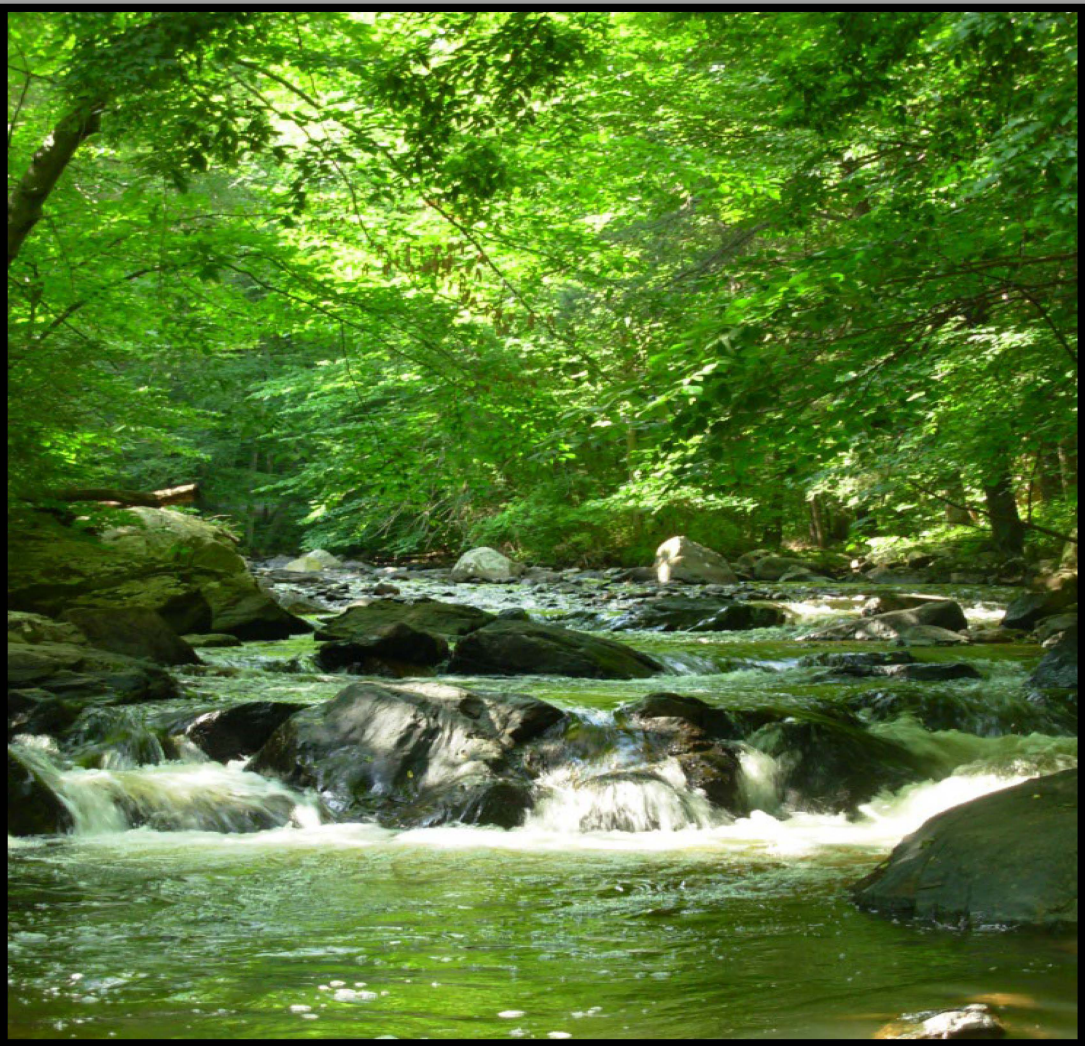
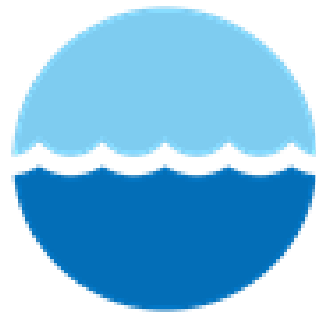


Highlands Watershed Restoration and Protection Plan Highlands WRPP Advisory Committee Meeting March 27, 2024



Our Mission

Since 1959, securing clean water for present and future generations. We protect land and water in our watershed and beyond through science, education and advocacy.

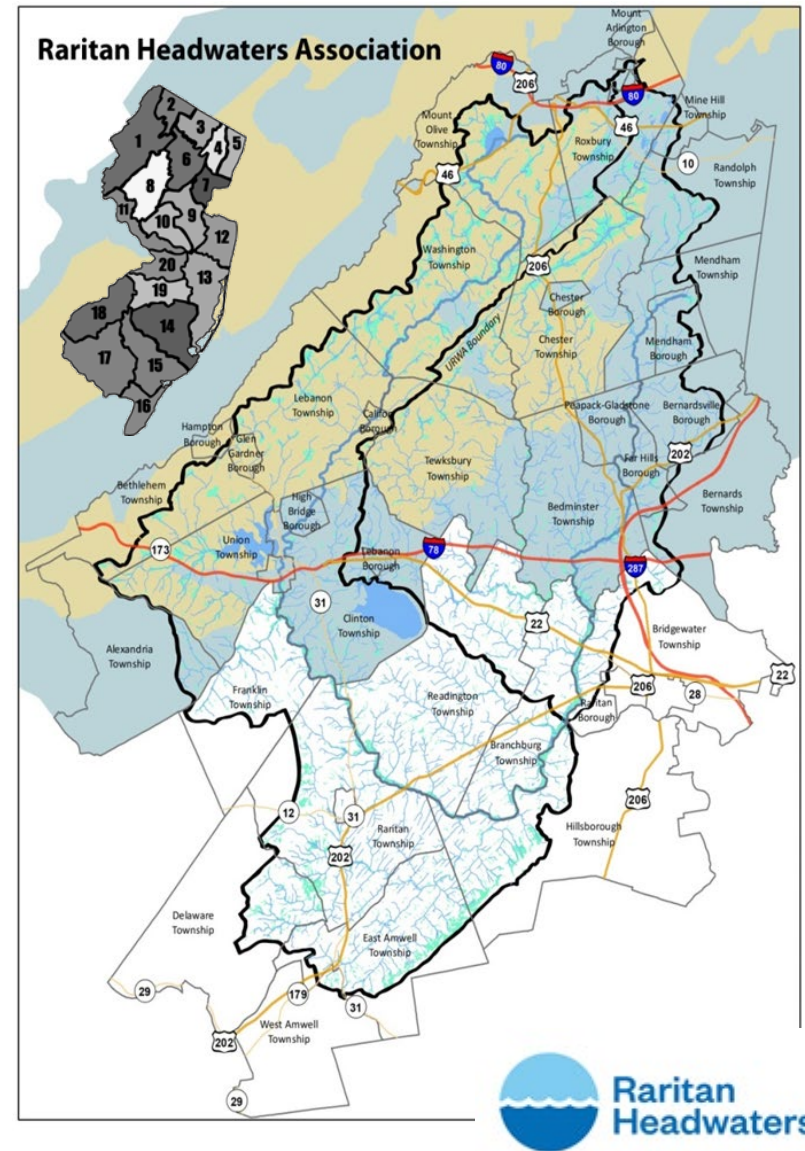


**Raritan
Headwaters**

Raritan Headwaters Association is a 501(c)(3) nonprofit organization

North & South Branch Raritan River Region

- 470 square miles: 43% of the Raritan River Basin
- 3 Counties: Hunterdon, Somerset & Morris - includes 38 municipalities
- home to nearly 300,000 people
- 34% Urban, 22% Ag, 45% Forest & Wetland
- our 1,404 miles of rivers and streams provide drinking water to more than 1.5 million citizens living downstream
- part of the Highlands Water Supply
- contains 2 of NJ's largest reservoirs, Spruce Run and Round Valley



Working to Protect and Restore Natural Resources in the Upper Raritan Watershed Region of New Jersey

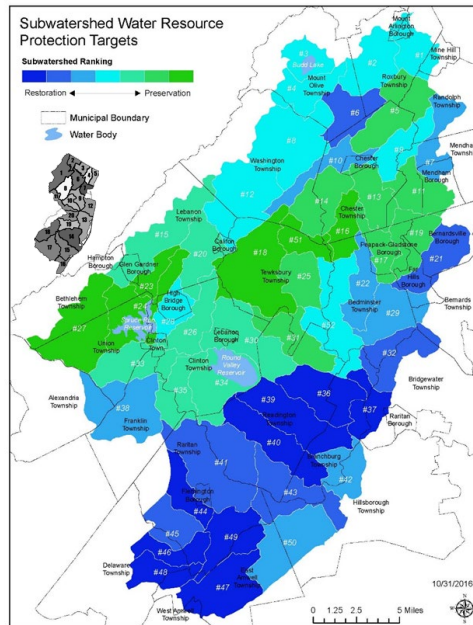
Monitoring & Research

- 72 long-term sites
- Biological, habitat & chemical
- 5 Mayfly Enviro-DIY stations
- Annual, more frequent and continuous
- Groundwater via well test program
- NAACC assessments
- Share data via our online report card, climate dashboard, and EPA WQX
- Data at highest tier for use by regulatory decision-makers (NJDEP Tier 3.3)



Restoration & Stewardship

- In stream restoration
- Dam removal
- Culvert retrofitting
- Riparian forest buffer & wetland restoration
- Invasive control
- Deer management



Best Management Practices (BMPs)

- River Friendly practices (non-point source pollution)
- Stormwater management with green infrastructure
- Local ordinances
- Regulations
- Well testing
- Wastewater management



Outreach & Education

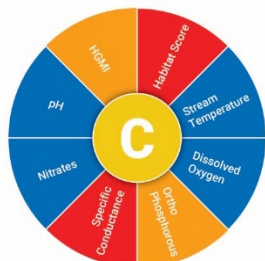
- Watershed Tools for Local Leaders workshops
- Watershed Restoration & Protection Planning
- RHA Resource Hub
- Programs for children and families



Land Preservation

- Accredited Land Trust
- Acquisition
- Easements
- Land Use Rules and Regs
- Land use planning

2023 Watershed Report Card



Raritan Headwaters health scale
Very good A B C D E Very poor

This report card tells us:

- We need to focus on protecting forests and riparian buffers.
- Control stormwater by limiting impervious cover and installing green infrastructure.
- Apply best management practices on farms.
- Increasing resiliency of our communities to climate change.

