



Project Overview

Rutgers Cooperative Extension Water Resources Program

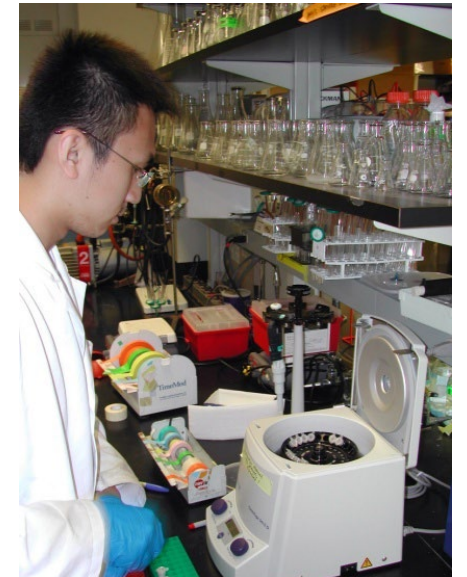
Christopher C. Obropta, Ph.D., P.E.

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

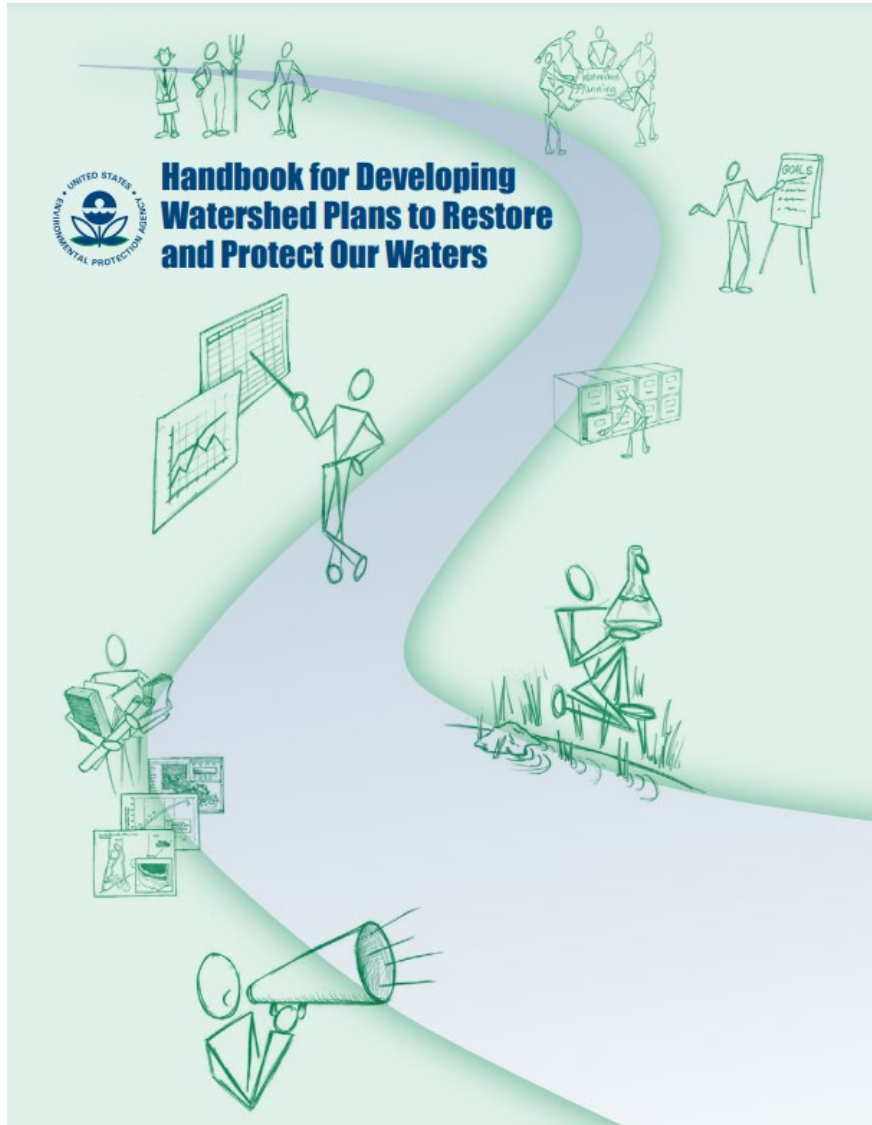


Our mission is to identify and address water resources issues by engaging and empowering communities to employ practical science-based solutions to help create a more equitable and sustainable New Jersey.

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

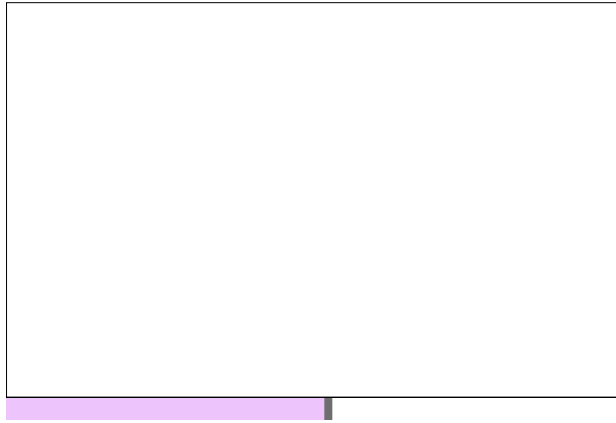
The NJDEP has prepared a TMDL for total suspended solids and total phosphorus that requires a 60% reduction in total suspended solids and a 68% to 84% reduction in total phosphorus. This project will create a plan that will be a blueprint for how to achieve these reductions.



