Healthy Watersheds

BYRON MADIGAN

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

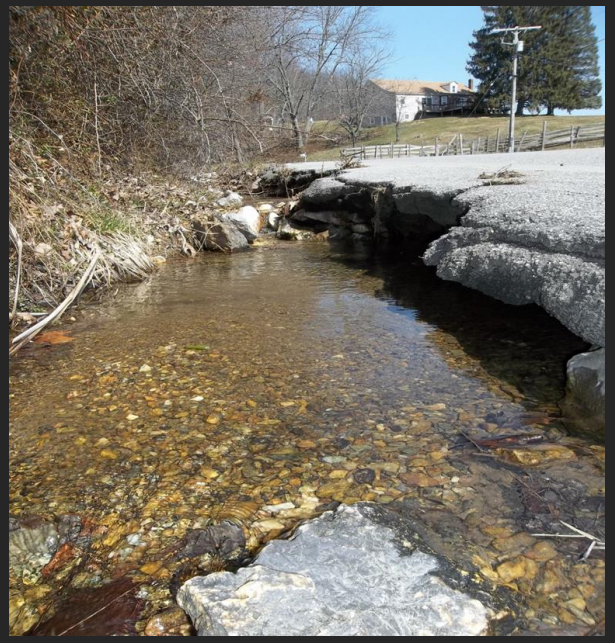
2000

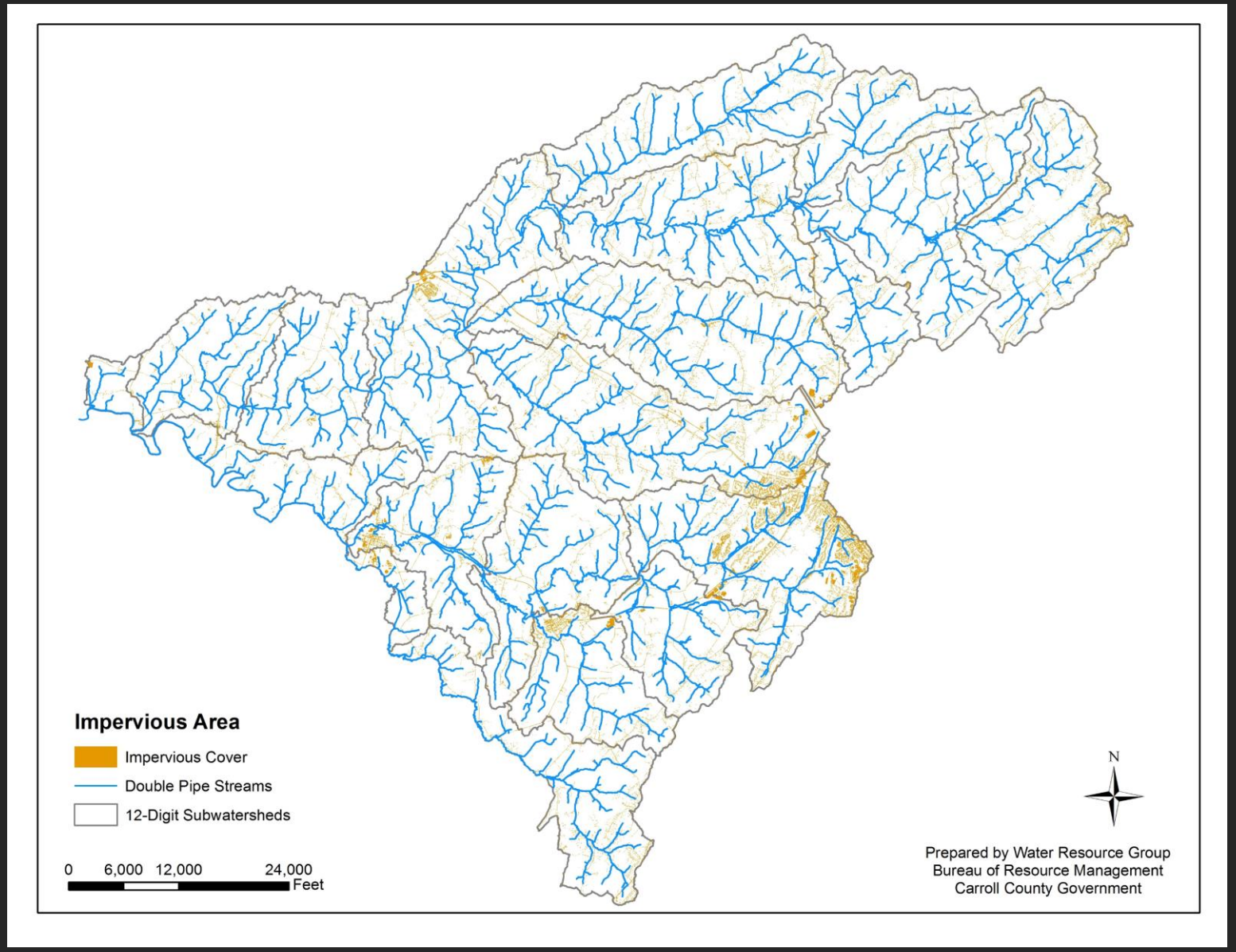
2020

Land Use Change

Impervious Surfaces

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





Erosion

Stream Corridor Assessments

Stream Corridor Assessments