In the context of increased precipitation and extreme weather events due to climate change, there is a heightened sense of urgency to protect our streams. Most of our stream impairments are due to non-point source pollution carried into waterways by stormwater. Every member of the community has a part to play in protecting the watershed by what they do in their homes, their backyards, and their businesses.

Role of Advisory Committee

- Learn about Highlands WRPP and the issues impacting water quality in the Watershed
- Attend meetings and provide feedback on data and draft plans, and project ideas
- Be a liaison to decision-makers, businesses and local residents about the WRPP
- Share local knowledge about potential projects, partners and other opportunities
- Partner on projects and assist in outreach

The full Advisory Committee will meet quarterly.

There will be 3 subgroups
South Branch Raritan
North Branch Raritan
Black River/Lamington
A quarterly meeting will be held for each these groups

Thus, you will each be invited to meet twice per quarter.



Major Threats to Water Quality in Our Region

- **Stormwater Runoff and non-point source pollution**
- **Increased impervious cover**
- **Loss of forests and declining forest health**
- **Lack of stream buffers**
- **Agriculture – pesticides, fertilizers**
- **Dams**
- **Harmful Algal Blooms(HABs)**
- **Loss of Biodiversity**
- **Septic systems**
- **Road salt**
- **Plastic**
- **Point sources – effluent, landfills, CSOs**

Climate Change and extreme weather

Warmer temperatures

Hotter summers, more heat waves

More precipitation (8% above avg. over past 10 years)

Increased frequency of extreme weather events – storms and droughts

Spring arriving earlier

What are the impacts on our streams and aquifers?

Watershed Protection & Restoration Strategies

Preservation

- Acquisition
- Easements
- Regulations (C-1; wetland protections)
- Land use planning

Restoration & Stewardship

- In stream restoration
- Dam removal
- Riparian forest or wetland restoration
- Invasive control
- Green Infrastructure

Best Management Practices (BMPs)

- River Friendly Program
 - Residents
 - Farms
 - Schools
 - Businesses
- Local Ordinances
- Regulations (climate vulnerability planning)
- Cutting carbon emissions
- Well testing and septic maintenance



**Raritan
Headwaters**

Woods & Waterways

SEEKING MUNICIPAL & NON-PROFIT PARTNERS
TO HELP IMPROVE RIPARIAN BUFFER HABITATS



A grant program to help restore riparian buffers along the North & South Branches of the Raritan River and their tributaries.

This program aims to plant 10,000 native trees on publicly accessible land. This will help stabilize banks, lower water temperatures, create habitat for wildlife, reduce pollution from stormwater runoff and improve water quality.

JOIN OUR FREE INFORMATIONAL WEBINAR

APRIL 25TH, 12-1:30 PM

We look forward to planting trees with you.



Raritan Headwaters Seminar Series

Watershed Tools for Local Leaders Spring 2024

To Register: tgordon@raritanheadwaters.org



**Healthy Forests = Clean Water
Webinar**



Thursday April 11th, 2024

Held from 12-1:30pm no registration fee

**New Rules for Municipal
Stormwater Permits, Webinar**



Thursday June 6th, 2024

Held from 12-1:30pm no registration fee



“Watershed Tools” provide practical guidance on scientific principles, useful tools, government regulations and funding sources for watershed protection.

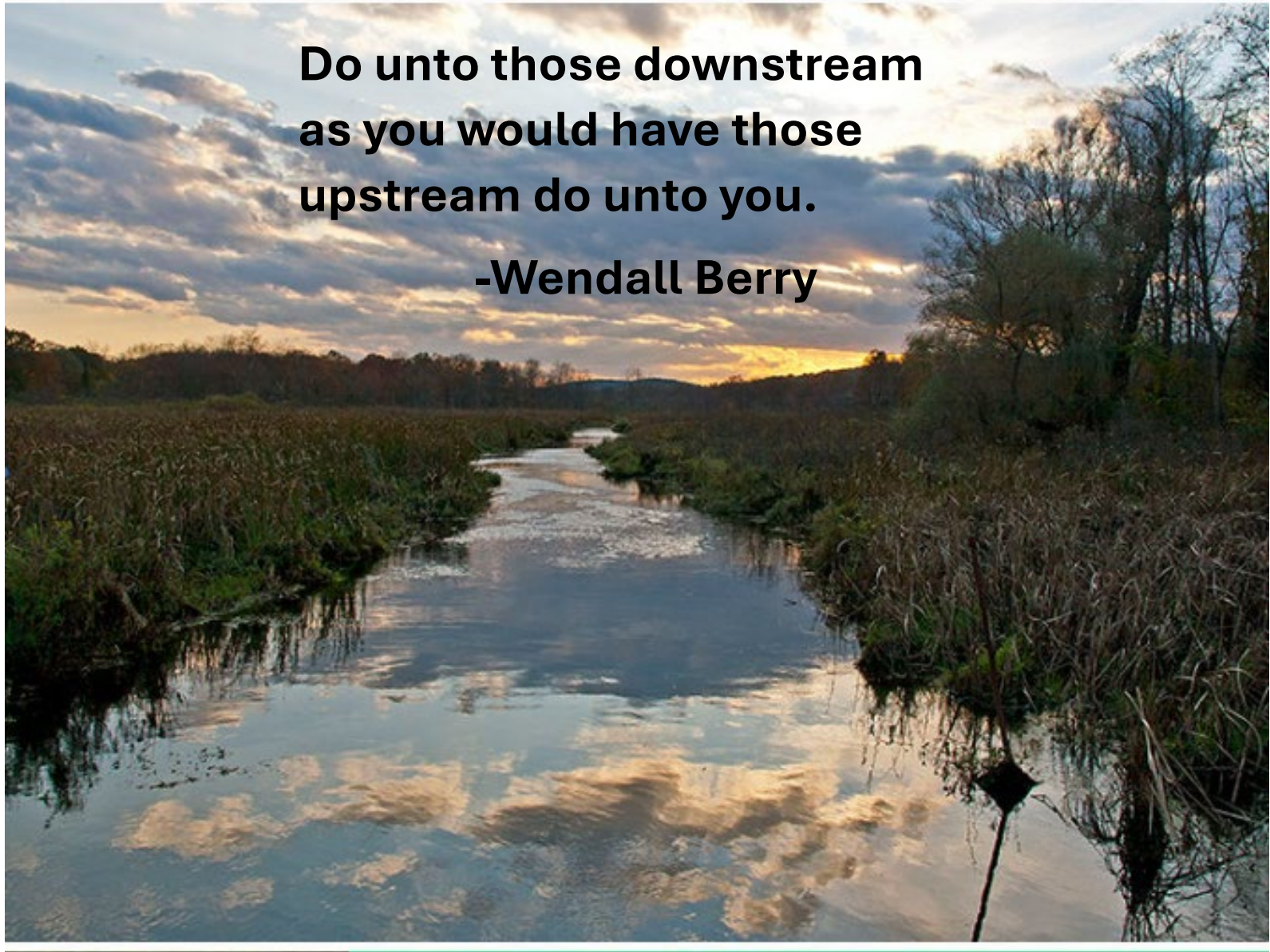
Future topics, dates to be announced. If you have a request for a pertinent topic related to watershed conservation and planning, please let us know.

tgordon@raritanheadwaters.org (908) 234 1852 x346

<https://www.raritanheadwaters.org/events-happenings/>

**Do unto those downstream
as you would have those
upstream do unto you.**

-Wendall Berry



tgordon@raritanheadwaters.org

(908)234-1852 x346

www.raritanheadwaters.org



Project Overview

Rutgers Cooperative Extension Water Resources Program

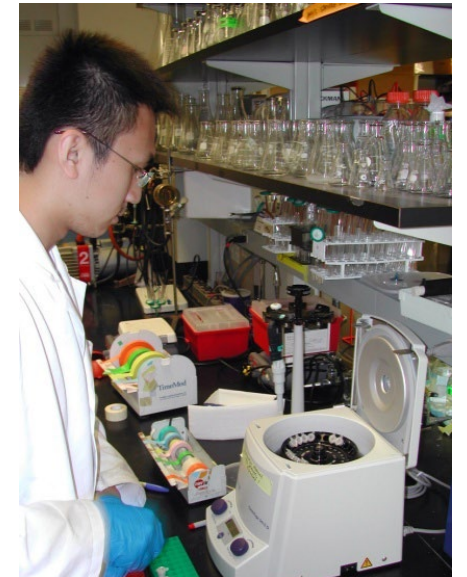
Christopher C. Obropta, Ph.D., P.E.

March 27, 2024



Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.





Water Resources Program

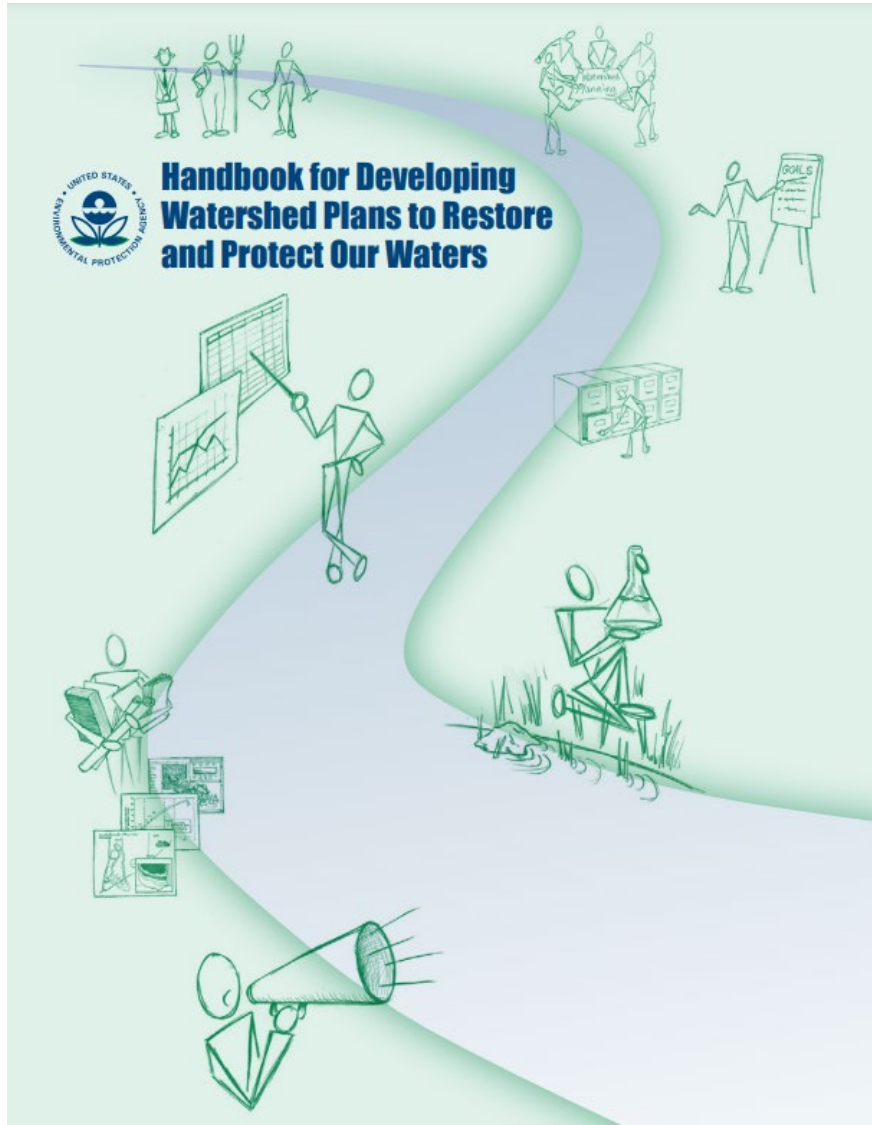


Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.