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

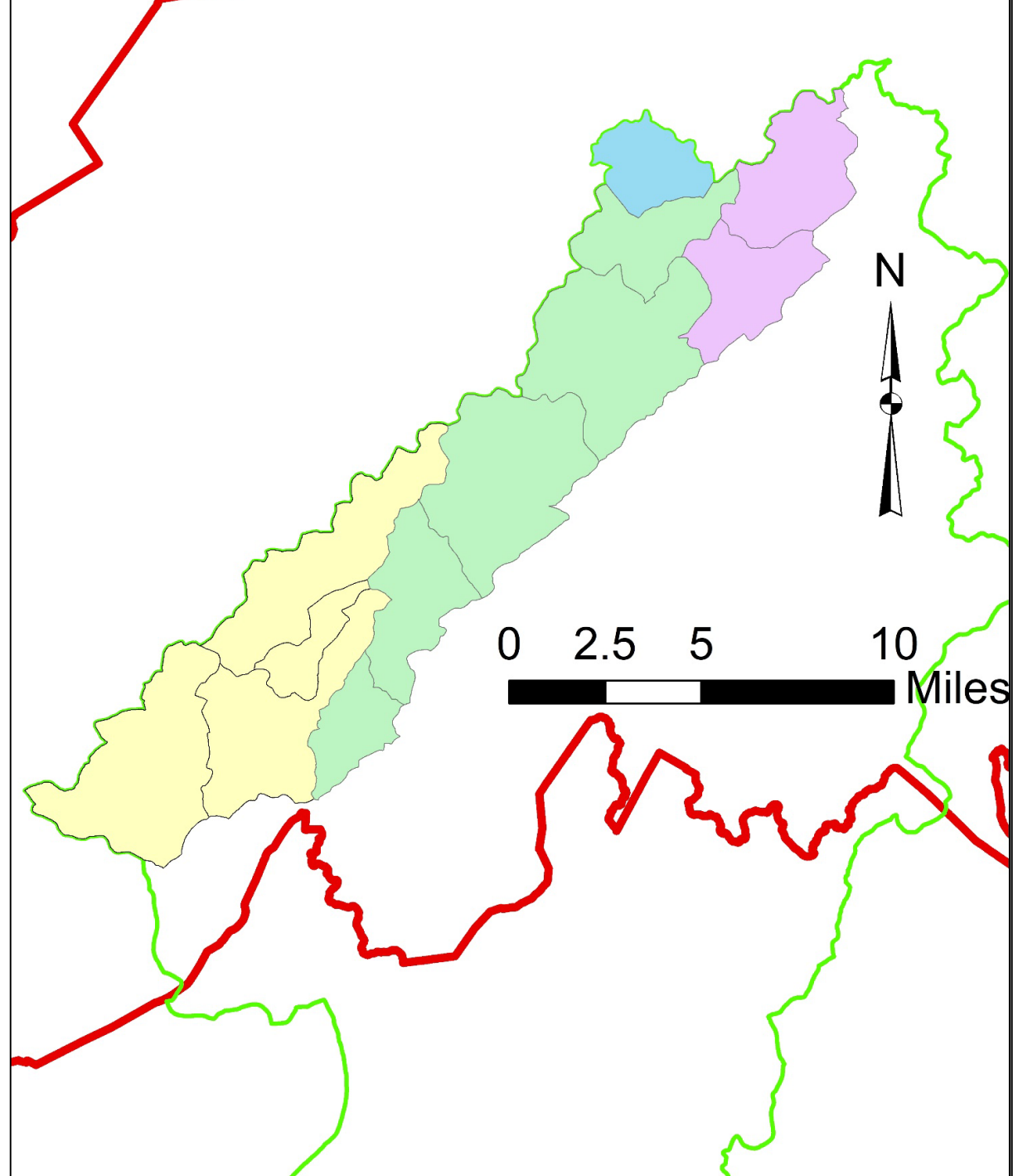
- 02030105010040
- 02030105010050
- 02030105010060
- 02030105010070
- 02030105010080

Total Area = 49 sq.mi.

Drakes Brook HUC14s

- 02030105010010
- 02030105010020

Total Area = 16.1 sq.mi.



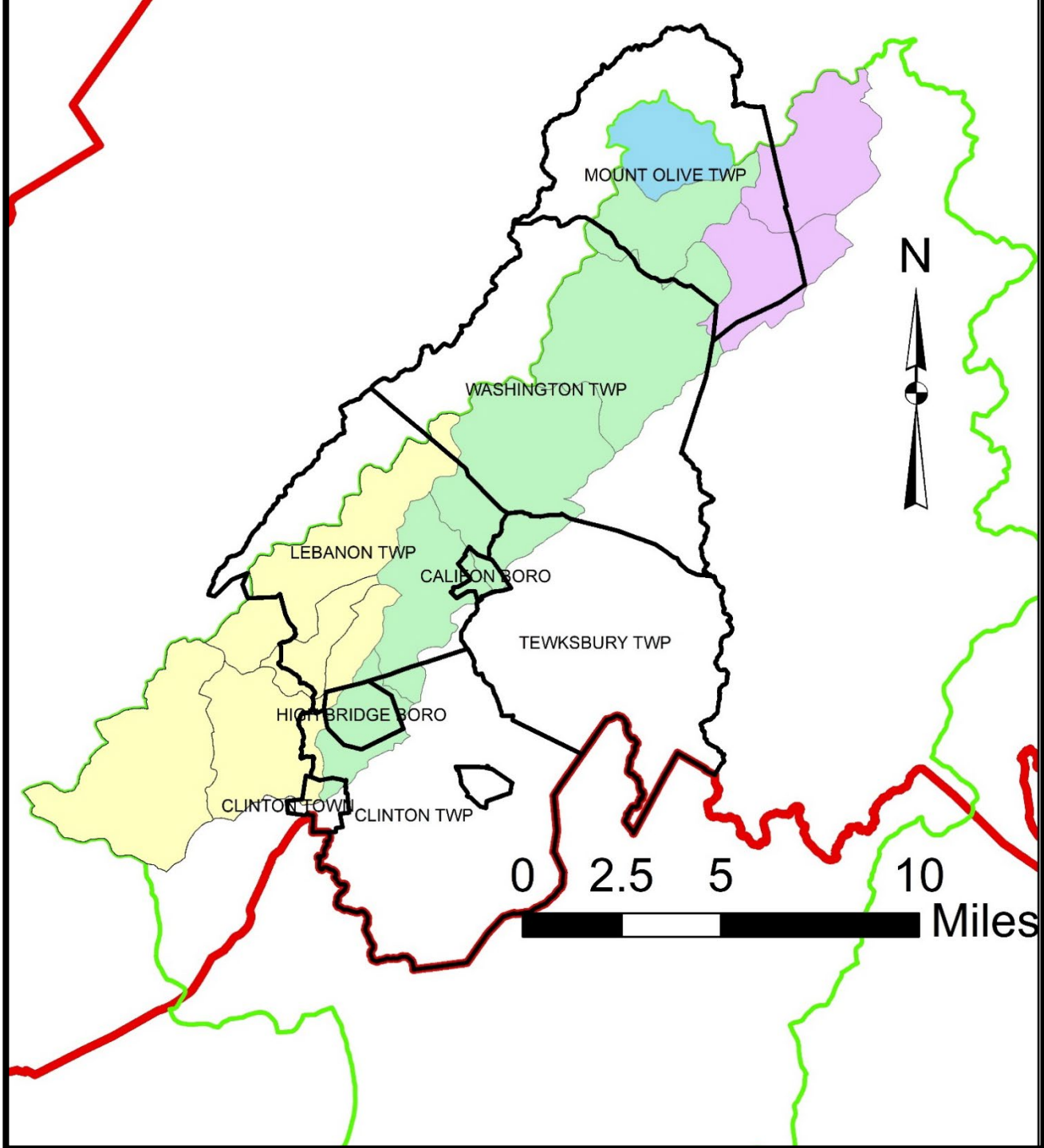
**Figure 2 – South Branch
Raritan River -
Municipalities**

