



Healthy Watersheds

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WATER RESOURCES
SUPERVISOR

CARROLL COUNTY
GOVERNMENT

Hydrologist

Hydrology - The science that encompasses the occurrence, distribution, movement and properties of the waters of the earth and their relationship with the environment.

CHALLENGE:

RESTORING WATERSHED
HEALTH.



Buzzard Rocks – Passage Creek Watershed





Key Staff

Water Resources Engineer

Hydrogeologist

Water Resource Specialist

Water Resource Technician

Water Resource Intern



1980



2000

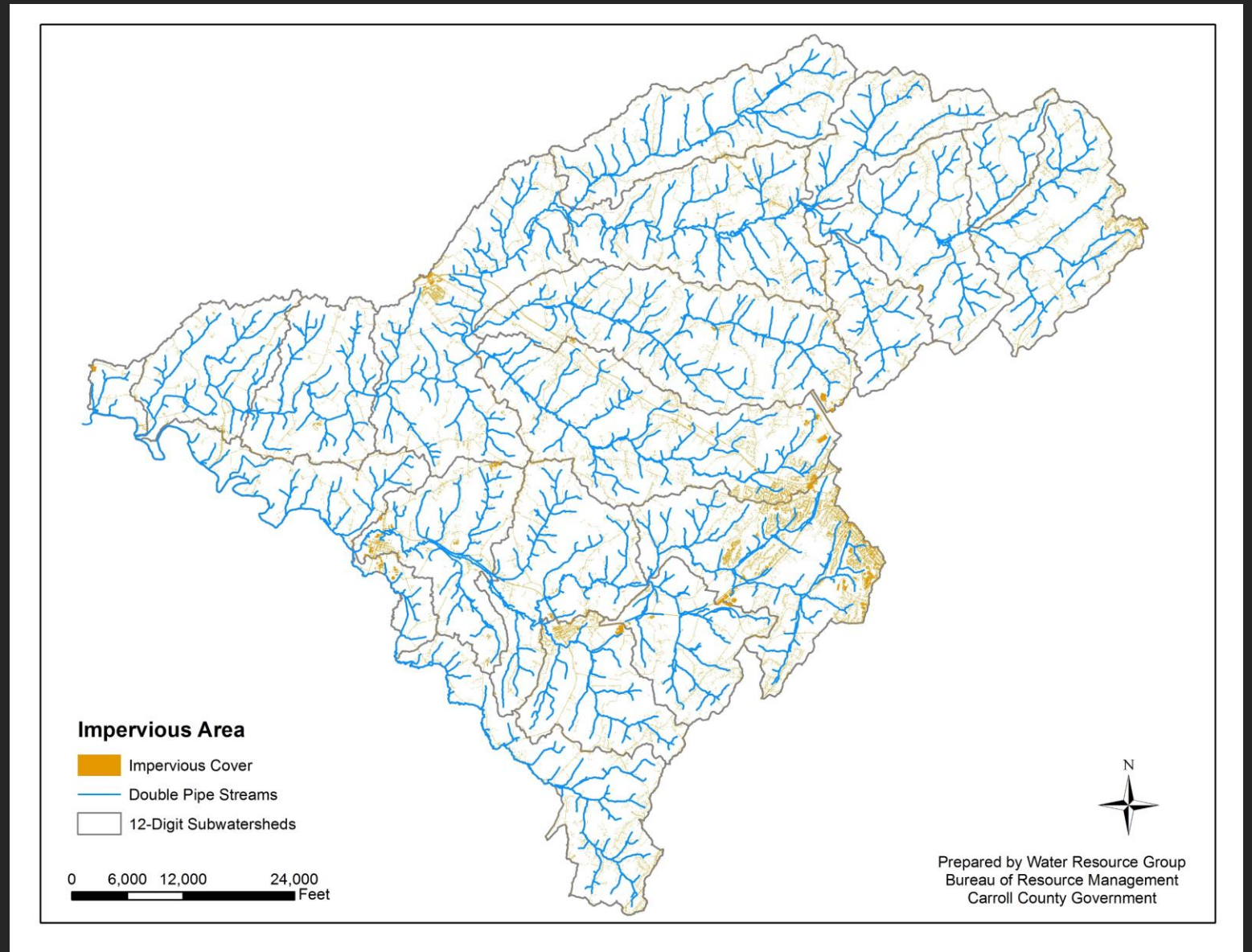


2020

Land Use Change

Impervious Surfaces

- Buildings, Parking Lots and Rooftops
- Roads, Driveways and Sidewalks



Erosion



A photograph of a stream in a forest. A large, weathered tree trunk lies across the stream, partially submerged. The banks are covered in snow and fallen leaves. The water is dark and reflects the surrounding environment. The background shows a dense forest of trees.