Project Partners



Summary of Scope of Work



The Rutgers Cooperative Extension (RCE) Water Resources Program will work closely with the municipalities and watershed groups to complete Watershed Restoration and Protection Plans for the North Branch Raritan River, the Lamington River, and the South Branch Raritan River that satisfy the EPA's nine minimum plan criteria.

Reason for the Work

The NJDEP has prepared a TMDL for total suspended solids and total phosphorus that requires a 60% reduction in total suspended solids and a 68% to 84% reduction in total phosphorus. This project will create a plan that will be a blueprint for how to achieve these reductions.



Detailed Scope of Work (List of Objectives)

1. Identification of the causes and sources of nutrient loading
2. Estimation of the load reductions expected for the management measures
3. Recommendation of nonpoint source (NPS) management measures to address the causes and sources
4. Estimation of the amounts of technical and financial assistance needed
5. Development and delivery of informational and education component
6. Development of a schedule for implementing NPS controls
7. Development of interim, measurable milestones
8. Development of criteria to ensure load reductions are being achieved
9. Development of a monitoring component to evaluate effectiveness

**Figure 1 – South Branch
Raritan River Study Area**



South Branch Raritan River
HUC14s

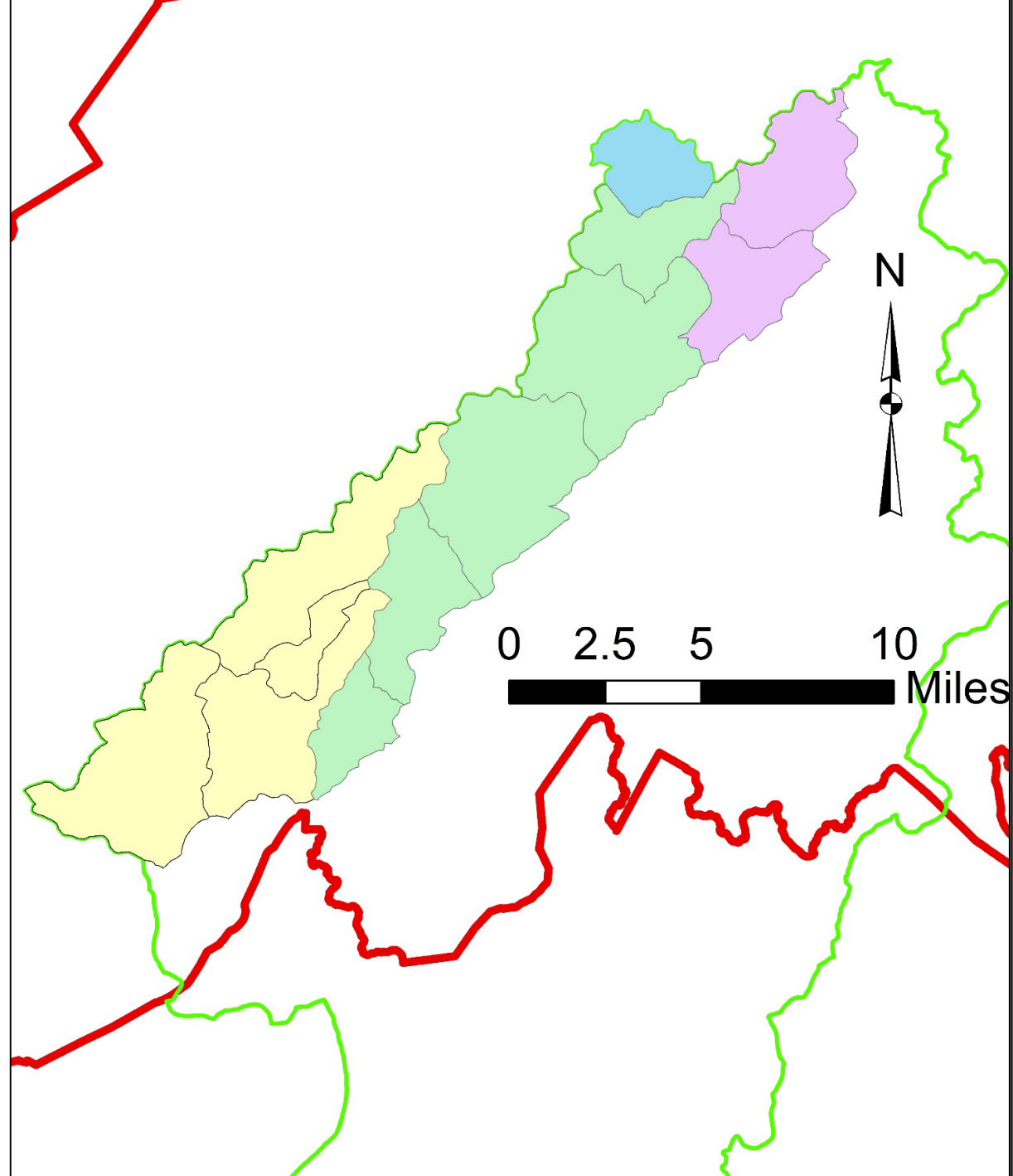
- 02030105010040
- 02030105010050
- 02030105010060
- 02030105010070
- 02030105010080

Total Area = 49 sq.mi.

Drakes Brook HUC14s

- 02030105010010
- 02030105010020

Total Area = 16.1 sq.mi.



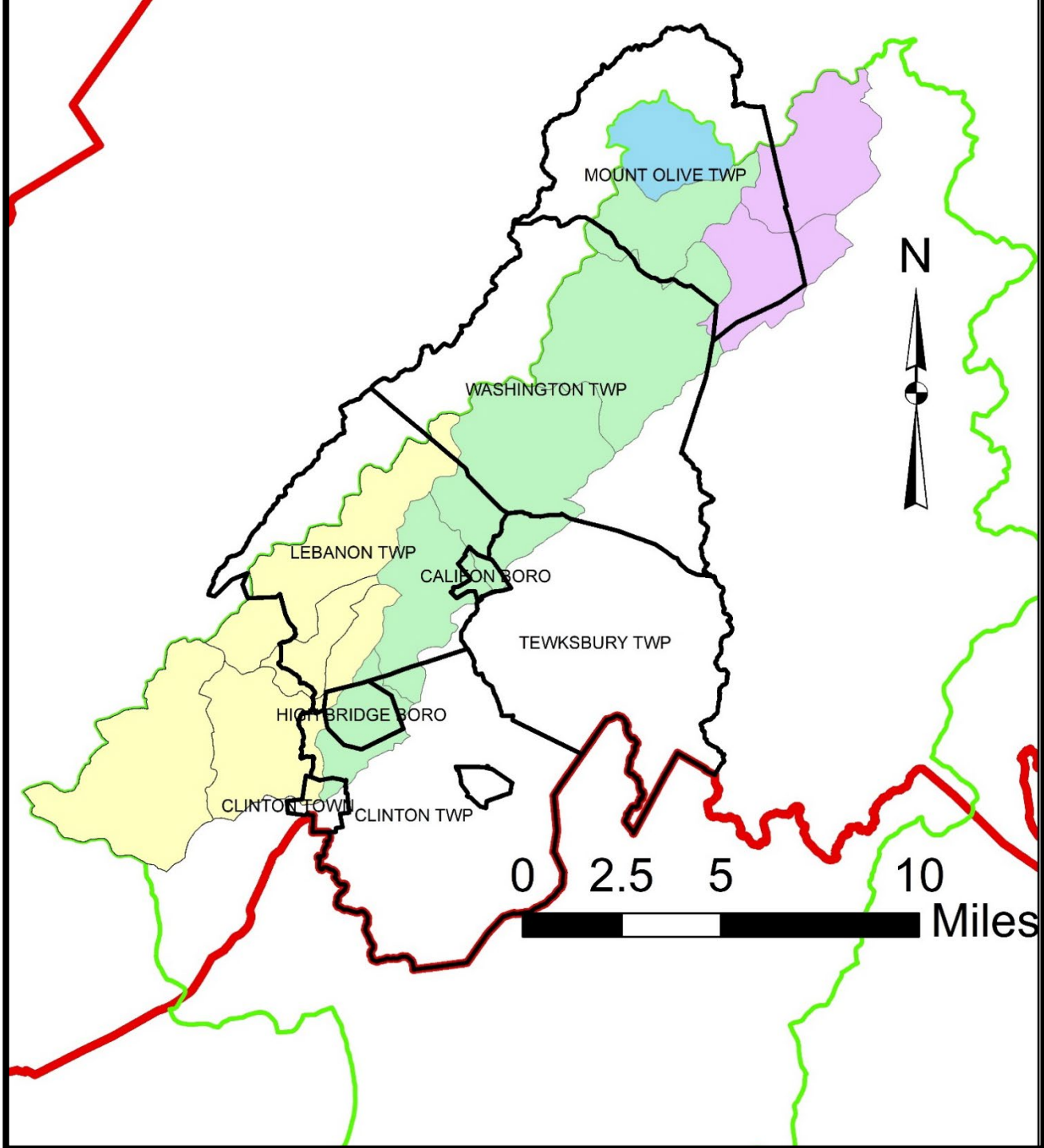
**Figure 2 – South Branch
Raritan River -
Municipalities**

Municipalities (SB Study
Area)

- Clinton Town
- Clinton Township
- High Bridge Boro
- Califon Boro
- Tewksbury Township
- Lebanon Township
- Washington Township
- Mt. Olive Township

