Little Bushkill Creek
2018 Watershed Management Plan
Summary of 2016-17 Activities and Progress

Presented by:
Jason Smith, Senior Scientist
June 2019

Outline
- Introduction
- Program Objectives
- Sampling Plan
- Results
- Recommended Corrective Actions
Introduction

- Little Bushkill Creek Watershed
  - 17.5 square miles
  - 38.8 miles of regulated streams
  - East, West, and Main Branches
- 2010-11 Water Quality Sampling Program
  - Portions of Little Bushkill Creek had elevated fecal coliform levels
- 2012 - PADEP Impaired for Recreational Use - Pathogens

Introduction (cont)

- 2013 - Township Initiated Watershed Management Plan
  - Fecal Coliform water quality sampling
  - Macroinvertebrate Study
- 2014 - Obtained PA DEP Growing Greener Grant funds to continue the Plan
  - Identified additional stream reaches for delisting
  - Continued monitoring where notably impaired
  - Conducted riparian assessments to find sources
  - Identified locations for improvement projects
Introduction (cont)

- 2016-17 - Obtained PA DEP Growing Greener Grant funds to continue the Plan
- Obtained support from the PA DEP Laboratory for Source Tracking Sampling
  - Human
  - Bovine (cow)
  - Swine (pig)
  - Avian (bird)
  - Total

Program Objectives (2016-17)

- Continue monitoring where notably impaired to better determine potential sources
  - Prior sampling locations
  - New sampling locations
- Conduct Source Tracking sampling with PA DEP Laboratory to better determine source cause(s)
- Develop and implement Watershed Restoration Plans
  - Farm along Delabole Road Tributary
  - Farm along Benders Church Road Tributary
- Identify additional corrective measures/actions
Sampling Plan (2016-17)

- **Sample Types**
  - Monitoring
  - Source Tracking

- **Sampling Periods/Sample Methods**
  - Baseflow samples collected during low flow conditions in June 2016 and September 2016 and 2017
  - Stormflow samples collected during high flow conditions in December 2016

- **Parameters Collected**
  - Fecal coliform and Fecal enterococcus
  - Nitrates and other water quality parameters (temperature, dissolved oxygen, pH, and conductivity)
  - Source Tracking (qPCR)

Sampling Plan (cont)

- **Locations**
  - West Branch
  - Heimer Road Spring Tributary
  - Delabole Road Tributary
  - Benders Church Road Tributary
  - Browntown Road Tributary
  - Wind Gap Borough
Results

- Fecal Coliform
- Fecal Enterococcus
- Source Tracking (qPCR)
- Nutrients
- Field Parameters
In 2016, the West Branch within Plainfield Township was delisted by PA DEP
  Two tributaries within Wind Gap Borough remain listed
Many sampling locations continued to show elevated levels, as expected
Fecal enterococcus levels were generally high and did not provide conclusive data
Source Tracking locations provided a better understanding of potential sources at two suspected locations
Source Tracking

- DNA Testing – Gene Counts
- Conducted at a limited number of locations
- Help to determine source as:
  - Human
  - Bovine (cow)
  - Swine (pig)
  - Avian (bird)
  - Total (all species)
- Notable results
  - Bovine at E-BCR-0.4 – 8,190 gene counts
  - Human at E-DRT-0.1 – 98,100 gene counts
Nutrient Sampling Results

- Nitrate plus Nitrite and Total Kjeldahl Nitrogen (TKN)
  - Determine potential association with wastewater as a source
  - May also indicate agricultural runoff inputs
- All locations were within the EPA acceptable range for Nitrate plus Nitrite
- Some locations on Benders Church Road Tributary, Delabole Road Tributary, and Browntown Road Tributary exhibited slightly elevated levels of TKN
Field Parameters