Stream Corridor Assessments



Stream Corridor Assessments



Restoring Watersheds |

An aerial photograph of a residential neighborhood. A central area is highlighted as a wetland, featuring a large, irregularly shaped pond with a rocky shoreline and a large, brownish, textured area that appears to be submerged gravel. The surrounding area is densely packed with houses, many of which have swimming pools. A road curves around the wetland area. In the bottom right corner, there is a vertical scale bar with a plus sign at the top and a minus sign below it, indicating zoom controls.

Submerged Gravel Wetland



Submerged Gravel Wetland





Sep 9, 2021 at 12:06:26 PM
911 Meadowgreen Dr
Mount Airy MD 21771
United States

Submerged Gravel Wetland

Northern
Leopard
Frog





Stream Restoration



Willow Project – Stream Restoration



Willow Project – Stream Restoration



Willow Project Stream Restoration (Before)



*Willow Project Stream
Restoration (After)*

Mayberry Project
Stream Restoration





Mayberry Project – Stream Restoration



Mayberry Project – Stream Restoration



Mayberry Project – Stream Restoration



Mayberry Project – Stream Restoration





Tree Plantings

Stream Shading or Cooling

Flood Control

Streambank Stabilization

Nutrient Uptake

Wildlife Corridors and Food Source





Water Quality Monitoring



Water Quality Monitoring Parameters

Chemical Monitoring

- Nutrients/Pollutants in Stream
- Chloride (salt), Nitrogen, Phosphorus, Sediment, Bacteria

Geomorphological Monitoring

- Stream Movement
- Measures Erosion

Biological Monitoring

- Living Stream Life
- Macro-invertebrates and Fish

Chemical Monitoring



Chemical Monitoring

Collect Water Sample

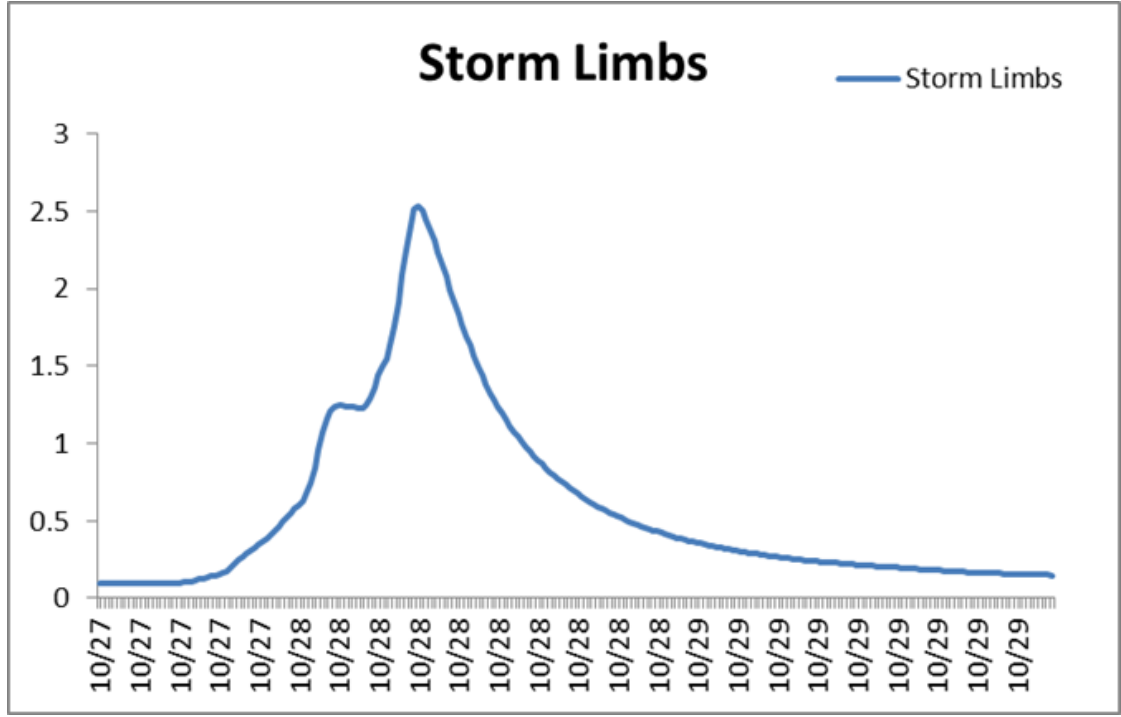
- Nitrogen, Phosphorus, Sediment

Physical Measurements

- pH (6.5-8.5)
- Dissolved Oxygen (>5.5 mg/L)
- Temperature (<68F Brook Trout)