Municipalities (Drake Brook
Study Area)

- Roxbury Township
- More of Mt. Olive
- Small portions of Chester
Township and Mount
Arlington Boro



**Figure 3 – Lamington River
Study Area**



Lamington River

HUC14s

02030105050010

02030105050020

02030105050030

02030105050040

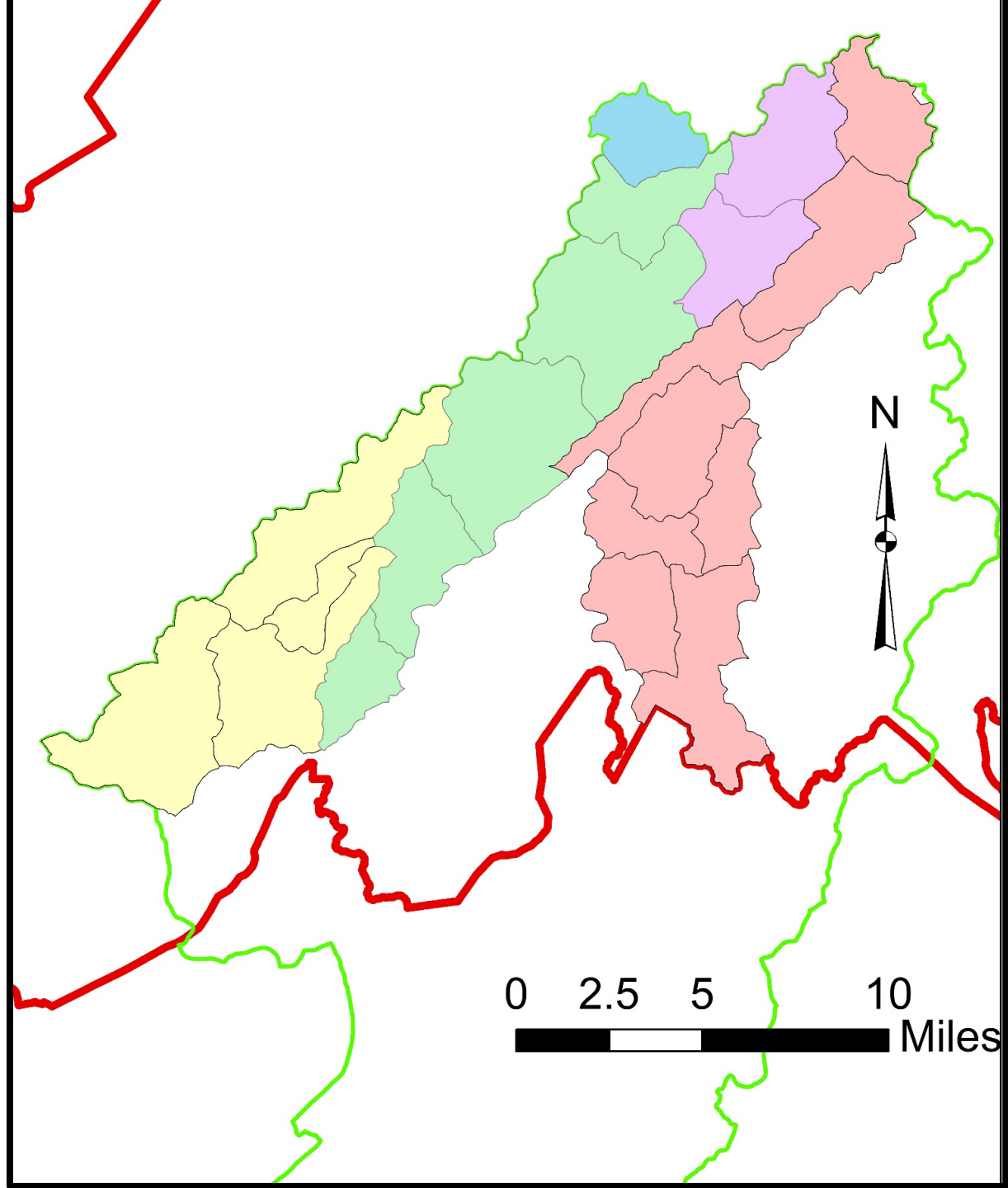
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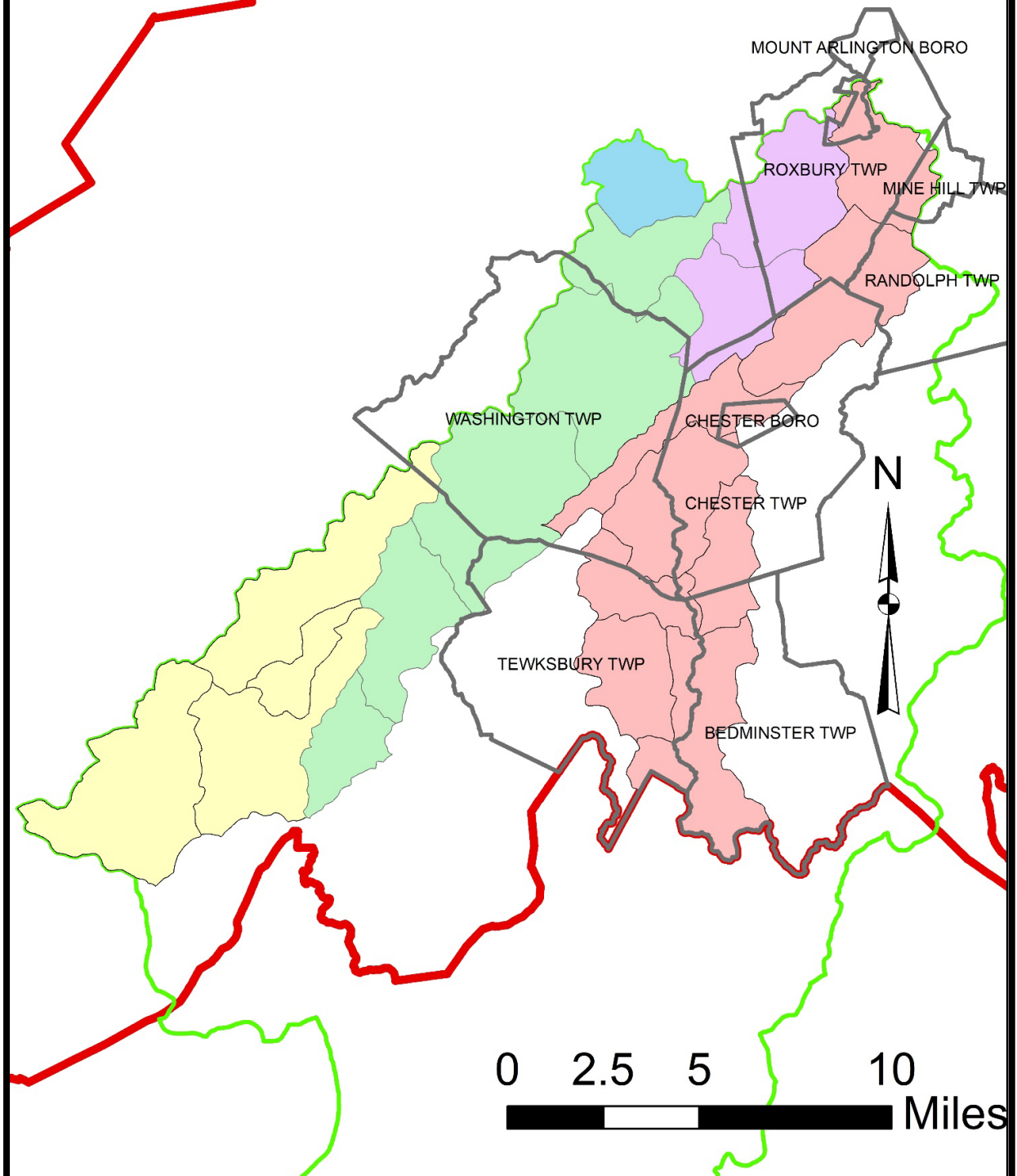
Total Area = 59.1 sq.mi.



**Figure 4 – Lamington River
- Municipalities**

Municipalities (Lamington
River Study Area)

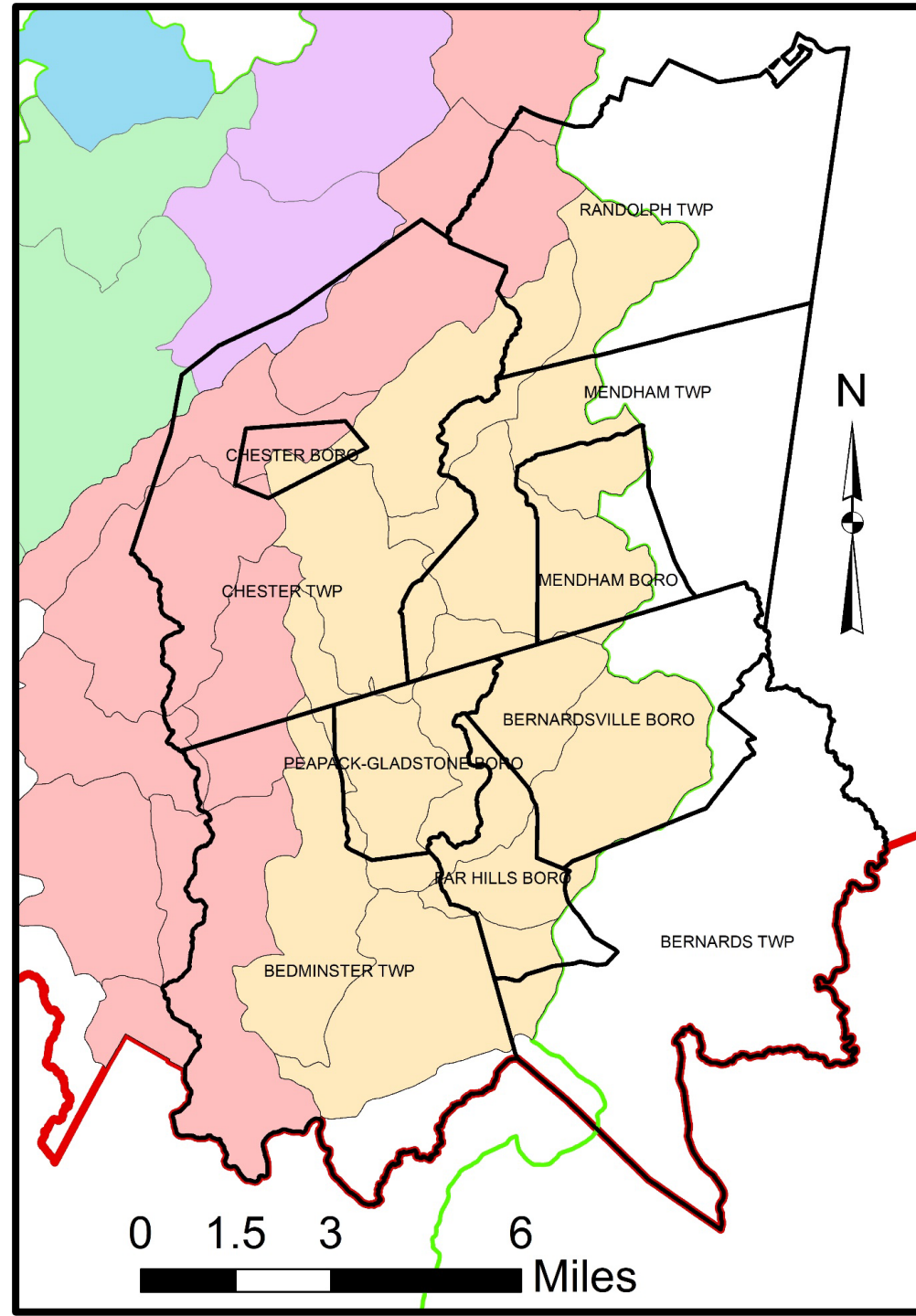
- Bedminster Township
- Tewksbury Township
- Chester Township
- Chester Boro
- Washington Township
- Randolph Township
- Mine Hill Township
- Roxbury Township
- Mt. Arlington Boro