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

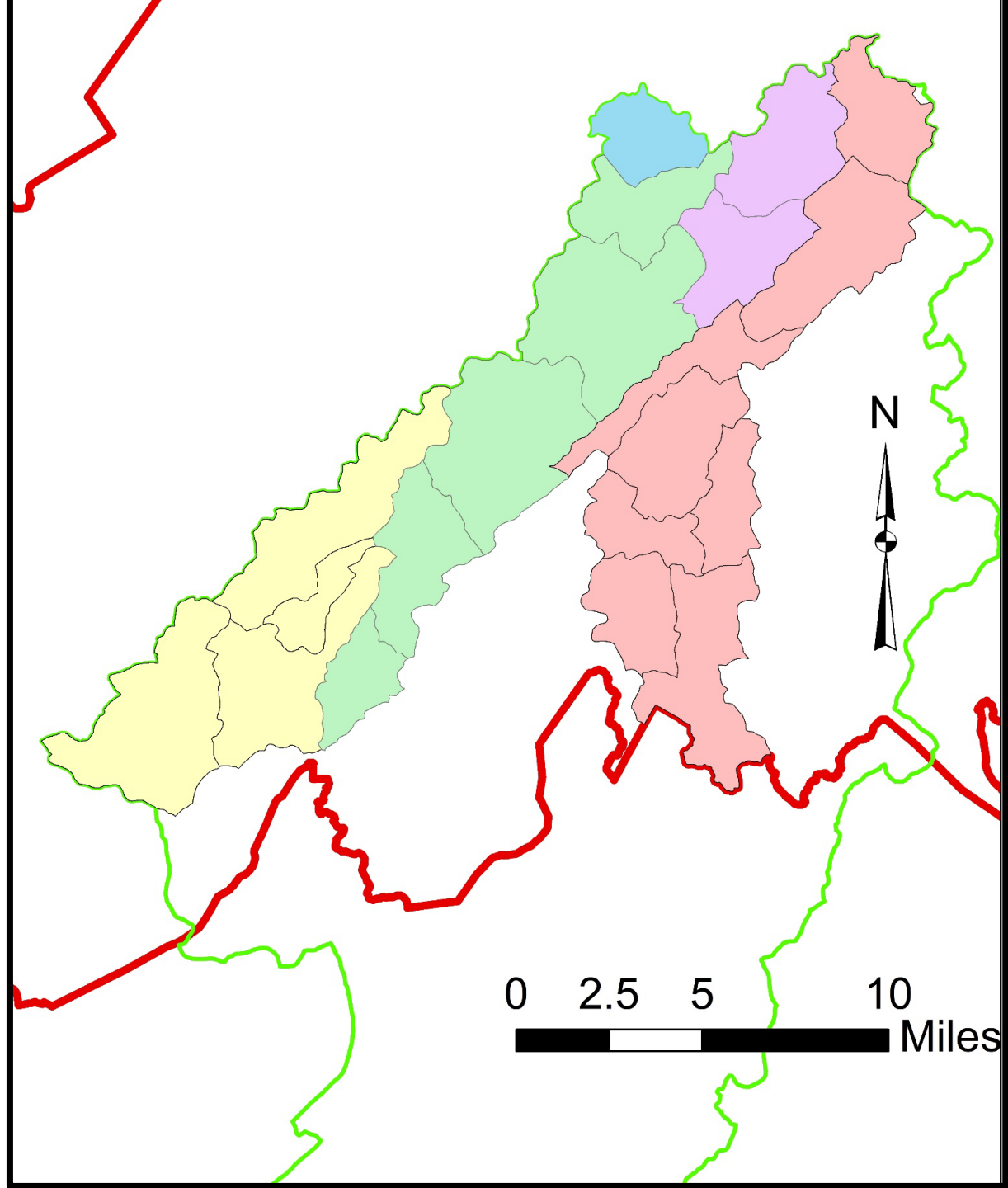
02030105050050

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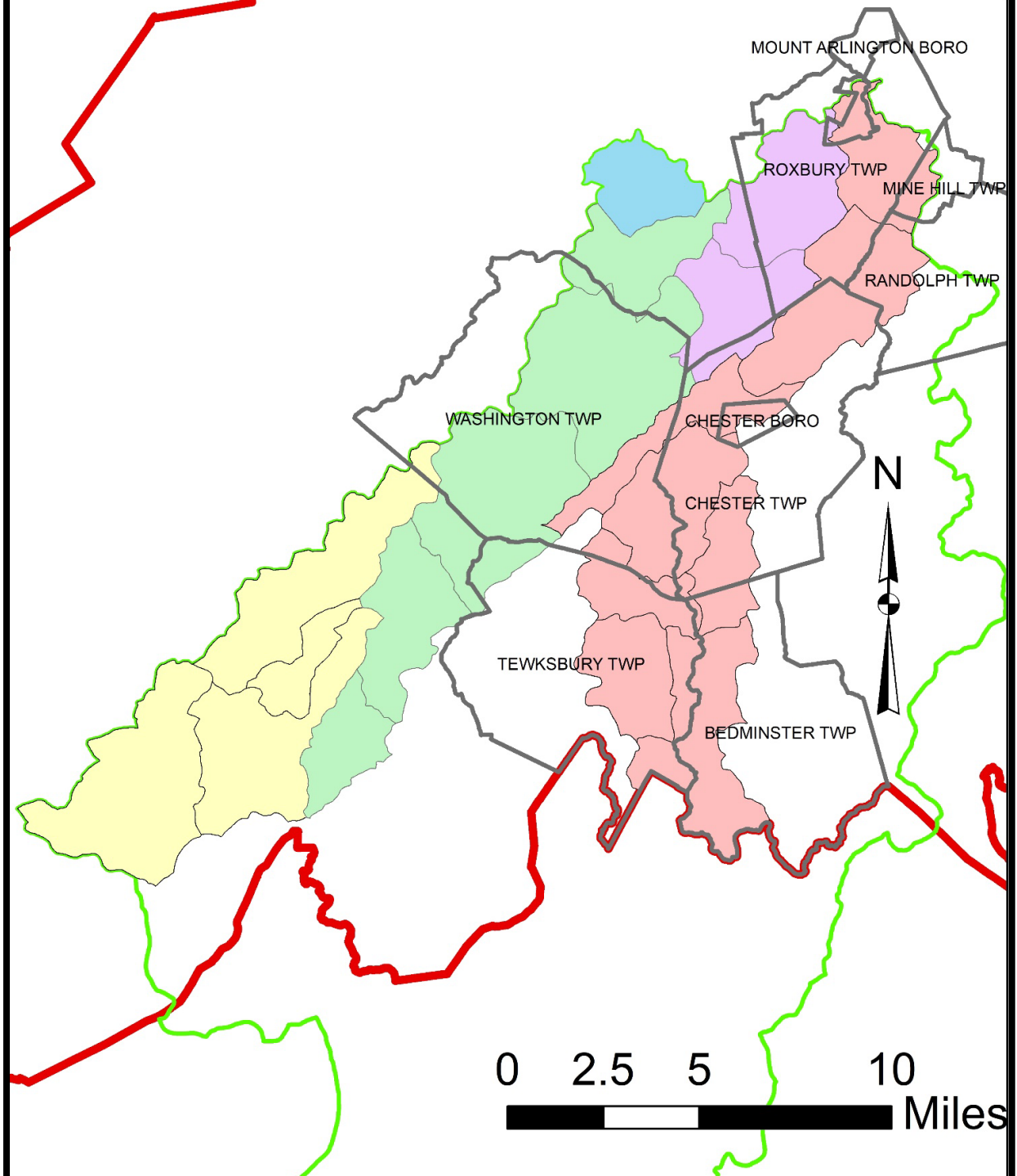
Total Area = 59.1 sq.mi.