Restoring Watersheds

Submerged Gravel Wetland

Submerged Gravel Wetland

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

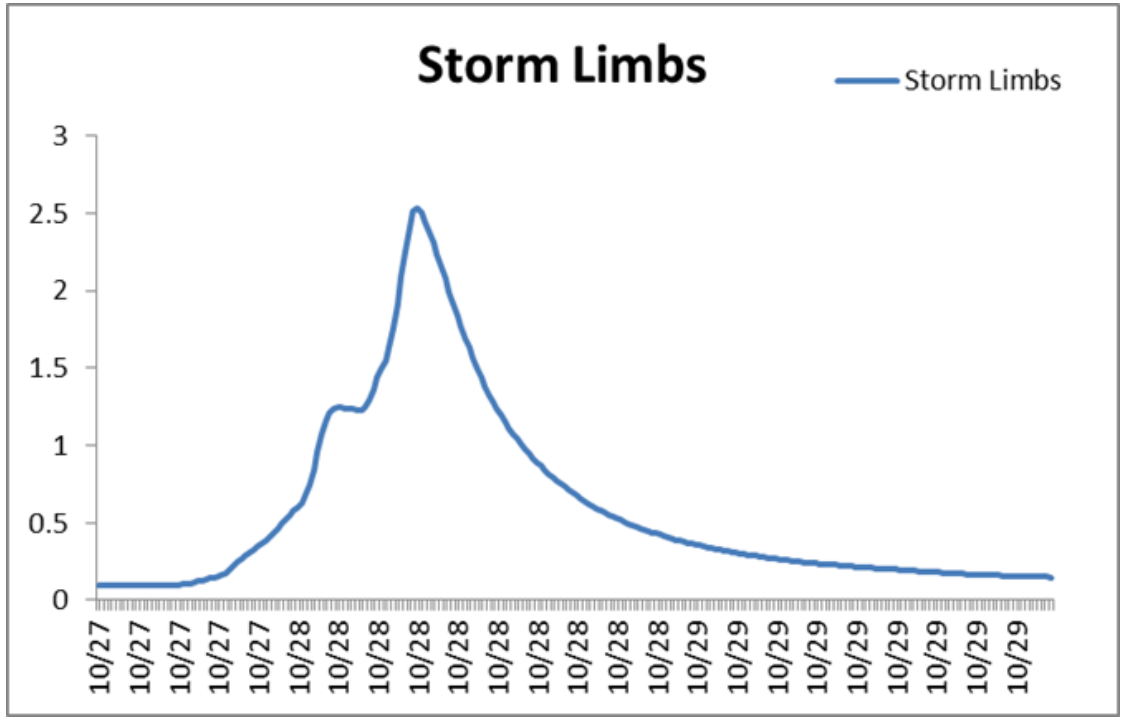
Collect Water Sample

- Nitrogen, Phosphorus, Sediment

Physical Measurements

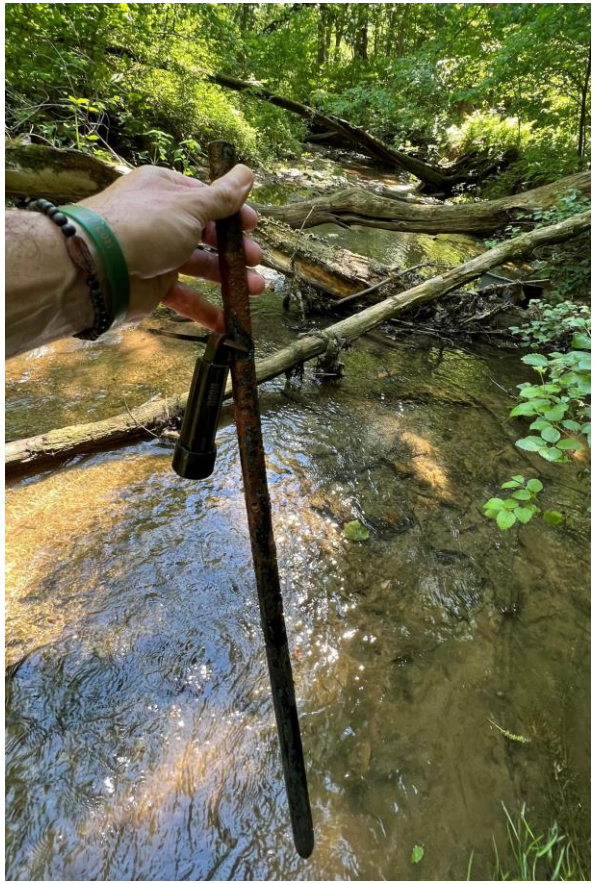
- pH (6.5-8.5)
- Dissolved Oxygen (>5.5 mg/L)
- Temperature (<68F Brook Trout)

