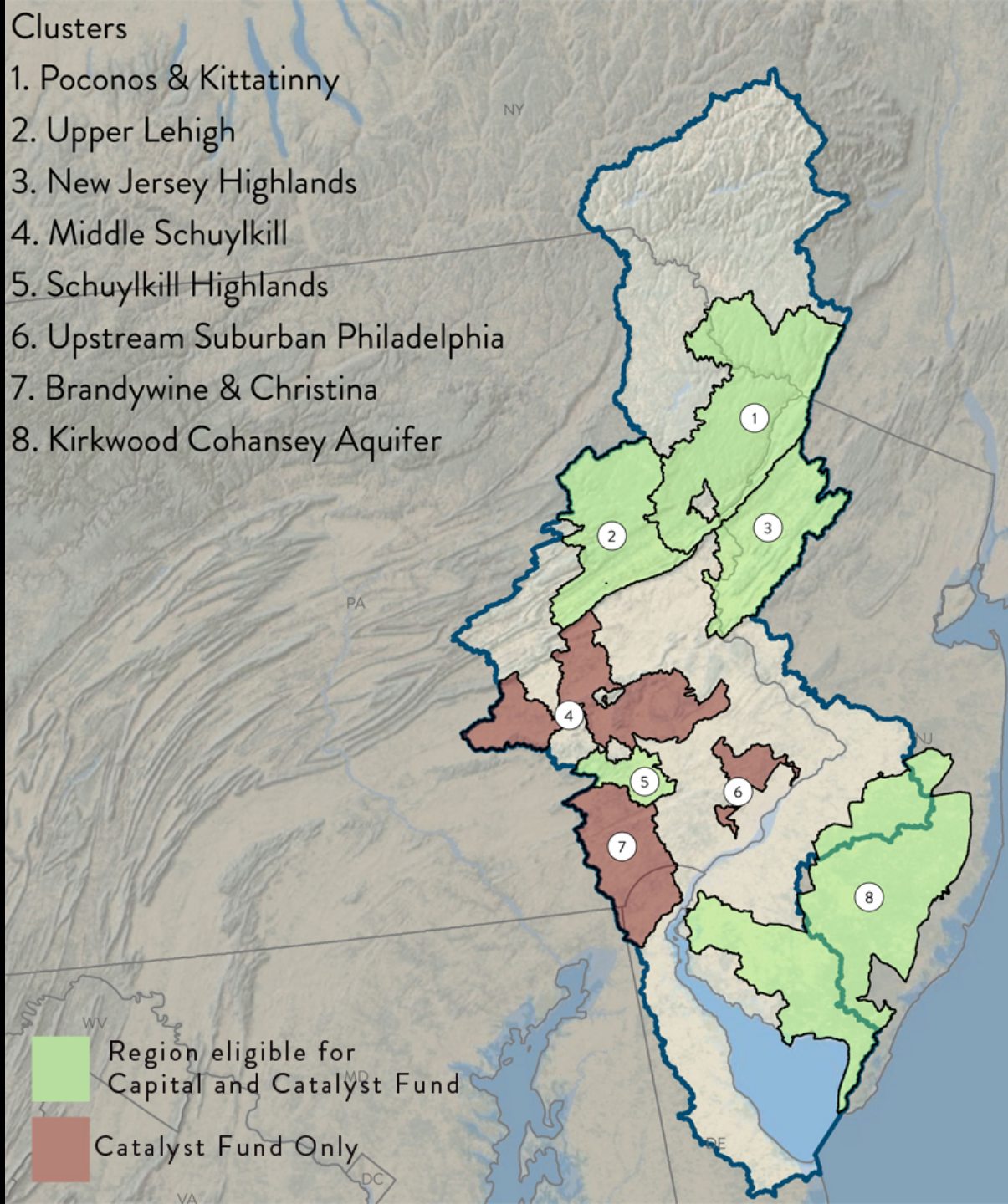


- Chironomidae
- ▣ Oligochaeta
- ▣ Amphipoda
- ▣ Hydropsychidae
- Elmidae

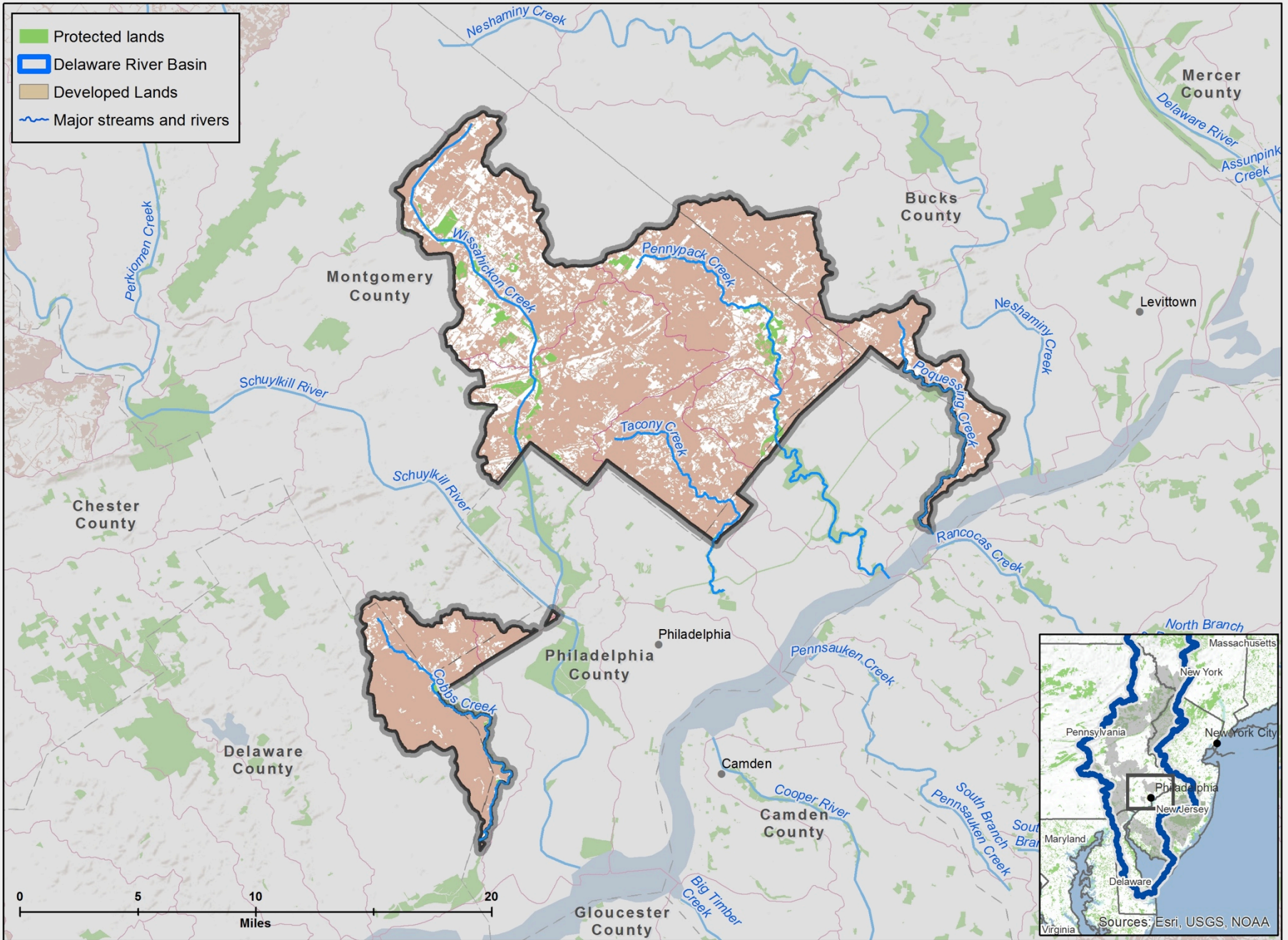


Clusters

1. Poconos & Kittatinny
2. Upper Lehigh
3. New Jersey Highlands
4. Middle Schuylkill
5. Schuylkill Highlands
6. Upstream Suburban Philadelphia
7. Brandywine & Christina
8. Kirkwood Cohansey Aquifer