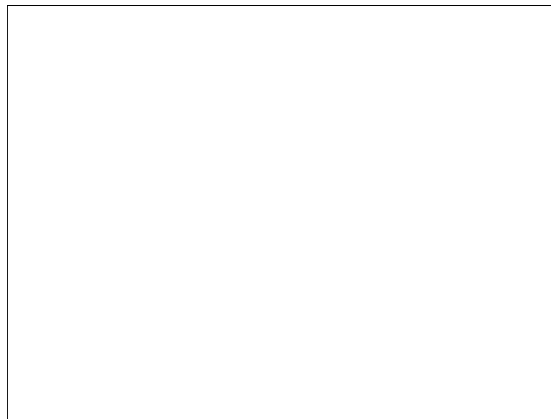
**Figure 4 – Lamington River
- Municipalities**

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



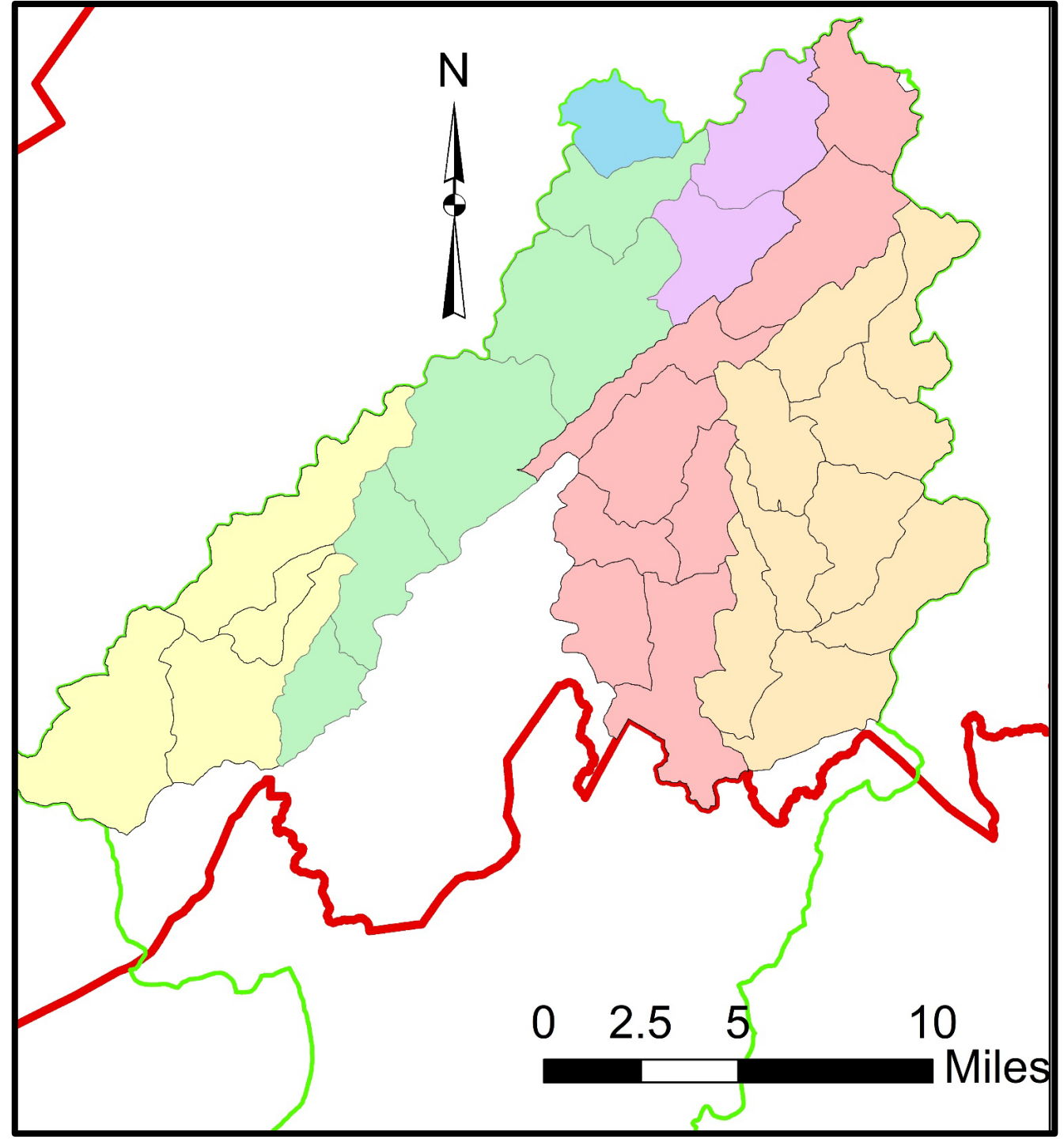
**Figure 5 – North Branch
Raritan River Study Area**



North Branch Raritan River
HUC14s

- 02030105060010
- 02030105060020
- 02030105060030
- 02030105060040
- 02030105060050
- 02030105060060
- 02030105060070
- 02030105060080
- 02030105060090