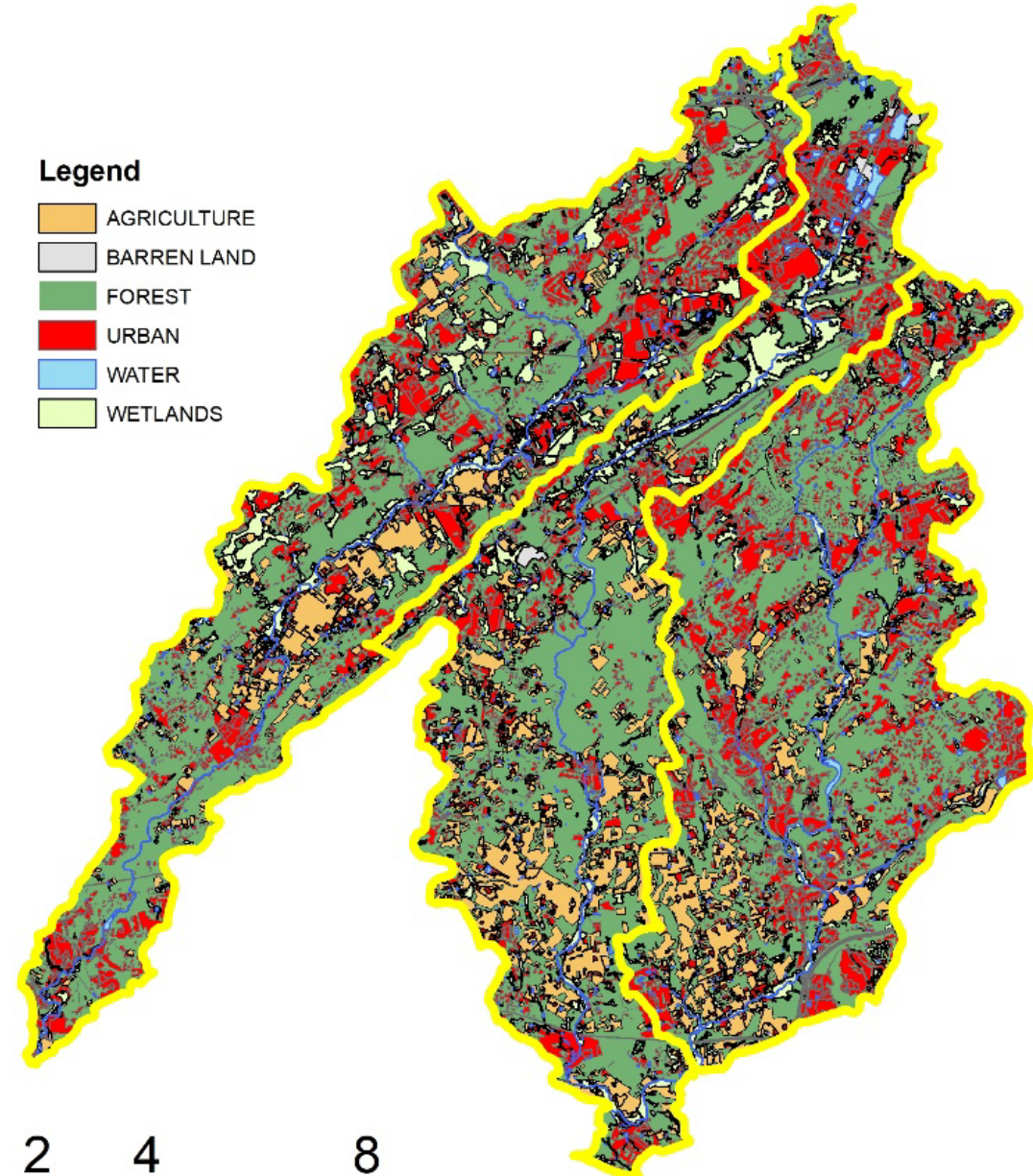
**Figure 6 – North Branch
Raritan River -
Municipalities**

Municipalities (North Branch Study
Area)

- Bedminster Township
- Bernardsville Boro
- Bernards Township
- Far Hills Boro
- Peapack-Gladstone Township
- Chester Boro
- Chester Township
- Mendham Boro
- Mendham Township
- Randolph Township



- Legend**
- AGRICULTURE
 - BARREN LAND
 - FOREST
 - URBAN
 - WATER
 - WETLANDS

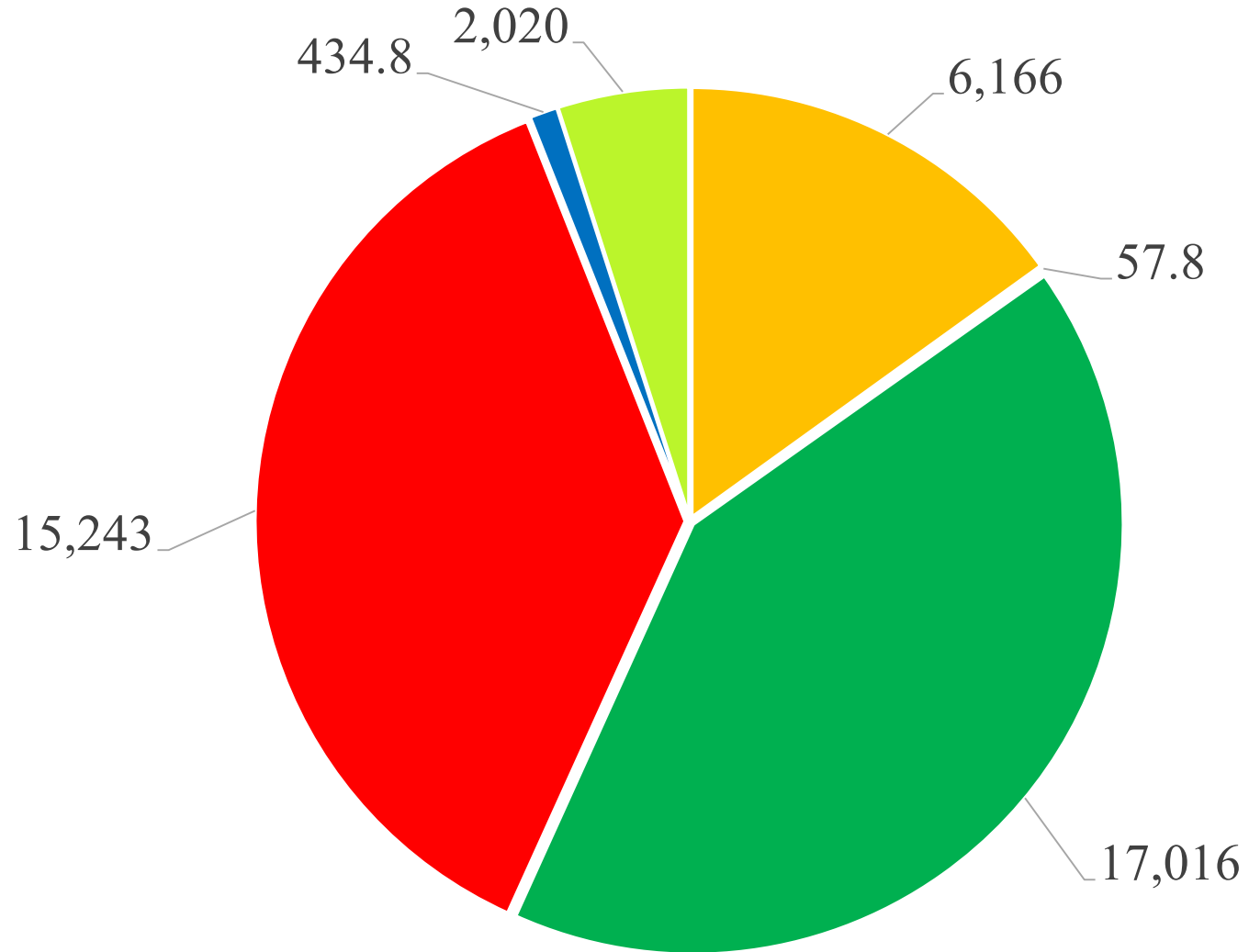


Land Cover	Total Phosphorus (TP) Load (lbs/acre/yr)	Total Nitrogen (TN) Load (lbs/acre/yr)	Total Suspended Solids (TSS) Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	10	120
Agriculture	1.3	10	300
Forest, Water, Wetlands	0.1	3	40
Barrenland/ Transitional Area	0.5	5	60