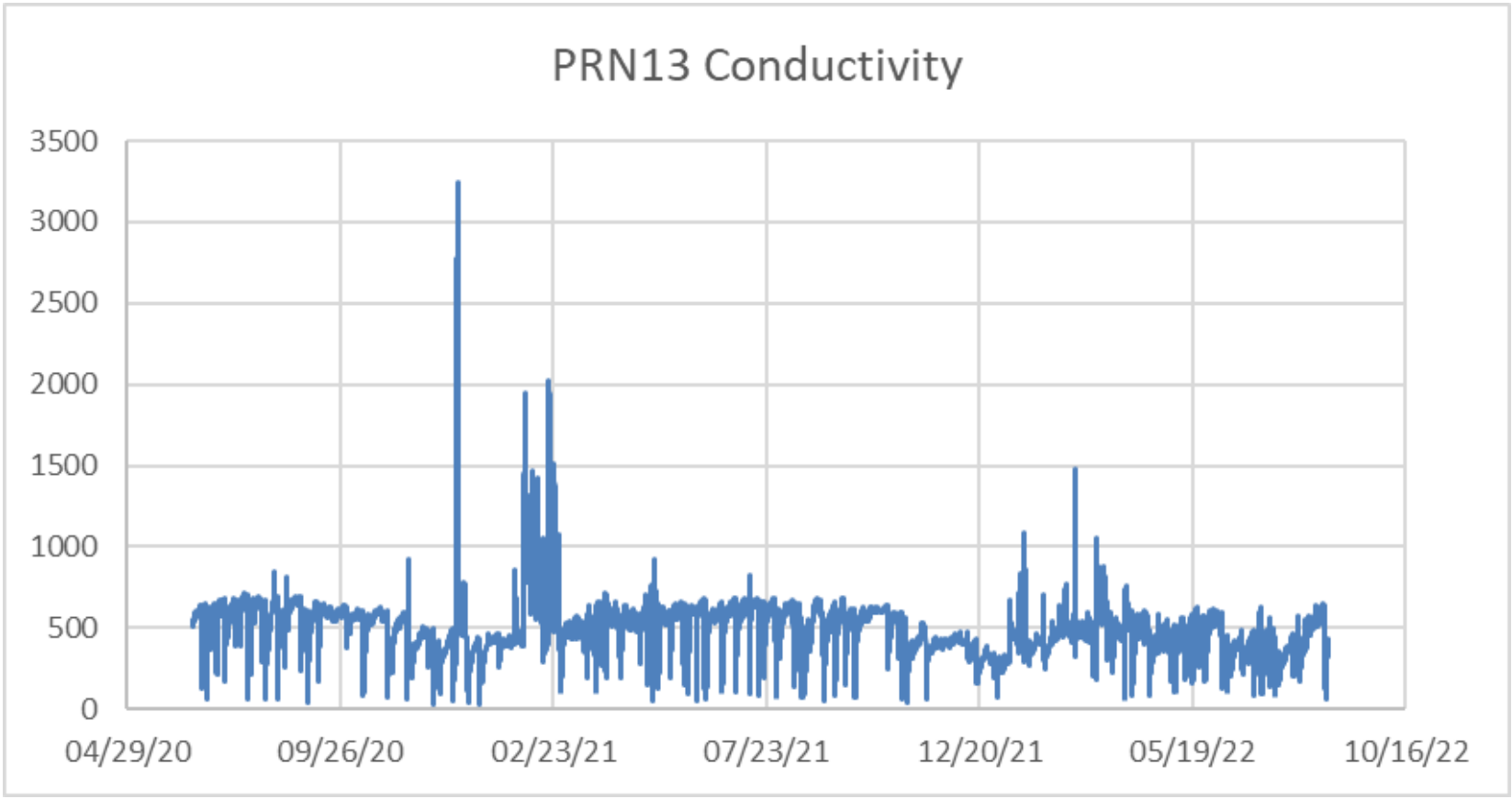
Measure Stream Flow



Chemical Monitoring - Automated

Chemical Monitoring

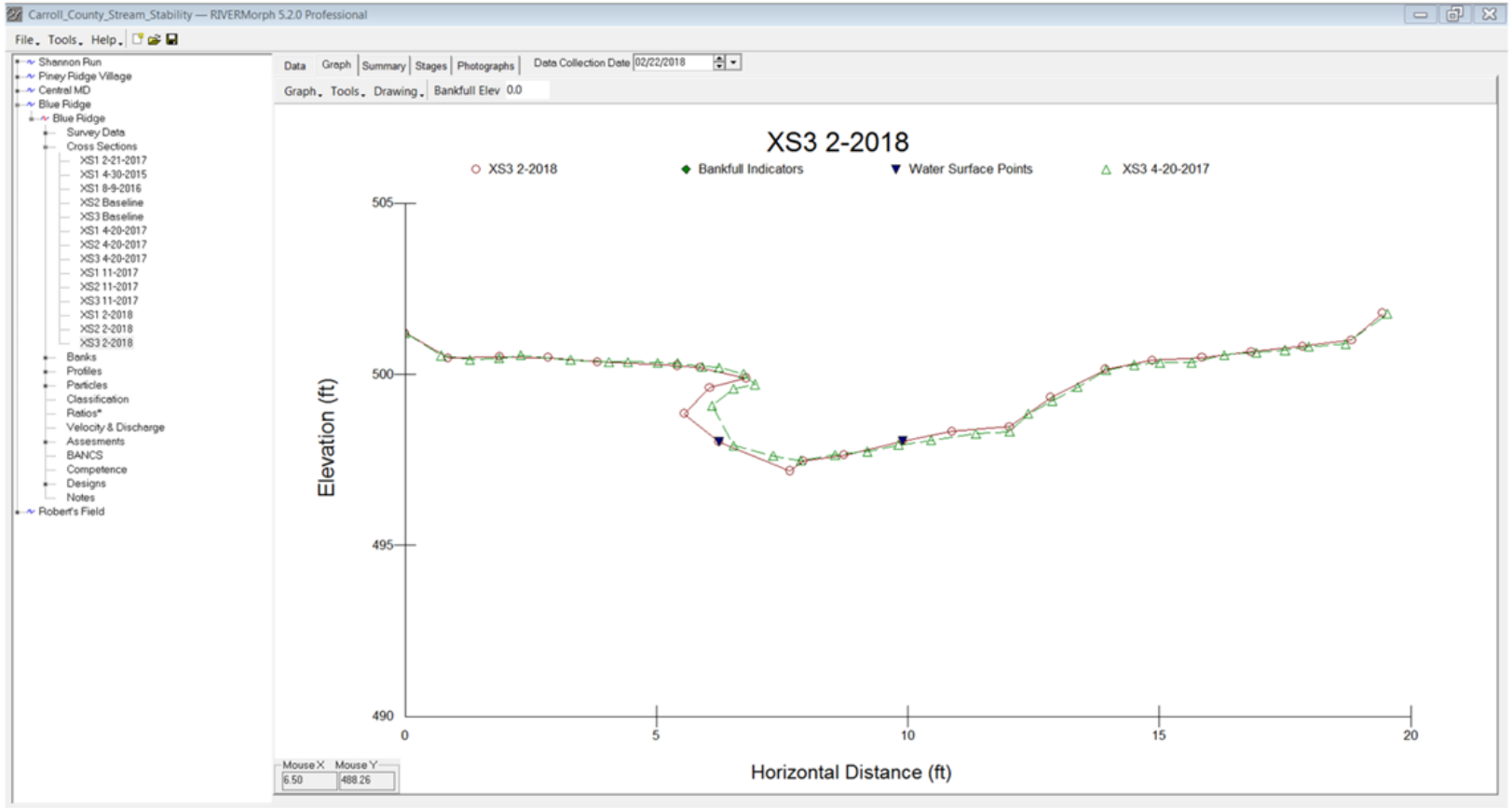




Stream Conductivity (Salt)

Geomorphology Monitoring

Measuring Erosion-Elevation Surveys