- **Temperature**
  - Warmer water temperatures
    - July 2016 - excessive
  - **Dissolved Oxygen**
    - Generally within normal range
    - Minor outliers - springs, small streams, ponds
  - **pH**
    - Normal range for all stream locations
    - Minor outliers - ponds and springs
  - **Conductivity**
    - Within normal range for most locations
    - Minor outliers close to normal range
Recommendations

- **West Branch**
  - Entire section within Plainfield Township was delisted in 2016 and 2018 Integrated Reports
  - Monitoring for this reach should be continued on an “as needed” basis through the Township’s MS4 Program
  - Corrective actions should be implemented for any identified sources

Recommendations

- **West Branch (cont)**
Recommendations (cont)

- **East Branch (main stem)**
  - No corrective measures recommended
  - Recommended corrective measures implemented on the tributaries should improve water quality in the main stem
Recommendations (cont)

- **Delabole Road Tributary**
  - Conduct additional sampling
    - Most existing locations
    - New locations
      - 2-4 locations between E-DRT-0.1 and E-DRT-0.4
      - 1 location between E-DRT-0.4 and E-DRT-1.1
  - Discontinue sampling for certain tributaries and watershed areas
  - Restore riparian buffers
    - Residential areas
    - Agricultural areas
  - Implement grassed waterways
Heimer Road Spring Tributary

- Conduct additional sampling during spring or wet period
  - Add sampling locations upstream of E-HRS-0.4, as needed, to better determine potential source
  - Determine and implement corrective actions, as needed
- Design and implement agricultural BMPs
  - Restore riparian buffers
  - Grassed waterways
Recommendations (cont)

- **Benders Church Road Tributary**
  - Conduct additional sampling
    - Most existing locations
    - New locations
      - Between E-BCR-0.4 and E-BCR-0.6
      - As needed upstream of E-BCR-0.9
      - Corrective actions should be implemented for any identified sources
  - Discontinue sampling for certain tributaries and watershed areas
  - Implement Agricultural BMP #1
    - Livestock fencing
    - Livestock crossing
    - Shade and watering facilities
  - Restore riparian buffers
Recommendations (cont)

- **Browntown Road Tributary**
  - Conduct additional sampling
    - Most existing locations
    - Conduct additional sampling upstream of M-BT-0.5-T during spring or wet period to better determine potential source(s)
    - Determine and implement corrective actions, as needed
  - Discontinue sampling for certain tributaries and watershed areas
Recommendations (cont)

- Wind Gap Borough
  - Conduct additional sampling
  - Conduct desktop review of wastewater collection system
  - Inspect collection system
  - Repair/replace components, as needed
  - Work with landowners to restore riparian buffers
  - Implement planning measures for protection and restoration of riparian buffers

Recommendations (cont)

- Wind Gap Borough (cont)
General

- Consider implementing an ordinance for septic system maintenance
- Consider implementing an Official Map for protection of riparian corridors
- Consider implementing an Open Space Program that includes preservation of natural areas
- Consider updates to existing ordinances for improved water quality protection
- Work closely with Conservation District and NRCS for implementation of agricultural plans on farms
Recommendations (cont)

- **General (cont)**
  - Continue to provide educational materials to residents
  - Review and update the Act 537 Sewage Facilities Plan
  - Conduct evaluation of stormwater management needs
  - Continue to monitor all listed stream segments with ultimate goal to delist

Ongoing Corrective Actions

- **Delabole Road Tributary**
  - Farm – Agricultural BMPs
    - Stream buffer reestablishment
    - Native trees and shrubs
    - 35-foot average buffer width
    - Livestock fencing
    - Riparian buffer plantings
    - Livestock crossing
    - Equipment crossings
    - Livestock watering facility
Ongoing Corrective Actions

- Benders Church Road Tributary
  - Farm - Agricultural BMPs
    - Stream buffer reestablishment
    - Native trees and shrubs
    - 35-foot average buffer width
    - Livestock fencing
    - Riparian buffer plantings
    - Stormwater infrastructure