North Branch Study Area

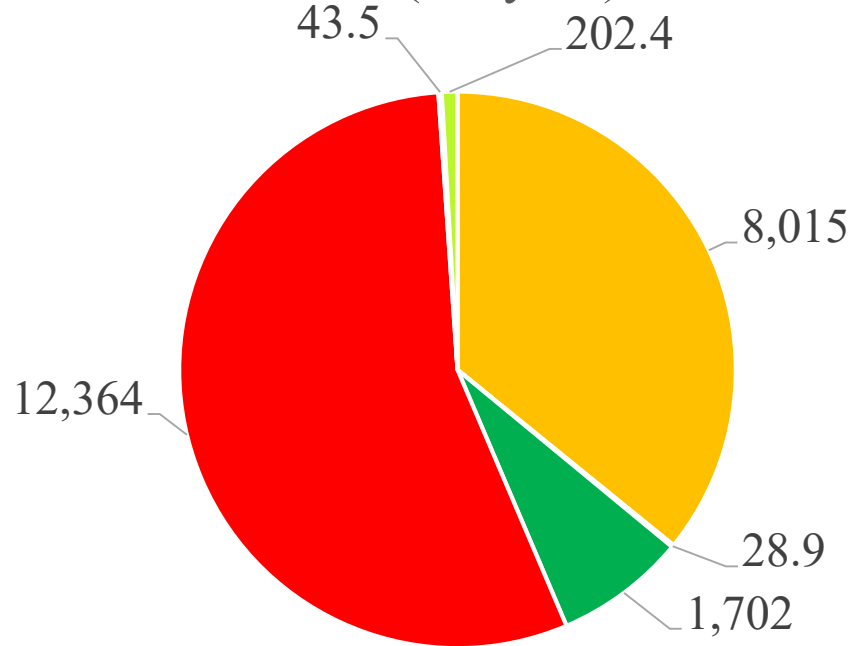
General Land Use Category	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
Agriculture	6,166	8,015	61,655	1,849,652
Barren Land	57.8	28.9	288.8	3,466
Forest	17,016	1,702	51,047	680,620
Urban	15,243	12,364	115,080	1,722,448
Water	434.8	43.5	1,304	17,390
Wetlands	2,020	202.4	6,062	80,815
Total	40,936	22,356	235,437	4,354,391

North Branch Study Area - Land Use Distribution (acres)



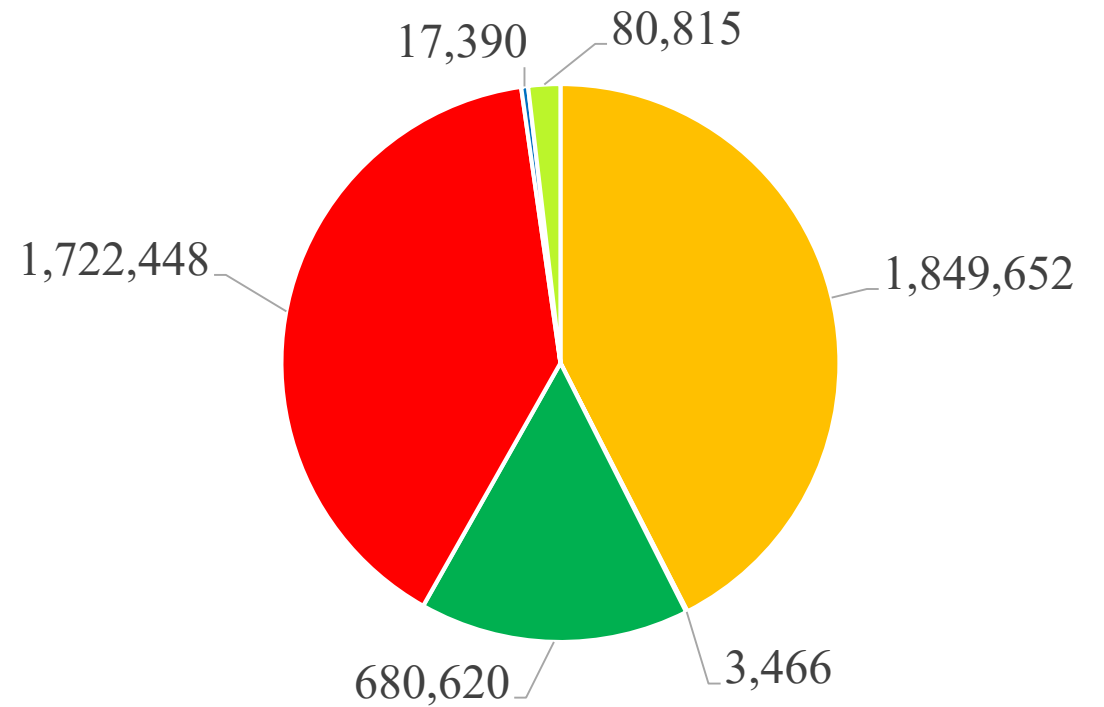
■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

North Branch Study Area - Total Phosphorus Loads by Land Use (lbs/year)



■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

North Branch Study Area - Total Suspended Solids Loads by Land Use (lbs/year)

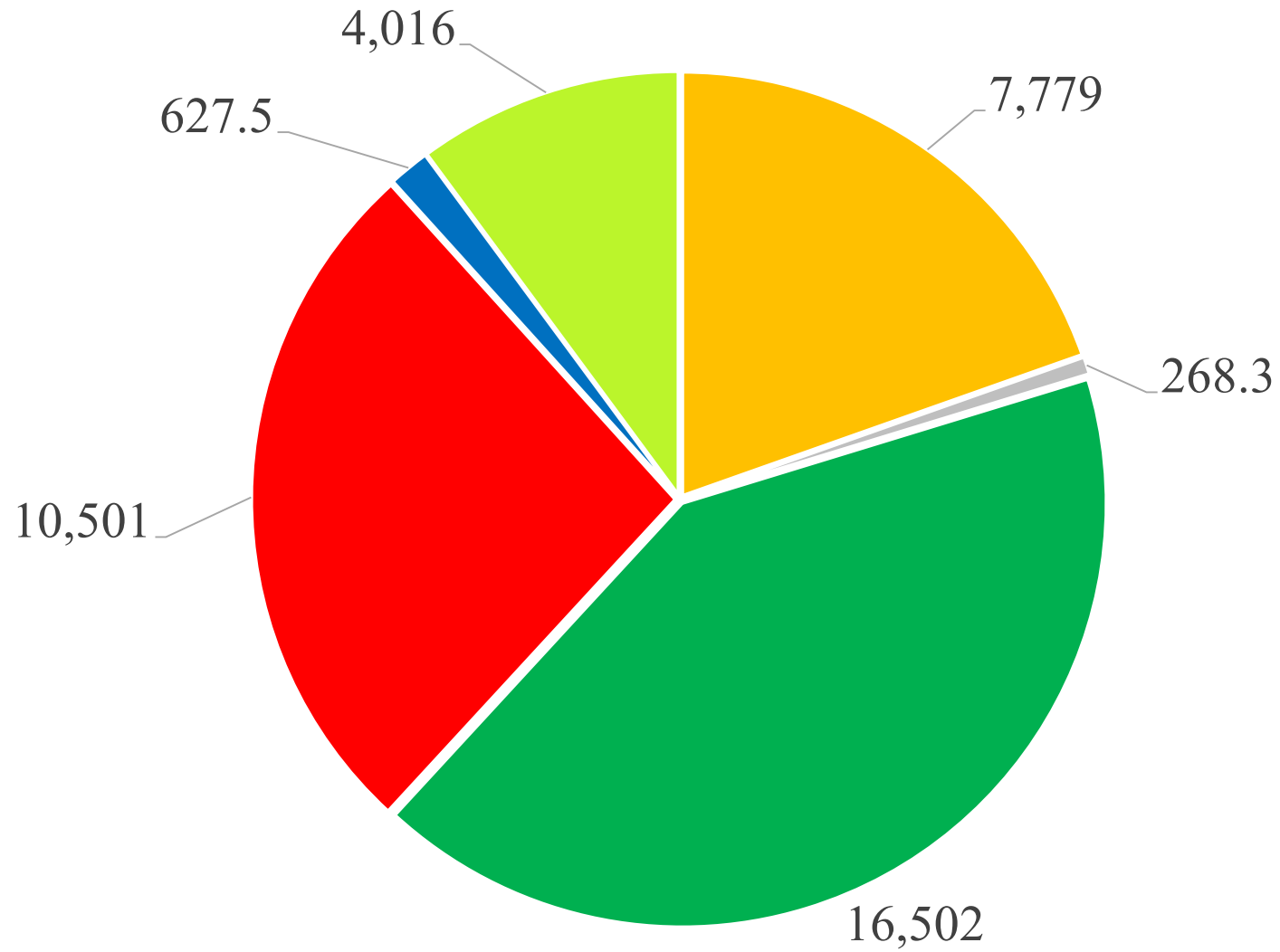


■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

Lamington River Study Area

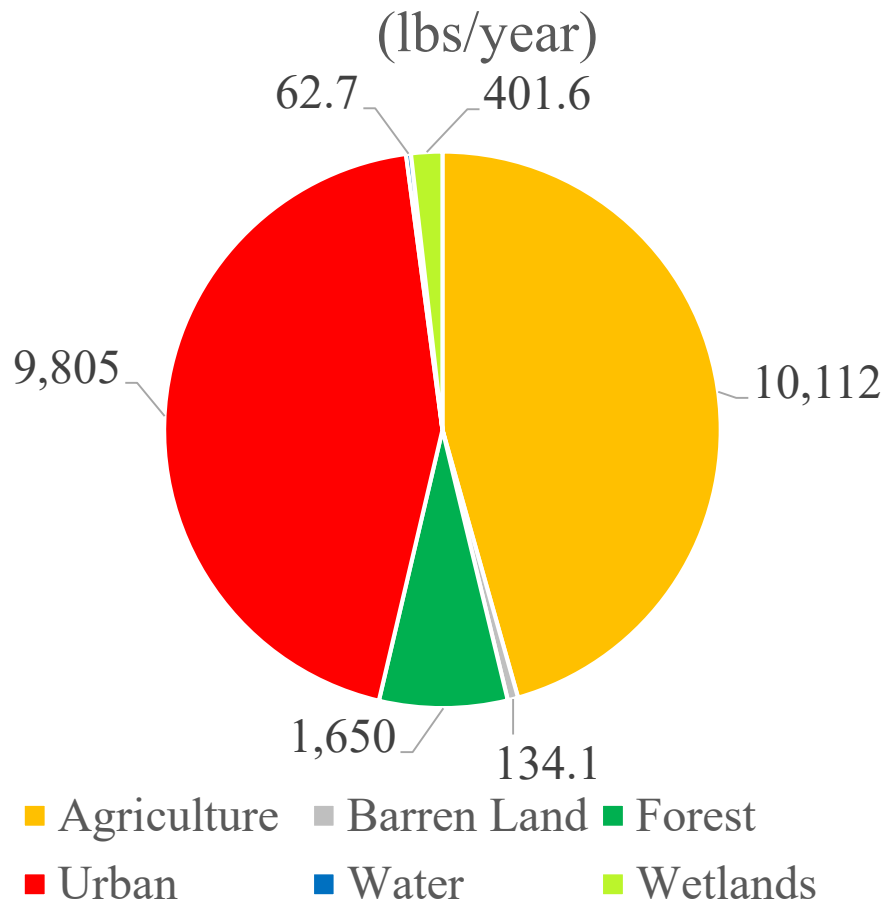
General Land Use Category	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
Agriculture	7,779	10,112	77,786	2,333,572
Barren Land	268.3	134.1	1,341	16,098
Forest	16,502	1,650	49,507	660,095
Urban	10,501	9,805	94,915	1,271,198
Water	627.5	62.7	1,882	25,099
Wetlands	4,016	401.6	12,047	160,632
Total	39,693	22,166	237,479	4,466,693