Measure Stream Flow

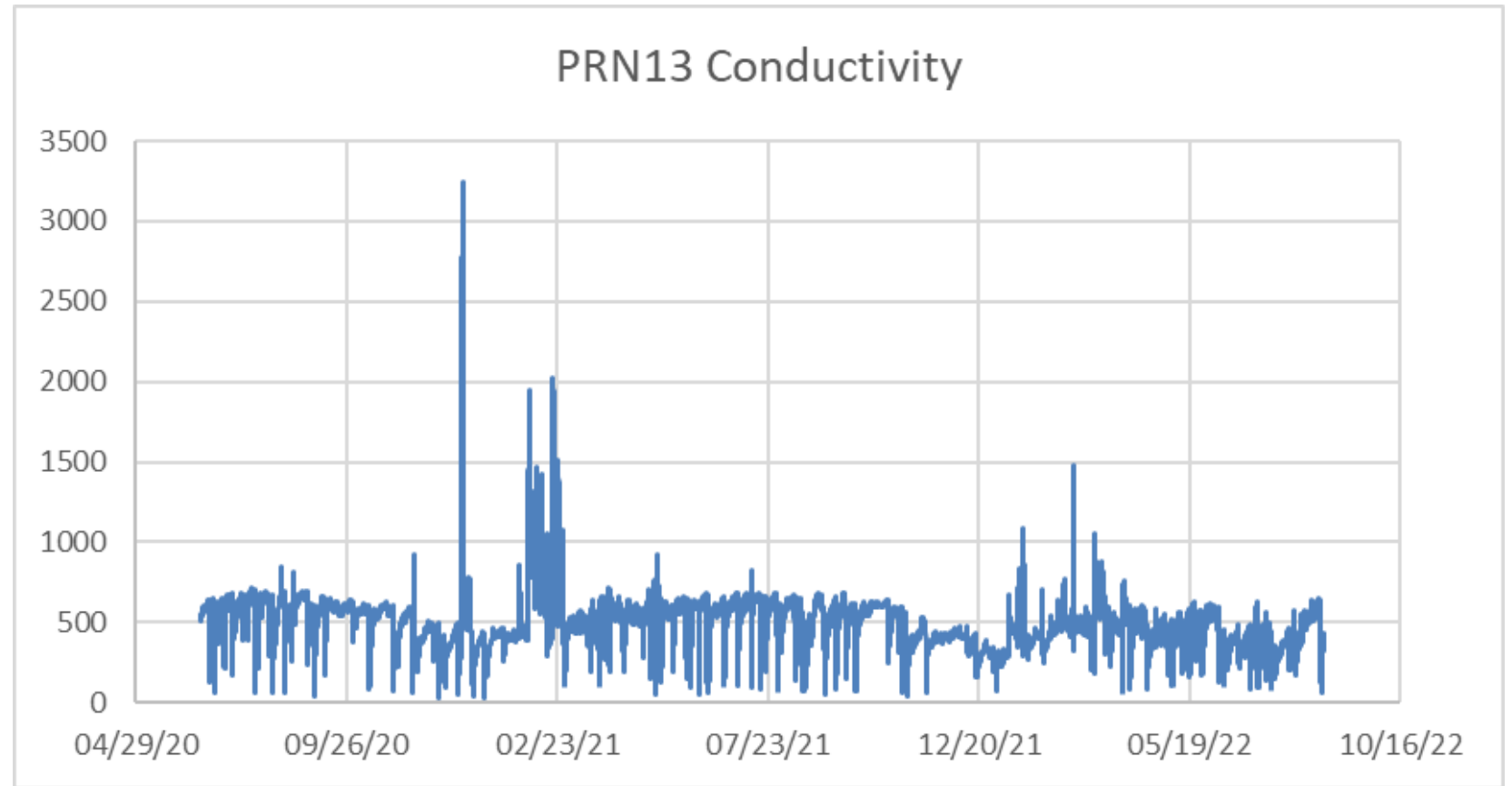




Chemical Monitoring - Automated

Chemical Monitoring





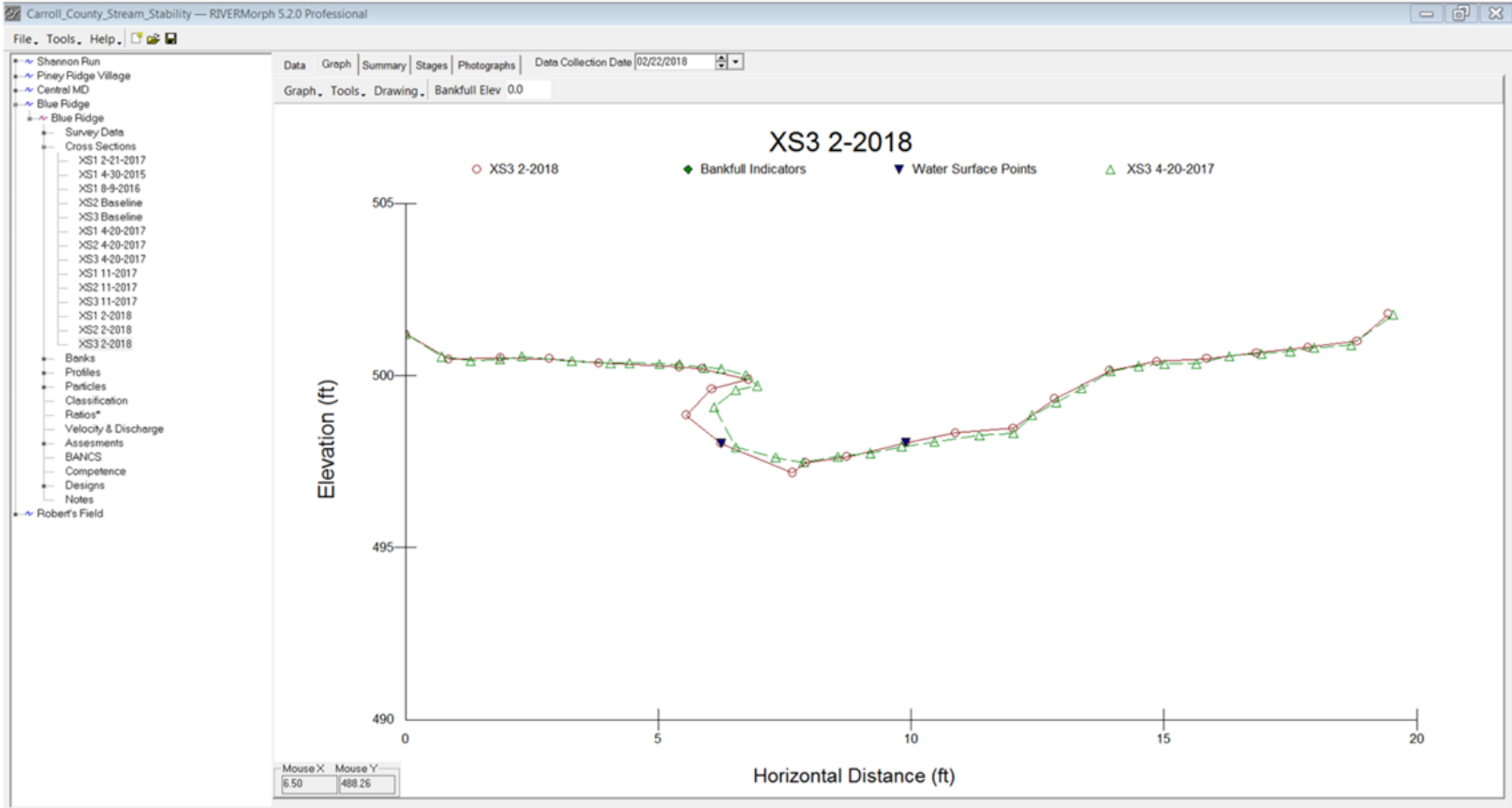
Stream Conductivity (Salt)



Geomorphology Monitoring



Measuring Erosion-Elevation Surveys



Measuring Erosion



Biological Monitoring |



Caddisflies



Stonefly



Stream Sampler

Macro-Invertebrates



Macro-Invertebrates

Summer Fish Sampling

A group of people, likely researchers or students, are wading through a shallow, rocky stream in a lush, green forest. They are wearing waders and carrying gear, including buckets and nets, indicating they are engaged in fish sampling. The stream is surrounded by dense vegetation and trees, creating a natural, shaded environment. The water is clear, and the rocks are visible on the streambed.