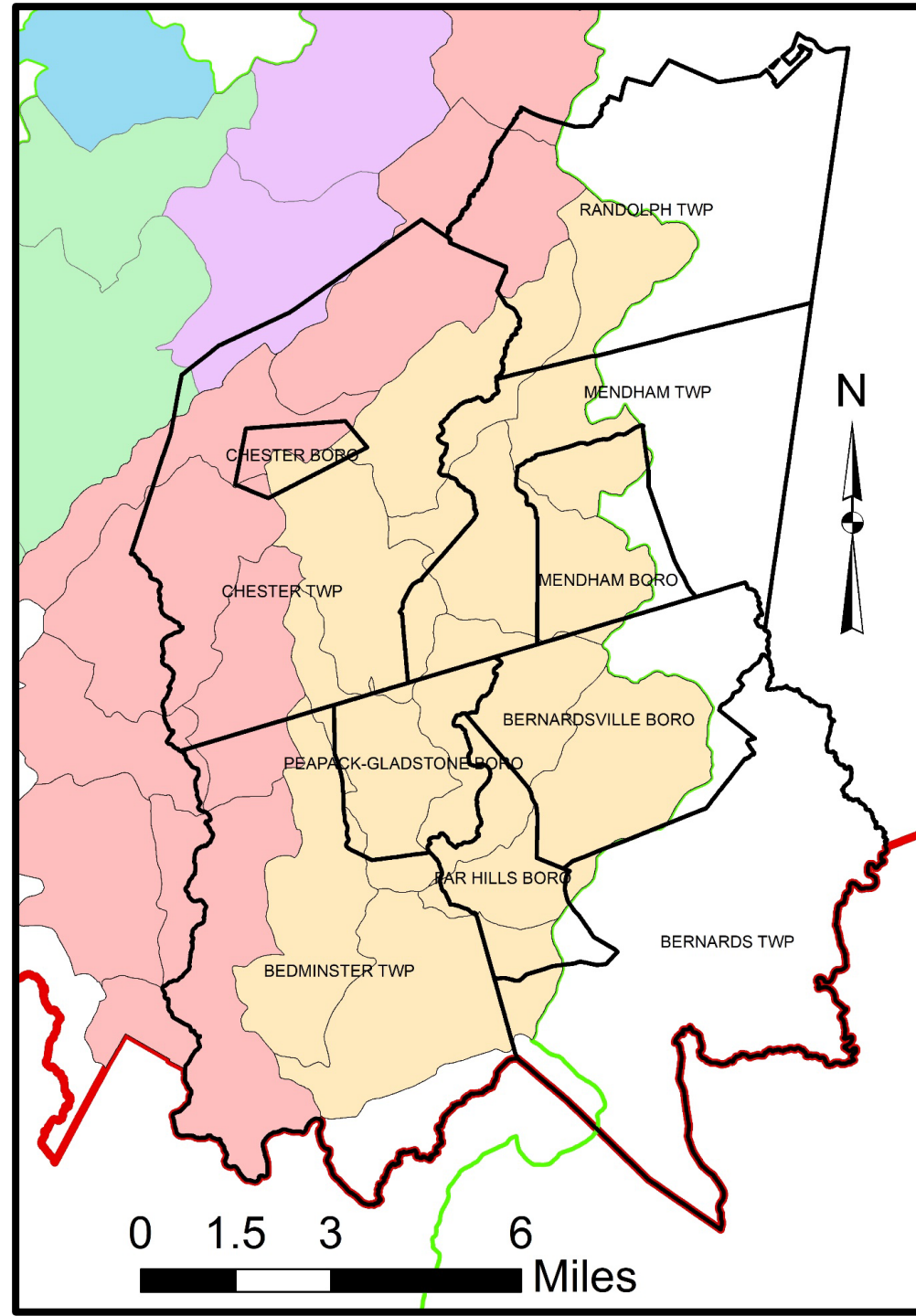
Total Area = 64 sq.mi.



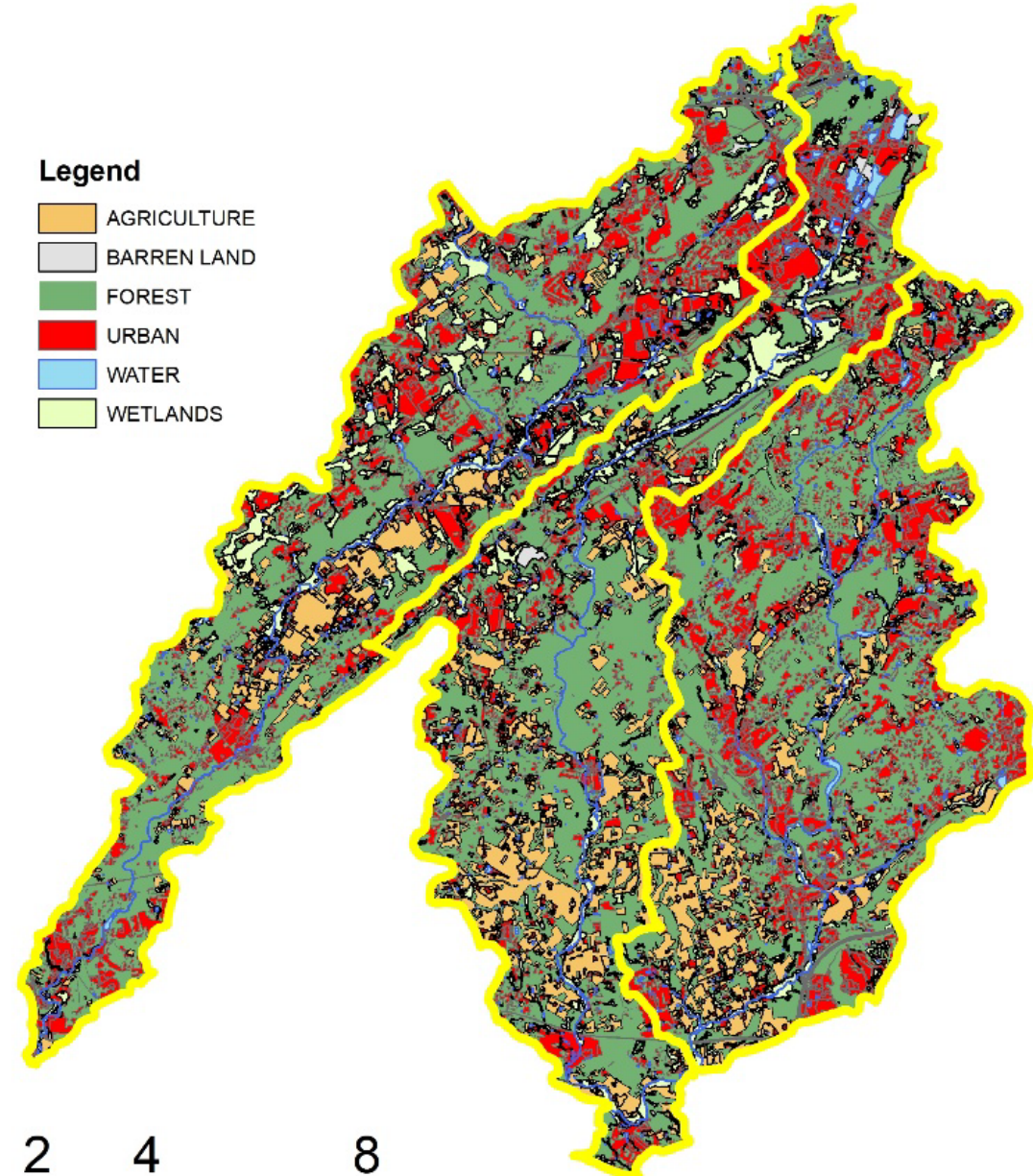
**Figure 6 – North Branch
Raritan River -
Municipalities**