Measuring Erosion

Biological Monitoring

Caddisflies

Stonefly

Stream Sampler

Macro-Invertebrates

Macro-Invertebrates

Summer Fish Sampling

Summer Fish - Streams

Summer Fish – Streams

Summer Fish - Reservoir

Summer Fish - Reservoir

Source Water Protection

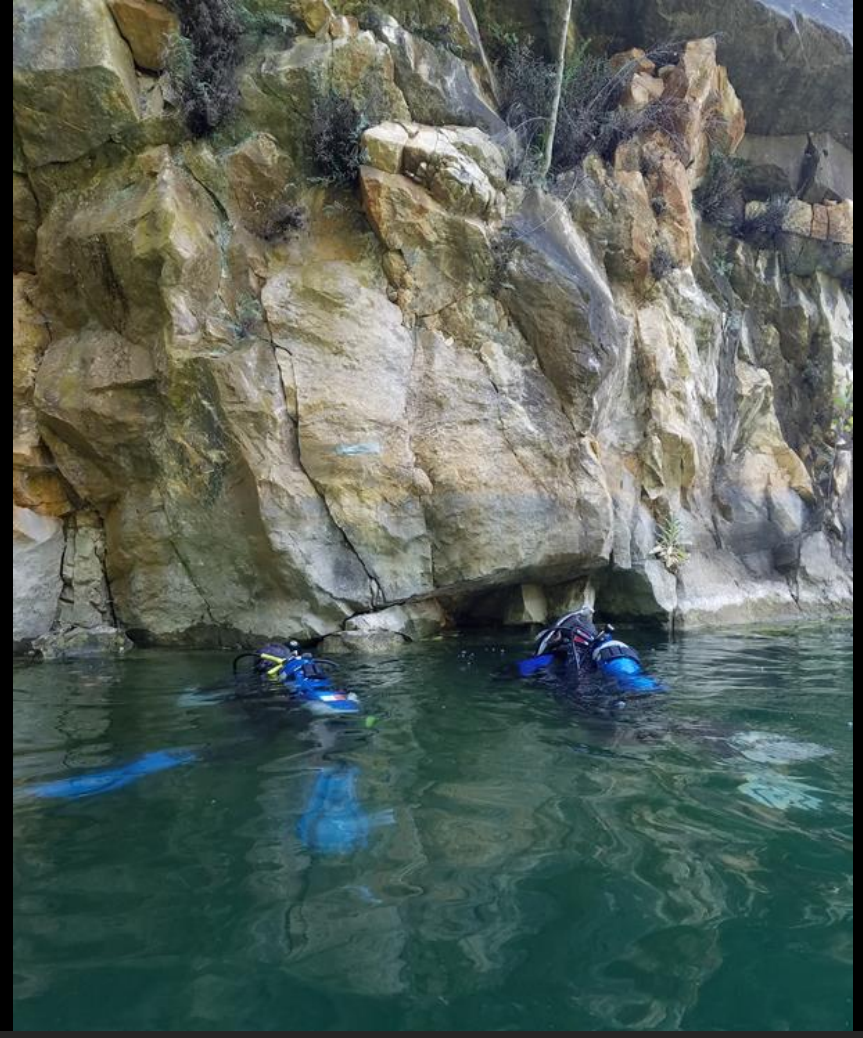
PINEY RUN

Source Water Protection – Piney Run

Source Water Protection

HYDE'S QUARRY

Invasive Species – Zebra & Quagga Mussels



Pool Party

Goodbye Invasives!!