Summer Fish - Streams

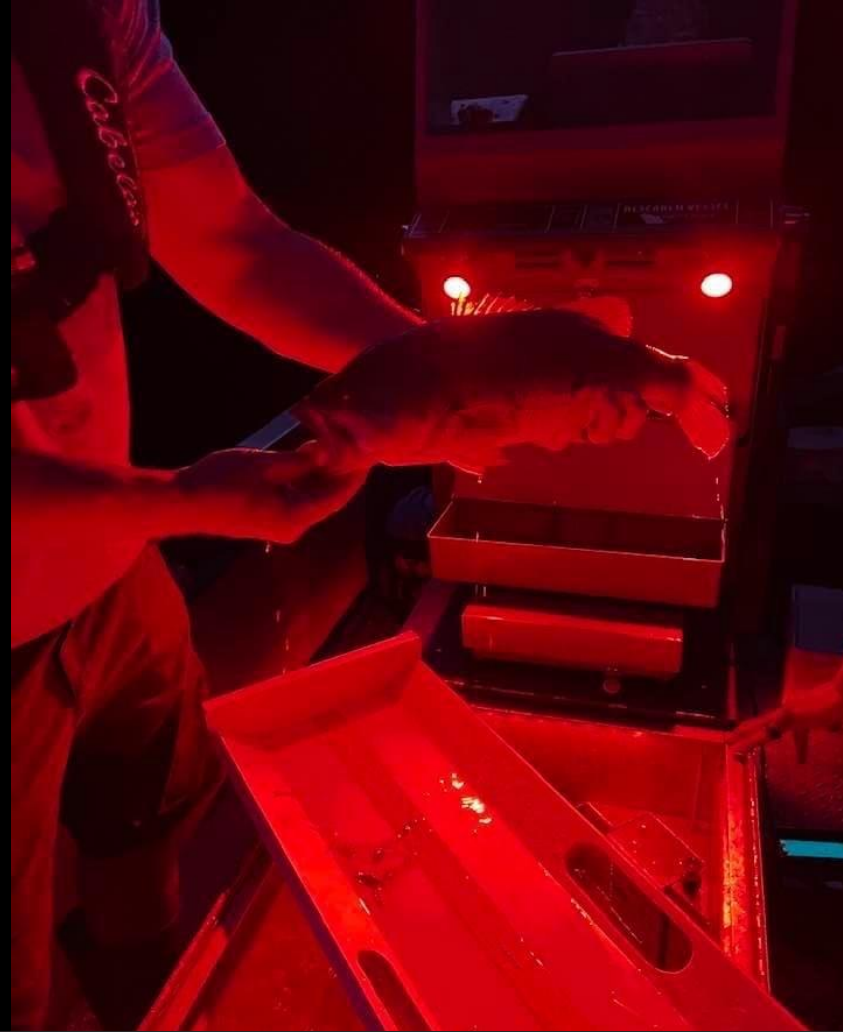




Summer Fish – Streams



Summer Fish - Reservoir



Summer Fish - Reservoir



Source Water Protection

PINEY RUN



Source Water Protection – Piney Run

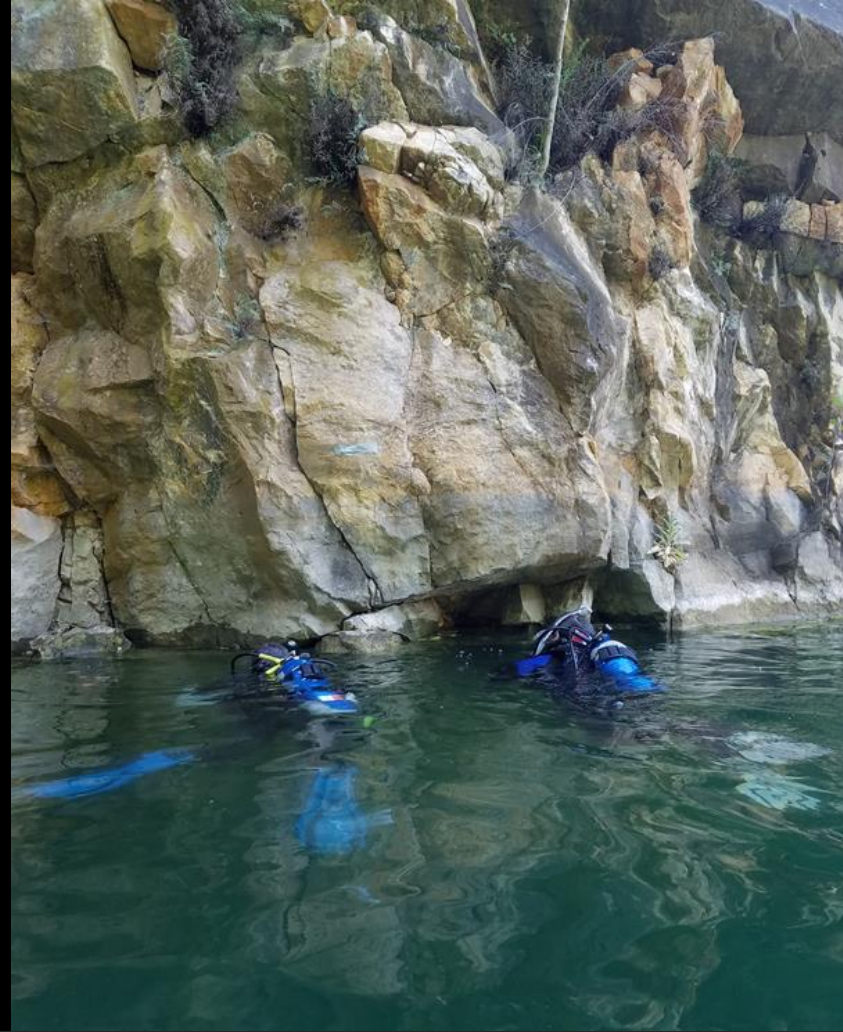


Source Water Protection

HYDE'S QUARRY

Invasive Species – Zebra & Quagga Mussels





Pool Party



Goodbye Invasives!!



Success!!