Upstream Suburban Philadelphia



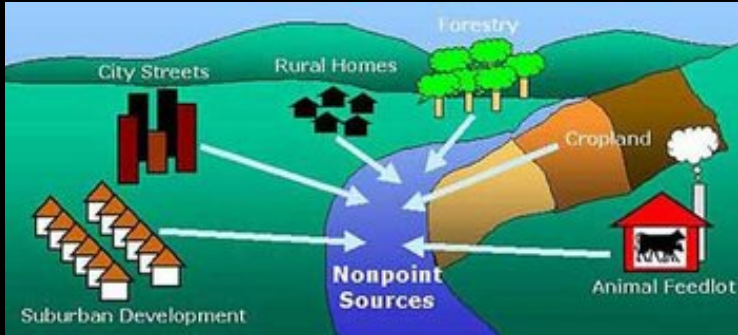
Issues



Two Types of Pollution

Non-Point Source Pollution

Pollution of the water from numerous locations that are hard to identify



Point Source Pollution

Single identifiable source of pollution from which pollutants are discharged



Erosion & Sedimentation



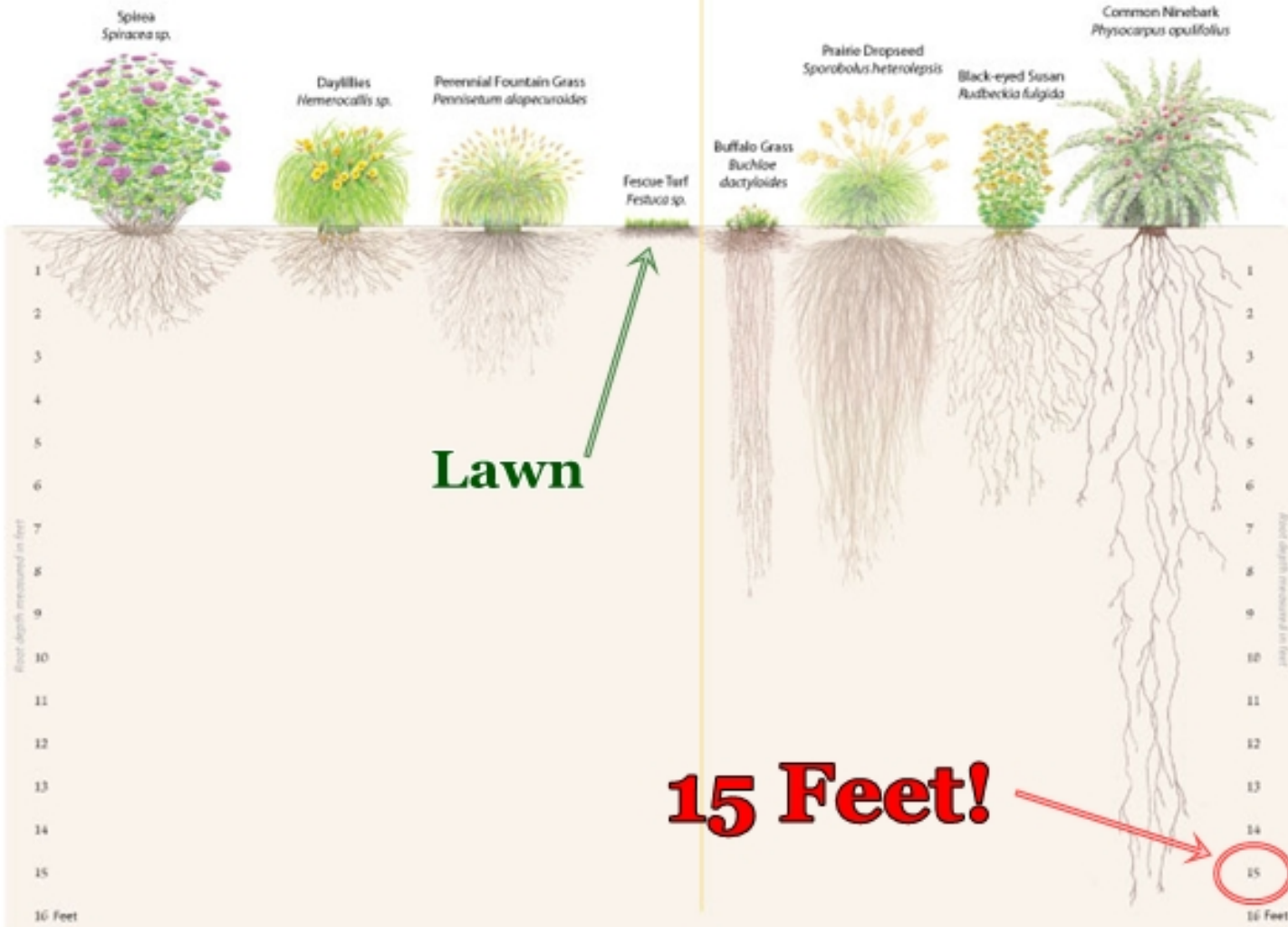
Ashbridge



Shortridge

Non-Natives

Natives