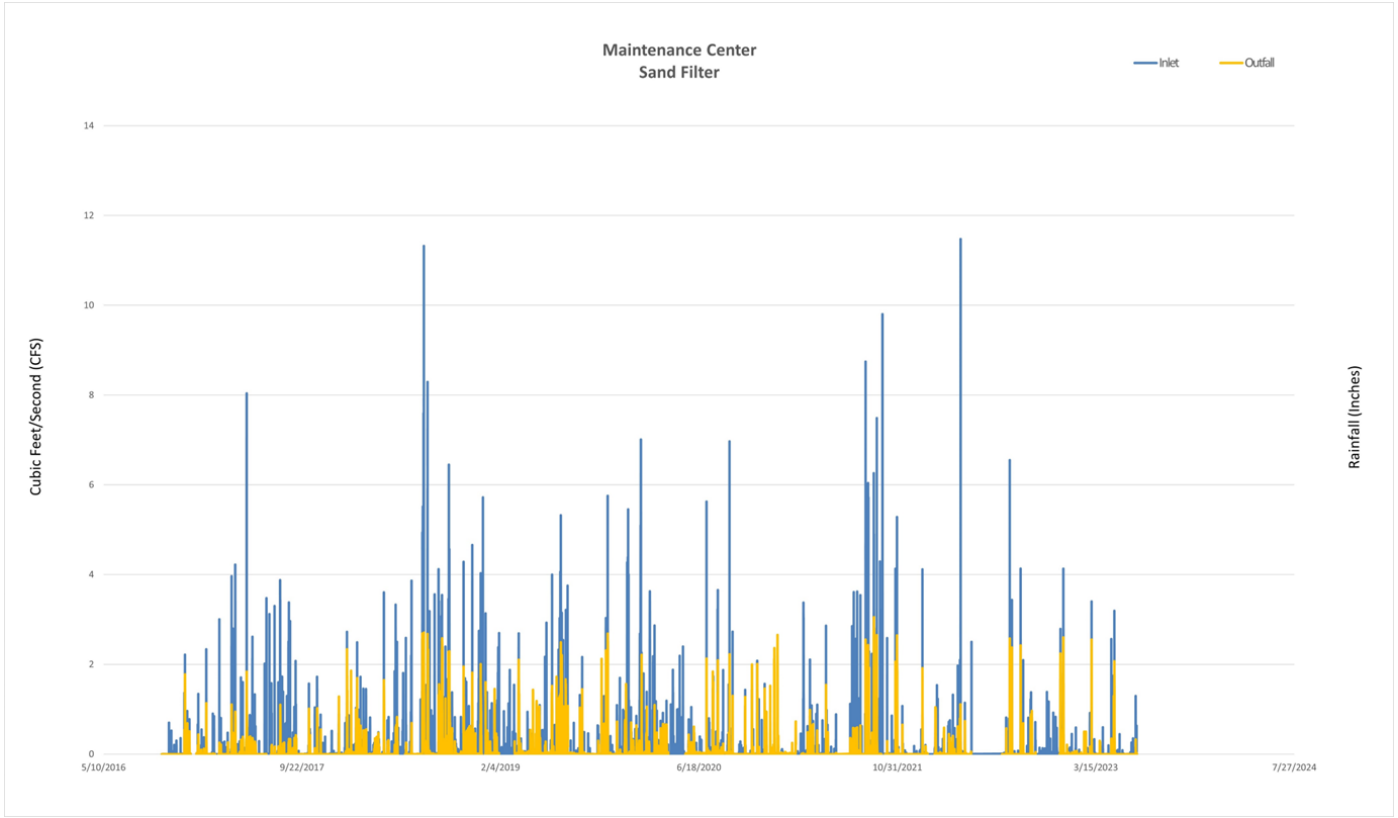
Success!!