Grant Funded Research and Innovative Monitoring

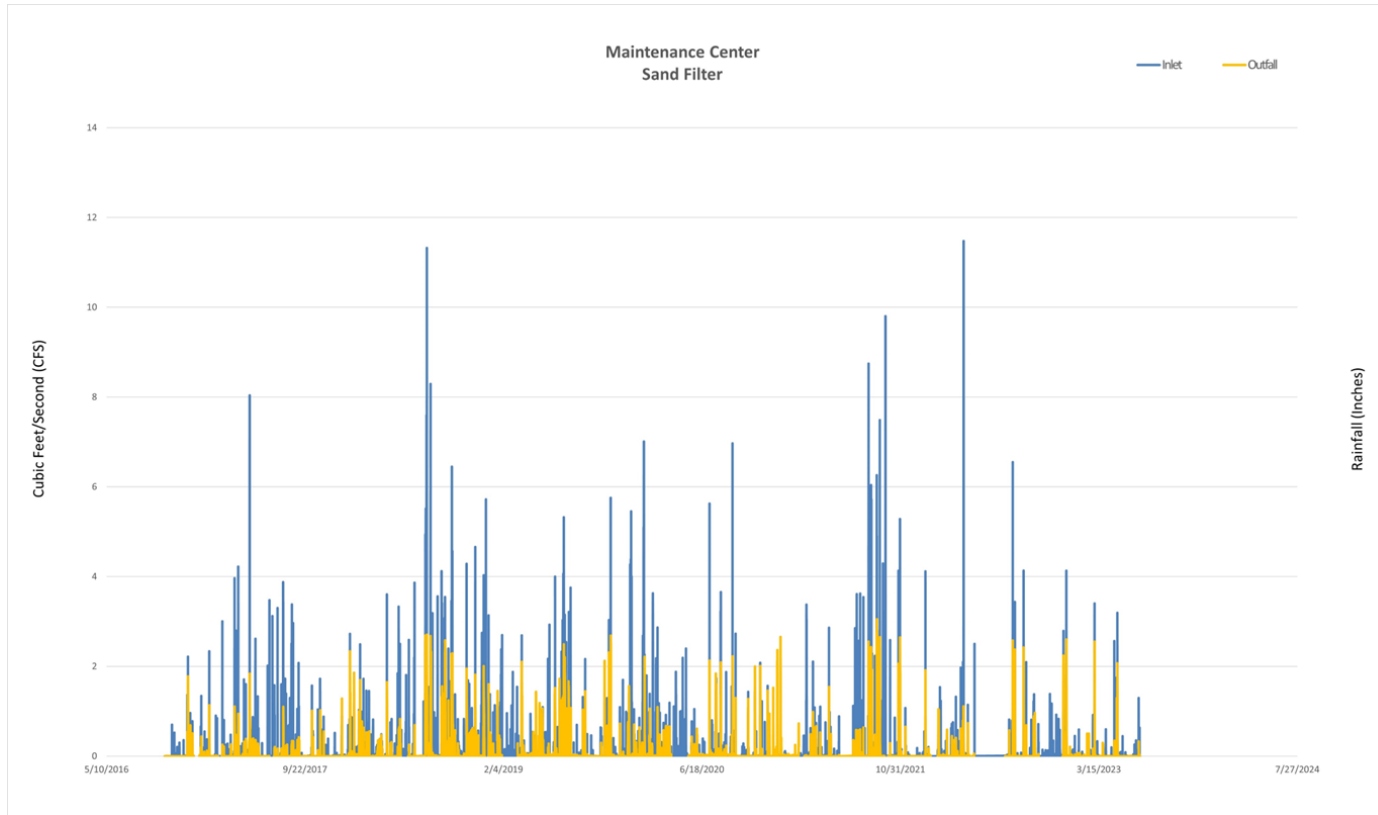
Research Grants and Internal Studies

- Chesapeake Bay Trust Restoration Research
 - Self-Recovery of Urban Streams in Headwater Watersheds
- National Fish and Wildlife Foundation – Innovative Nutrient Sediment Reduction
 - Total Phosphorus mass removal using performance enhancing filter media
- Gravel Lens Thermal Study