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

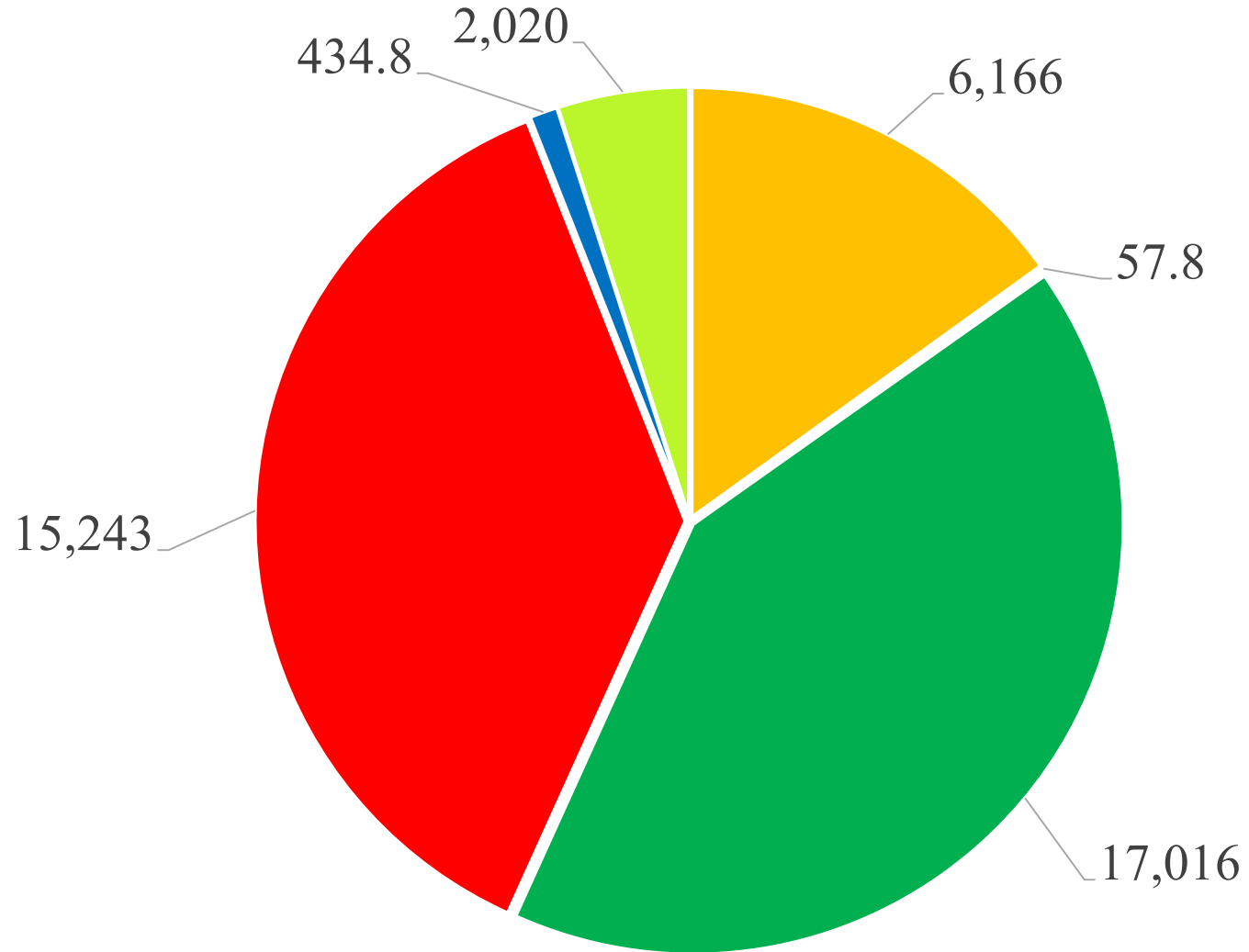


Land Cover	Total Phosphorus (TP) Load (lbs/acre/yr)	Total Nitrogen (TN) Load (lbs/acre/yr)	Total Suspended Solids (TSS) Load (lbs/acre/yr)
High, Medium Density Residential	1.4	15	140
Low Density, Rural Residential	0.6	5	100
Commercial	2.1	22	200
Industrial	1.5	16	200
Urban, Mixed Urban, Other Urban	1.0	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

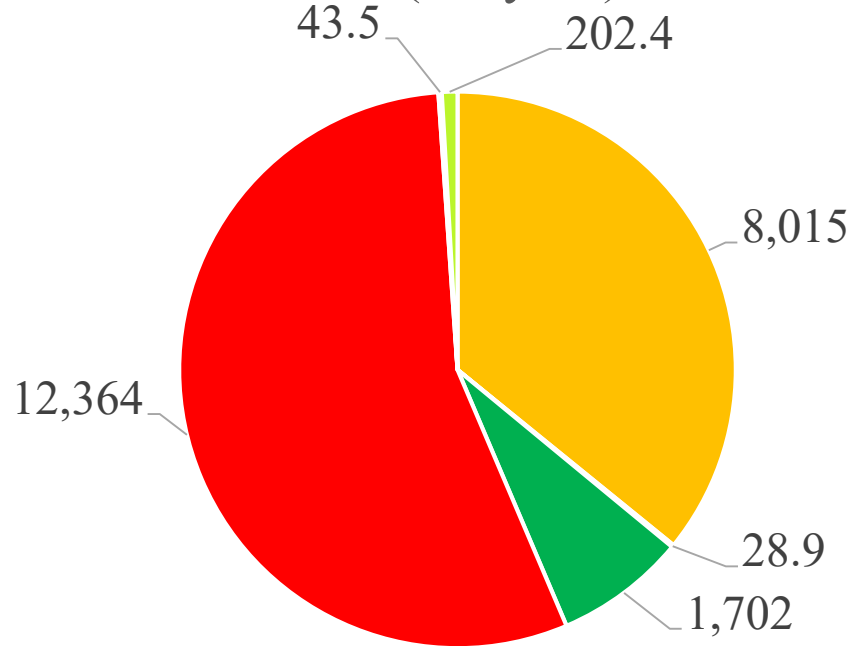
General Land Use Category	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
Agriculture	6,166	8,015	61,655	1,849,652
Barren Land	57.8	28.9	288.8	3,466
Forest	17,016	1,702	51,047	680,620
Urban	15,243	12,364	115,080	1,722,448
Water	434.8	43.5	1,304	17,390
Wetlands	2,020	202.4	6,062	80,815
Total	40,936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