Grant Funded Research and Innovative Monitoring

Research Grants and Internal Studies

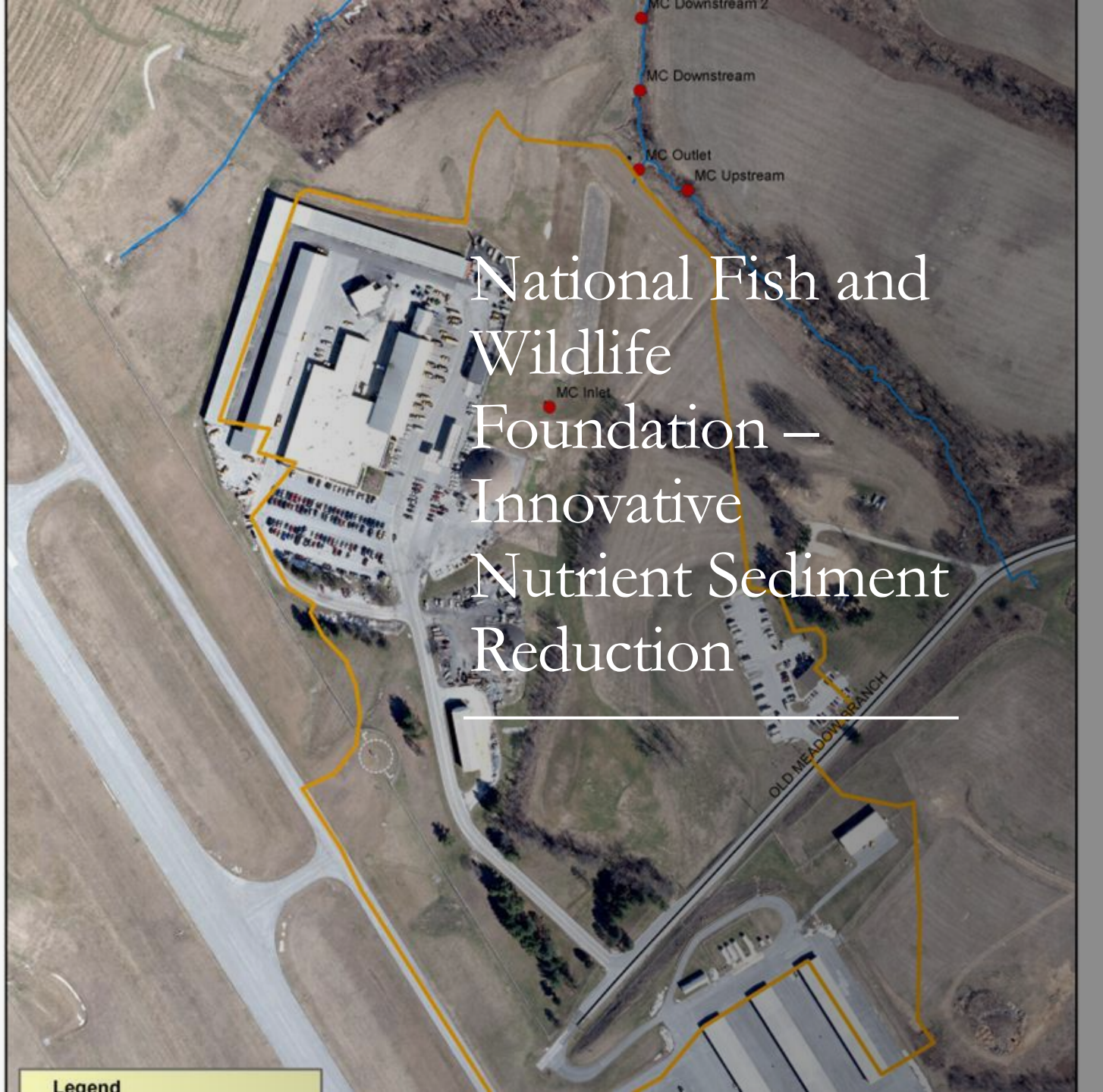
- Chesapeake Bay Trust Restoration Research
  - Self-Recovery of Urban Streams in Headwater Watersheds
- National Fish and Wildlife Foundation – Innovative Nutrient Sediment Reduction
  - Total Phosphorus mass removal using performance enhancing filter media
- Gravel Lens Thermal Study