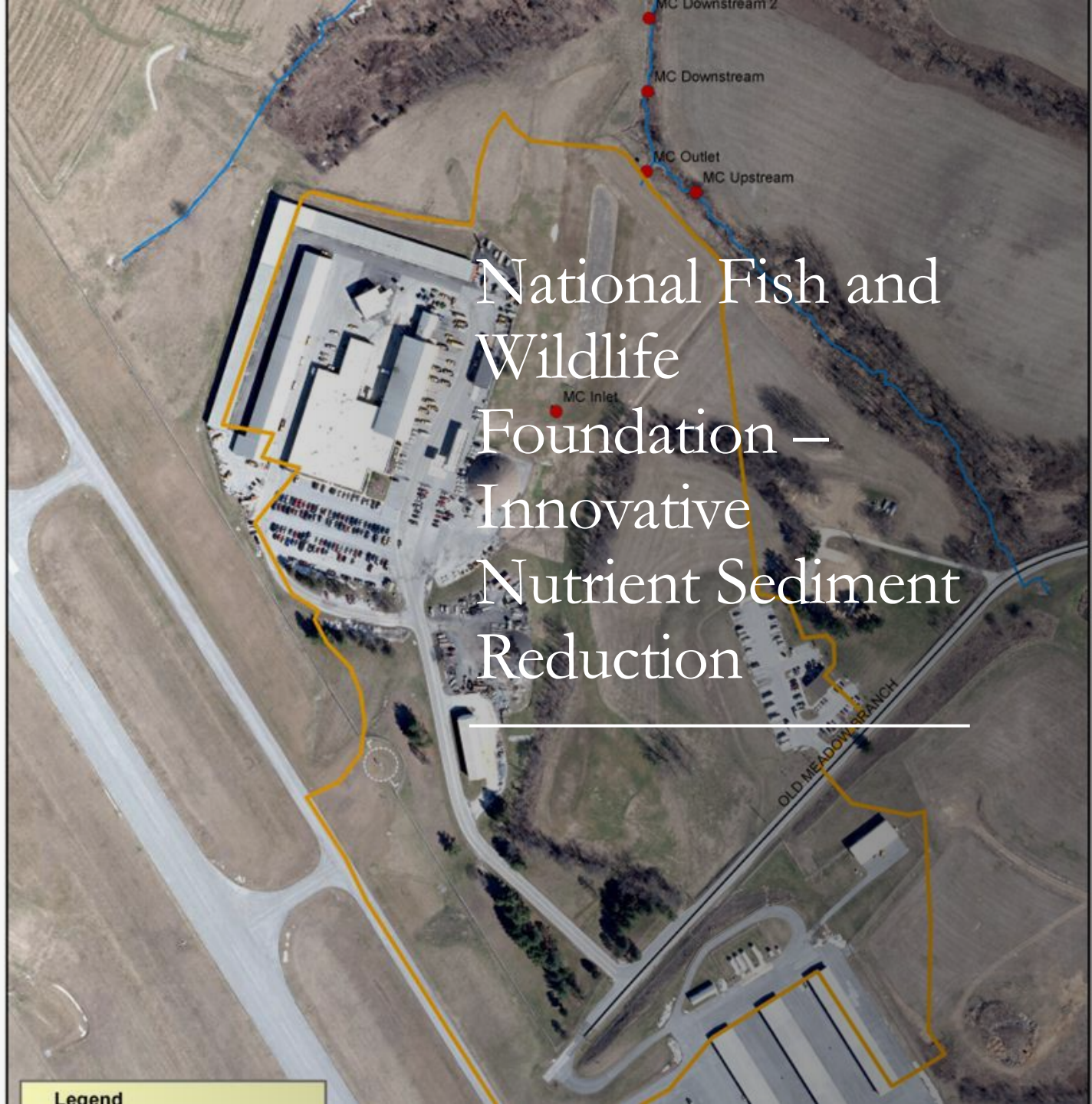
Chesapeake Bay Trust Restoration Research