Lamington Study Area - Land Use Distribution (acres)

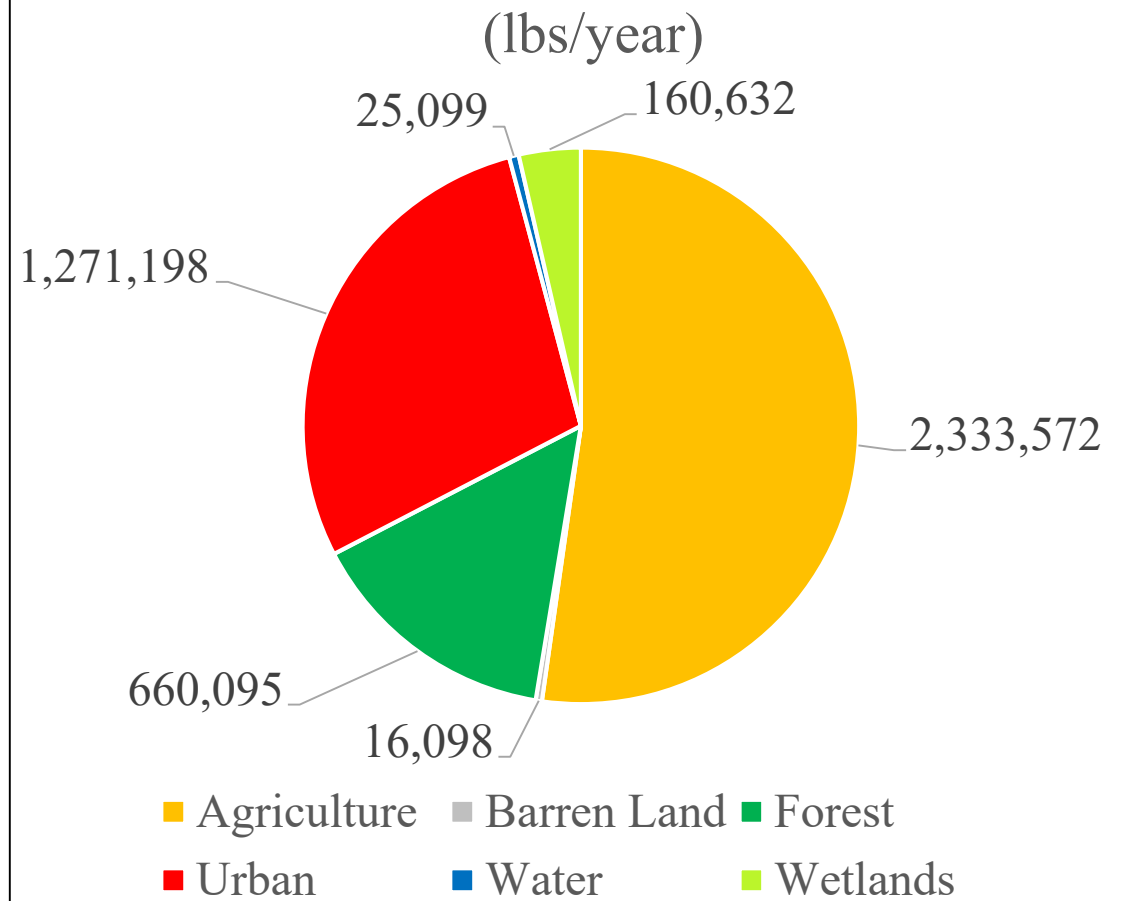


■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

Lamington Study Area - Total Phosphorus Loads by Land Use



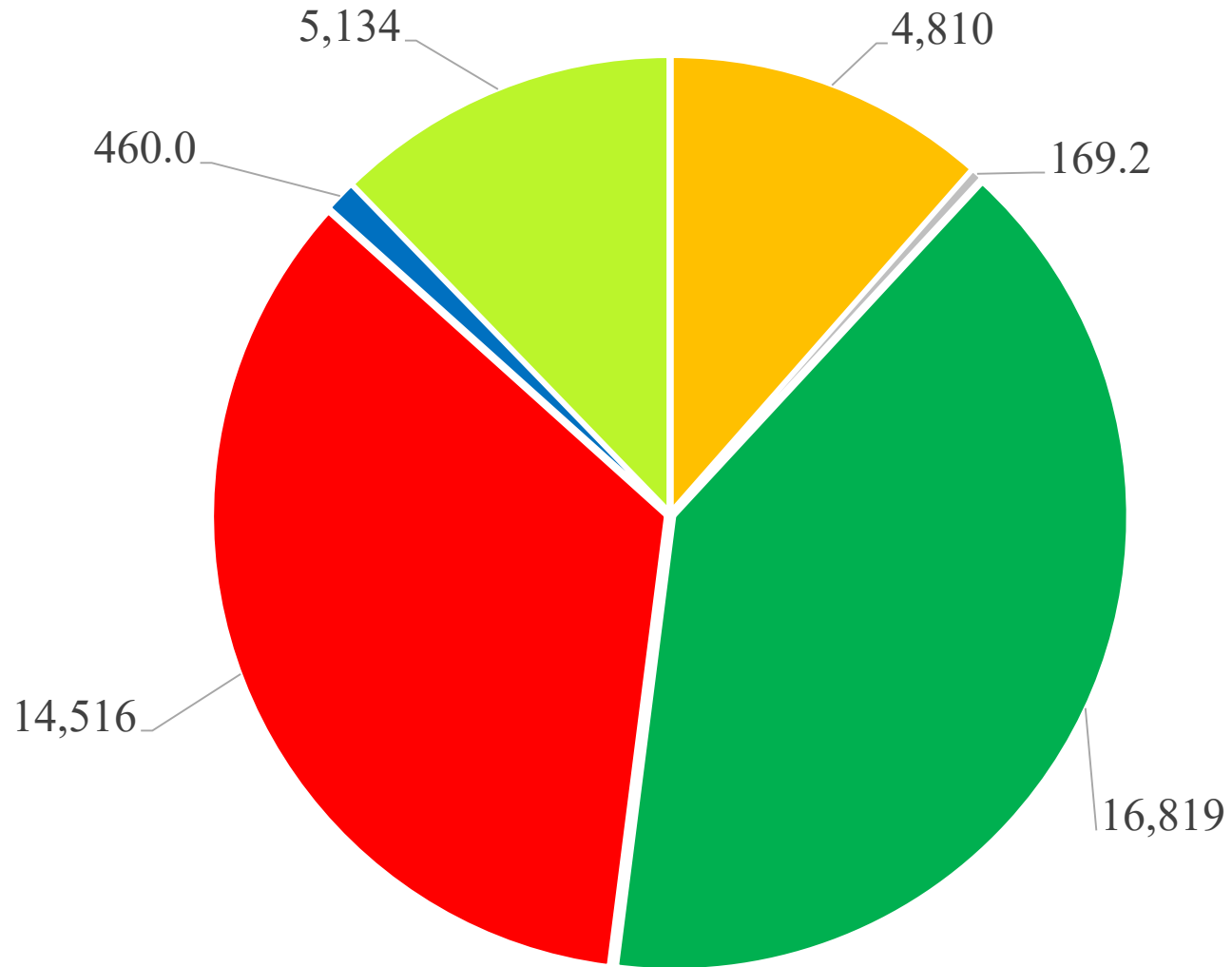
Lamington Study Area - Total Suspended Solids Loads by Land Use



South Branch Study Area

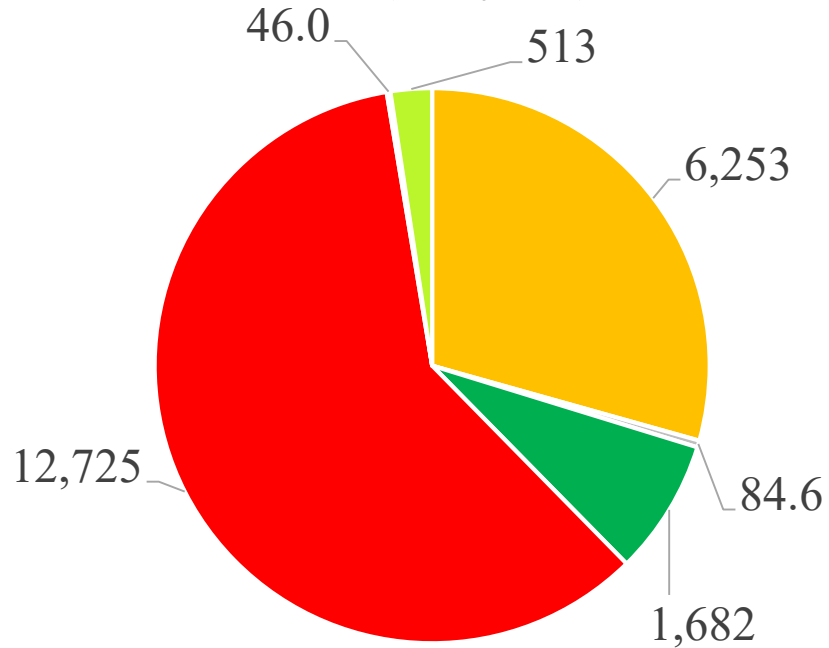
General Land Use Category	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
Agriculture	4,810	6,253	48,103	1,443,091
Barren Land	169.2	84.6	845.8	10,150
Forest	16,819	1,682	50,457	672,755
Urban	14,516	12,725	121,145	1,702,144
Water	460.0	46.0	1,380	18,400
Wetlands	5,134	513	15,401	205,343
Total	41,908	21,304	237,331	4,051,882

South Branch Study Area - Land Use Distribution (acres)