Chesapeake Bay Trust Restoration Research



2016

2023

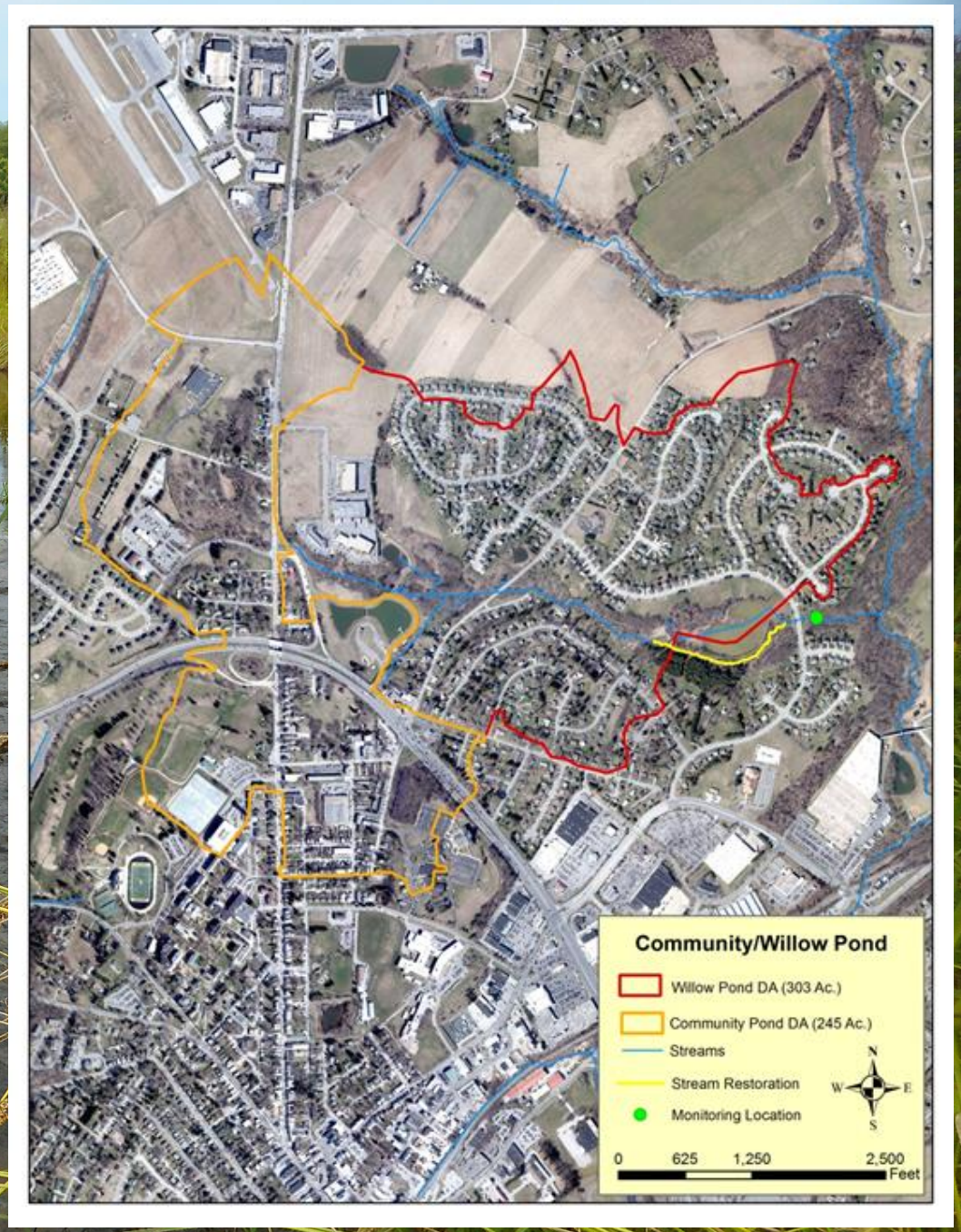


National Fish and Wildlife Foundation – Innovative Nutrient Sediment Reduction

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!