2016



2023



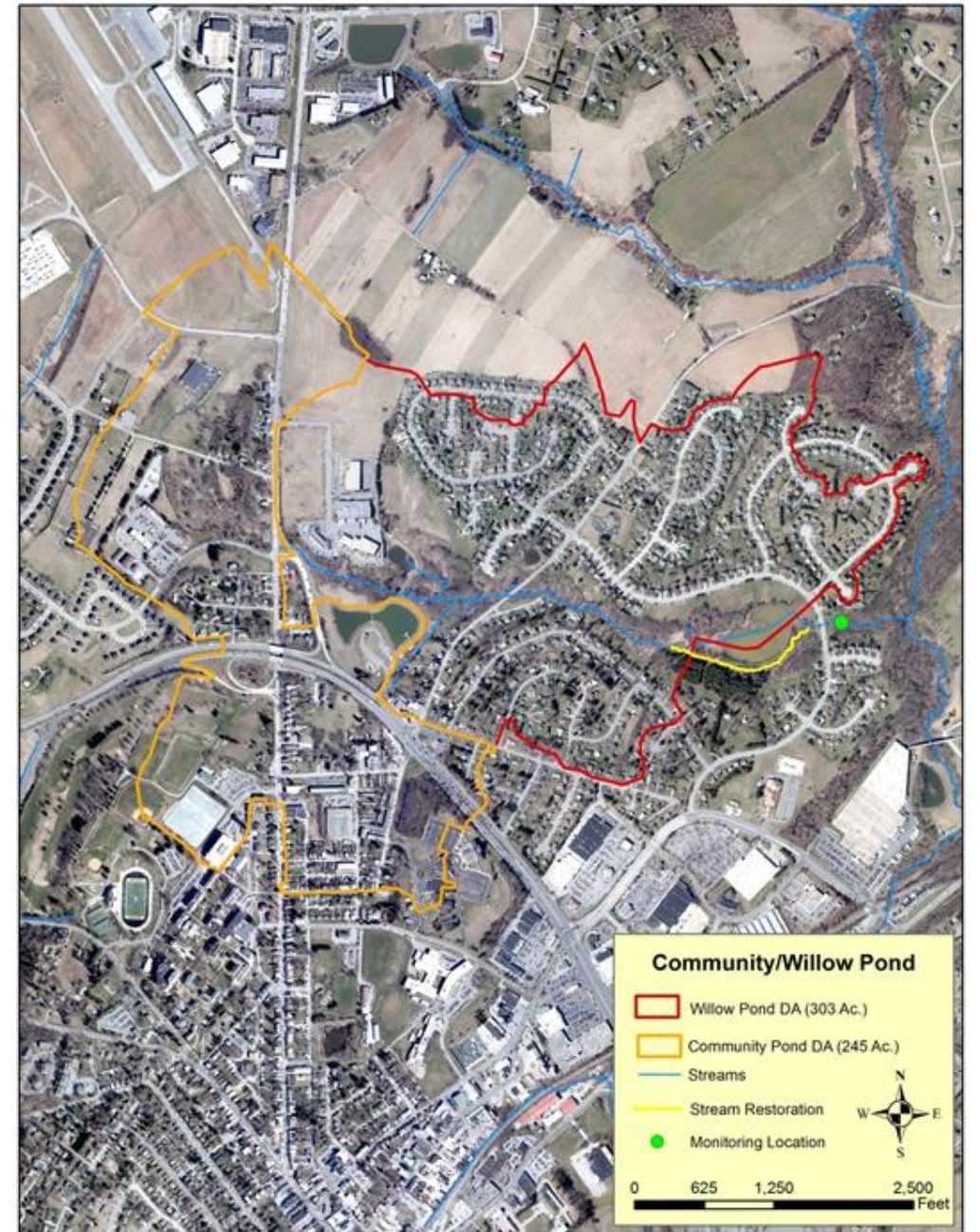
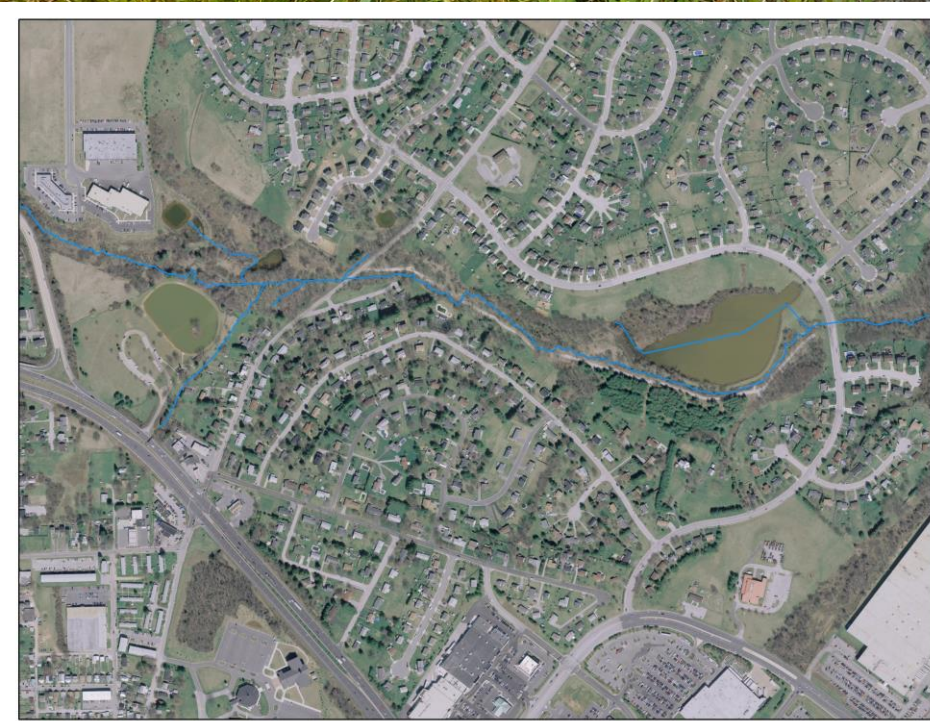
National Fish and Wildlife Foundation – Innovative Nutrient Sediment Reduction

Legend

Gravel Lens Thermal Study

- Control Vs. Treatment
- Bottom withdraw Vs. Gravel substrate ("gravel lens")
- Thermal Response?
- 2-year design storm

2007 Aerial Photo



Thank You!