North Branch Study Area - Land Use Distribution (acres)



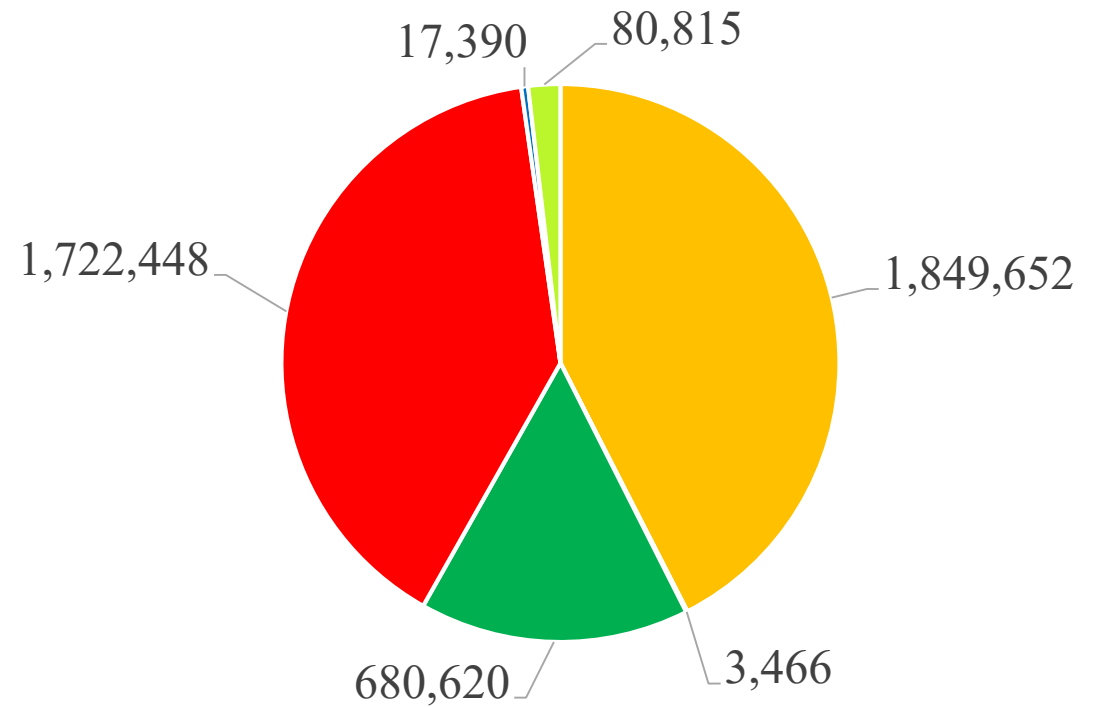
■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

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)