<http://marc.org/environment/Water/images/rootsdiagram.jpg>

Flooding



Road Salt



Township Requirements

- MS4 Permit – Municipal Separate Storm Sewer System



TMDLs – Total Maximum Daily Load 2018

At Home



Green City, Clean Waters

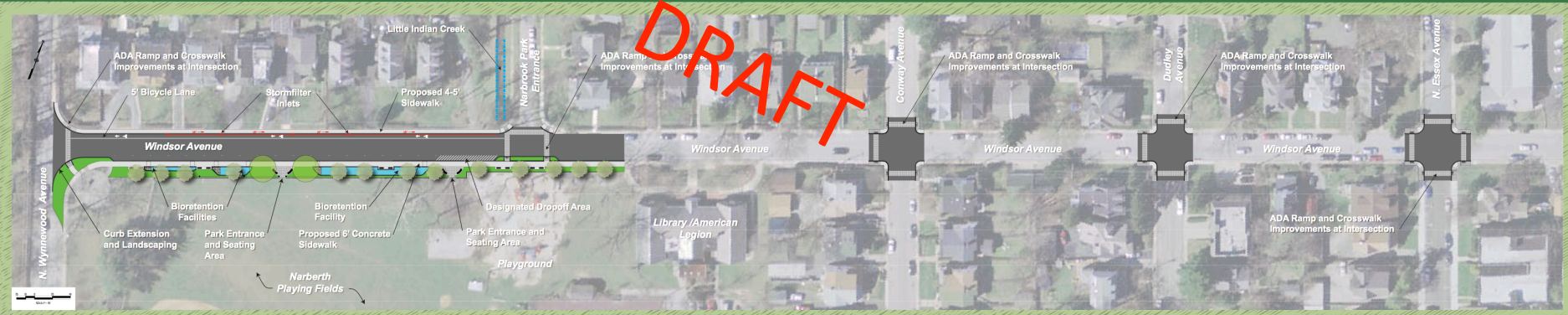


A Green Narberth



WINDSOR AVENUE 'GREEN STREET'

DRAFT



NARBERTH OPEN SPACE IMPLEMENTATION PROJECTS

WINDSOR AVENUE 'GREEN STREET'

Environmental Improvements