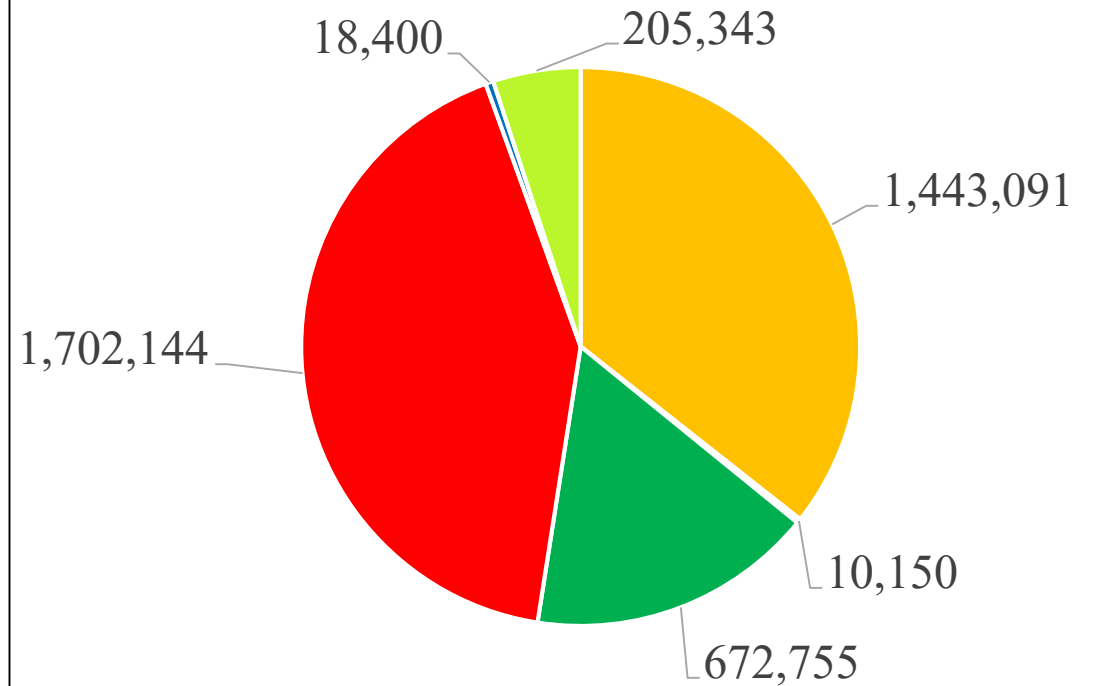
■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

South Branch Study Area - Total Phosphorus Loads by Land Use (lbs/year)



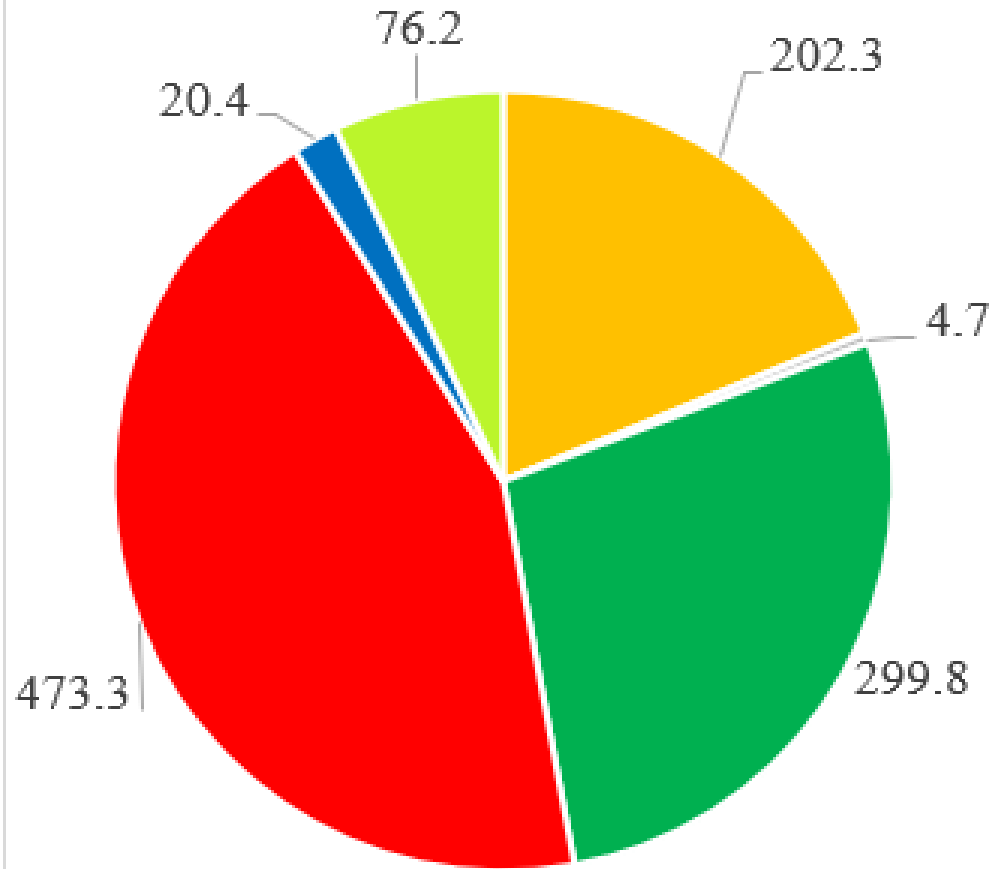
■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

South Branch Study Area - Total Suspended Solids Loads by Land Use (lbs/year)



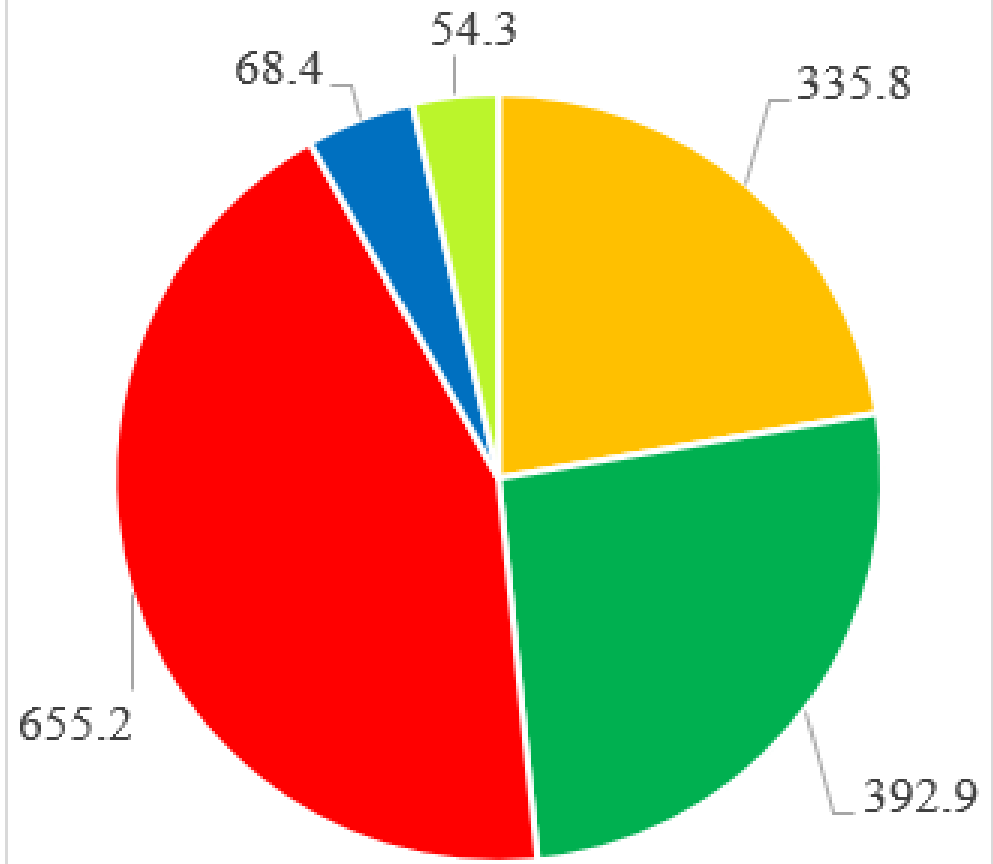
■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

HUC 2040105030010 - Total Phosphorus Loads by Land Use (lbs/year)



■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

HUC 2040105030020 - Total Phosphorus Loads by Land Use (lbs/year)



■ Agriculture ■ Forest ■ Urban
■ Water ■ Wetlands

Preliminary Results

- Total phosphorus load from land uses = 65,826 pounds per year
- TMDL required reduction = 68 to 84% for agriculture and urban land uses
- Total phosphorus load reduction required = 45,086 pounds per year

- Total suspended solids load from land uses = 12,872,967 pounds per year
- TMDL required reduction = 60% for agriculture and urban land uses
- Total suspended solids load reduction required = 6,193,263 pounds per year

Next Steps

- Conduct land use and nonpoint source loading calculations by HUC14 and by municipality
- Calculate impervious cover by HUC14 and by municipality
- Calculate stormwater runoff volumes for water quality storm, 2-, 10-, and 100-year storms by HUC14 and municipality (2020 and 2100 rainfall totals)
- Identify existing stormwater management practices for urban land uses
- Identify opportunities to reduce loading
 - Urban land uses
 - Agricultural land uses
 - Site specific
 - Watershed-wide

How can municipalities use these data?

- MS4 permit requirement to develop a Watershed Improvement Plan
- Mapping is due December 31, 2025
 - Impervious areas will be mapped for the Watershed Restoration and Protection Plan
 - TMDL watershed will be identified and drainage areas to these waters
- Watershed Assessment Report is due December 31, 2026
 - Identification of potential water quality improvement projects
 - Estimate load reduction for each of these projects
- Watershed Improvement Plan Report is due December 31, 2027
 - Summary of potential projects
 - Implementation schedule
 - Project costs

Other ways municipalities can use these data?

MS4 requires municipalities to implement public education and outreach program (12 points are required from 3 of 5 categories)

1. General education of the public on stormwater issues
2. Targeted audiences outreach
3. School/youth education and activities
4. Watershed/regional collaboration
5. Community involvement activities

How can you help?

- Let us know where we might be able to implement stormwater practices to reduce runoff flows to these waterbodies.
- Are there any areas of severe erosion that need to be mitigated?
- What else can you tell us about the North Branch Raritan, South Branch Raritan, and Lamington Rivers and the land that drains to it?

Christopher C. Obropta, Ph.D., P.E.

Rutgers Cooperative Extension

Water Resources Program

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www.water.rutgers.edu