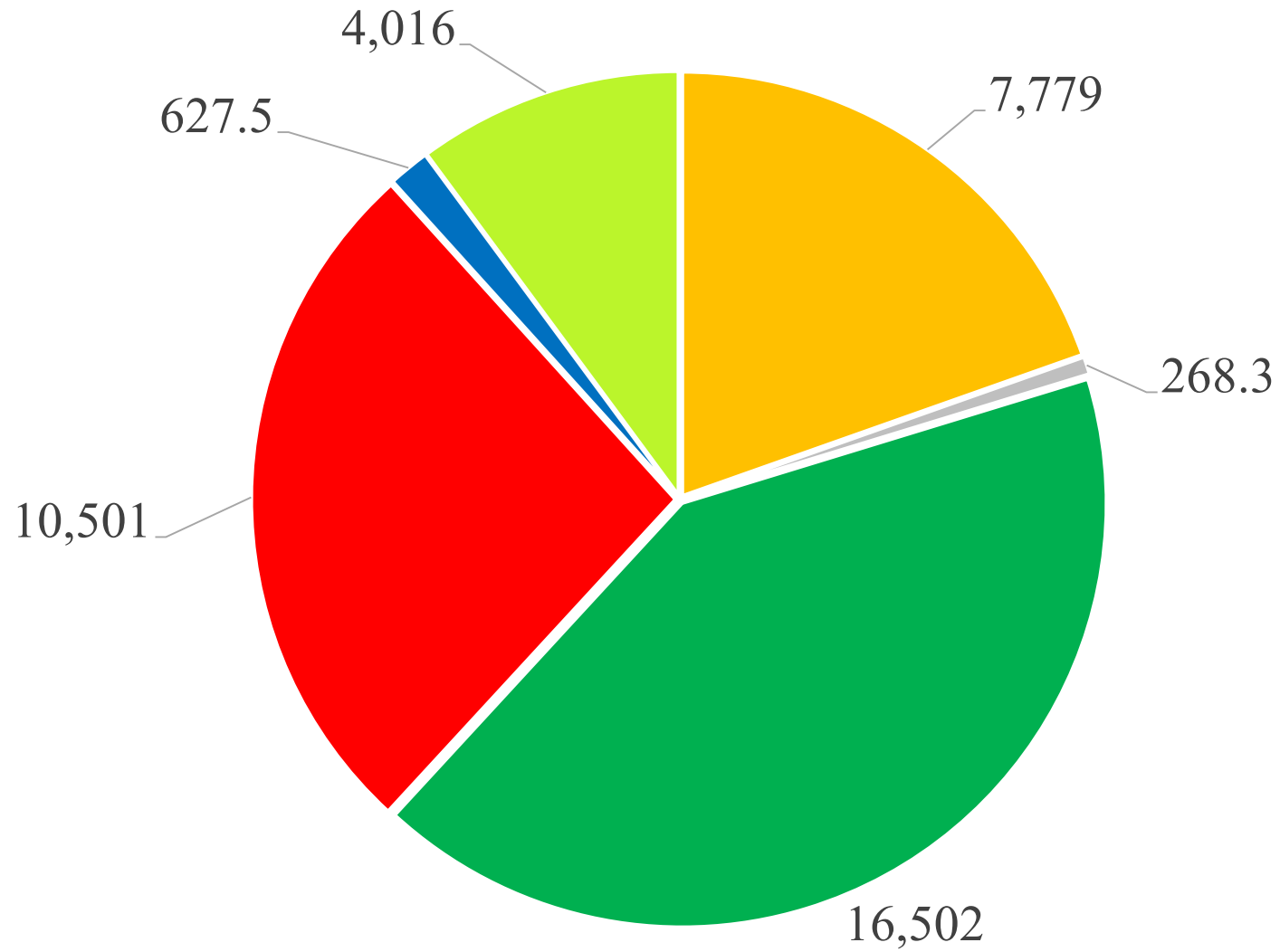


■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

Lamington River Study Area

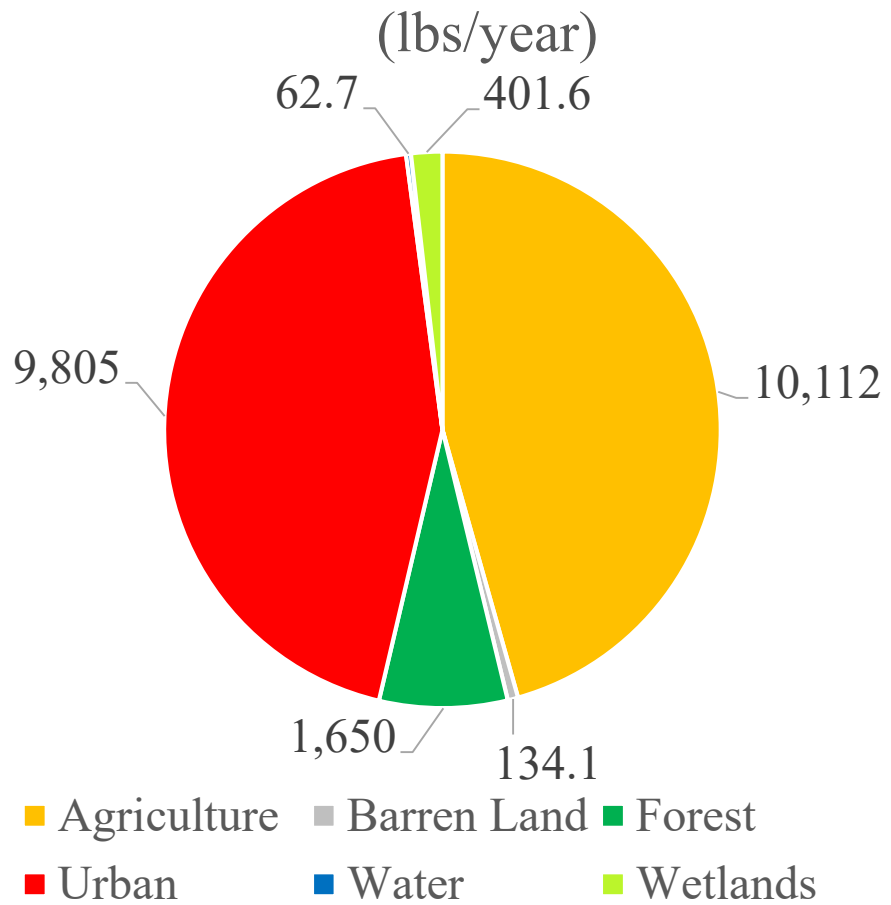
General Land Use Category	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
Agriculture	7,779	10,112	77,786	2,333,572
Barren Land	268.3	134.1	1,341	16,098
Forest	16,502	1,650	49,507	660,095
Urban	10,501	9,805	94,915	1,271,198
Water	627.5	62.7	1,882	25,099
Wetlands	4,016	401.6	12,047	160,632
Total	39,693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

Lamington Study Area - Land Use Distribution (acres)

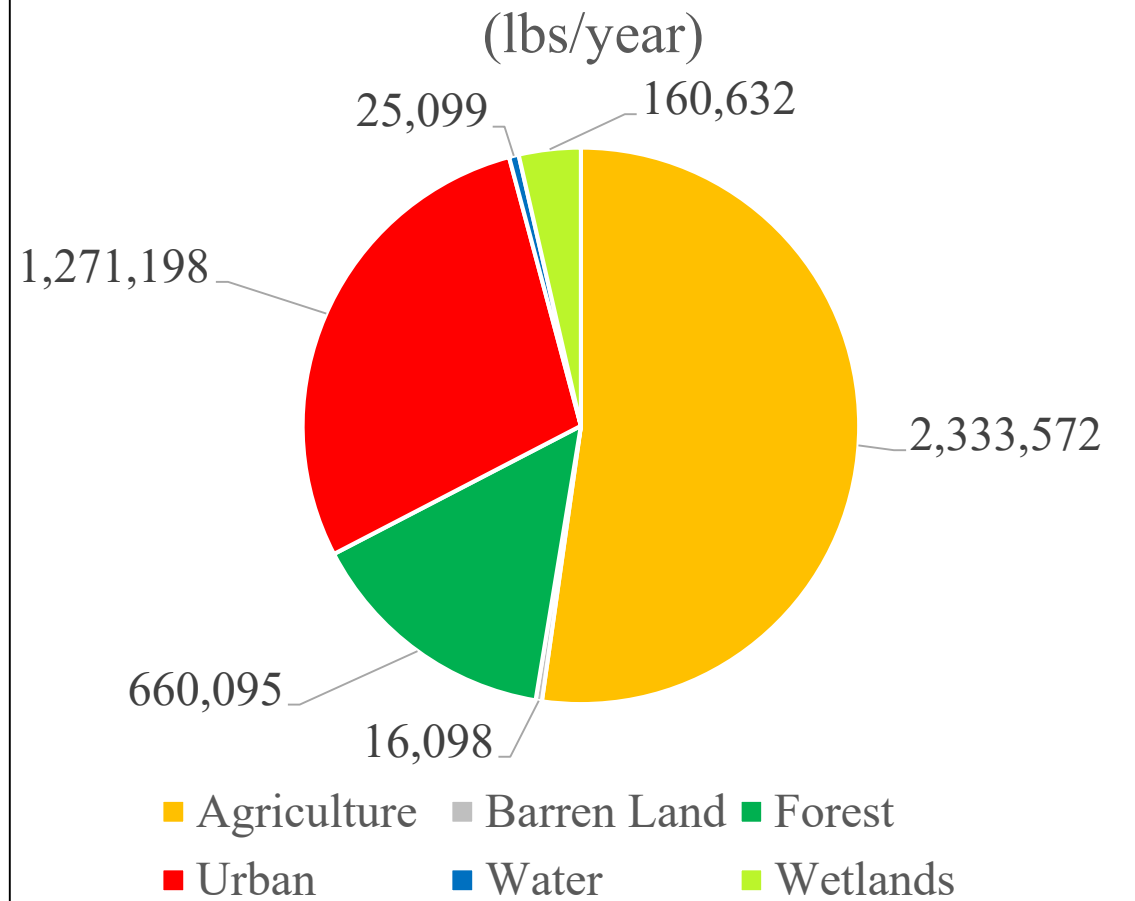


■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

Lamington Study Area - Total Phosphorus Loads by Land Use



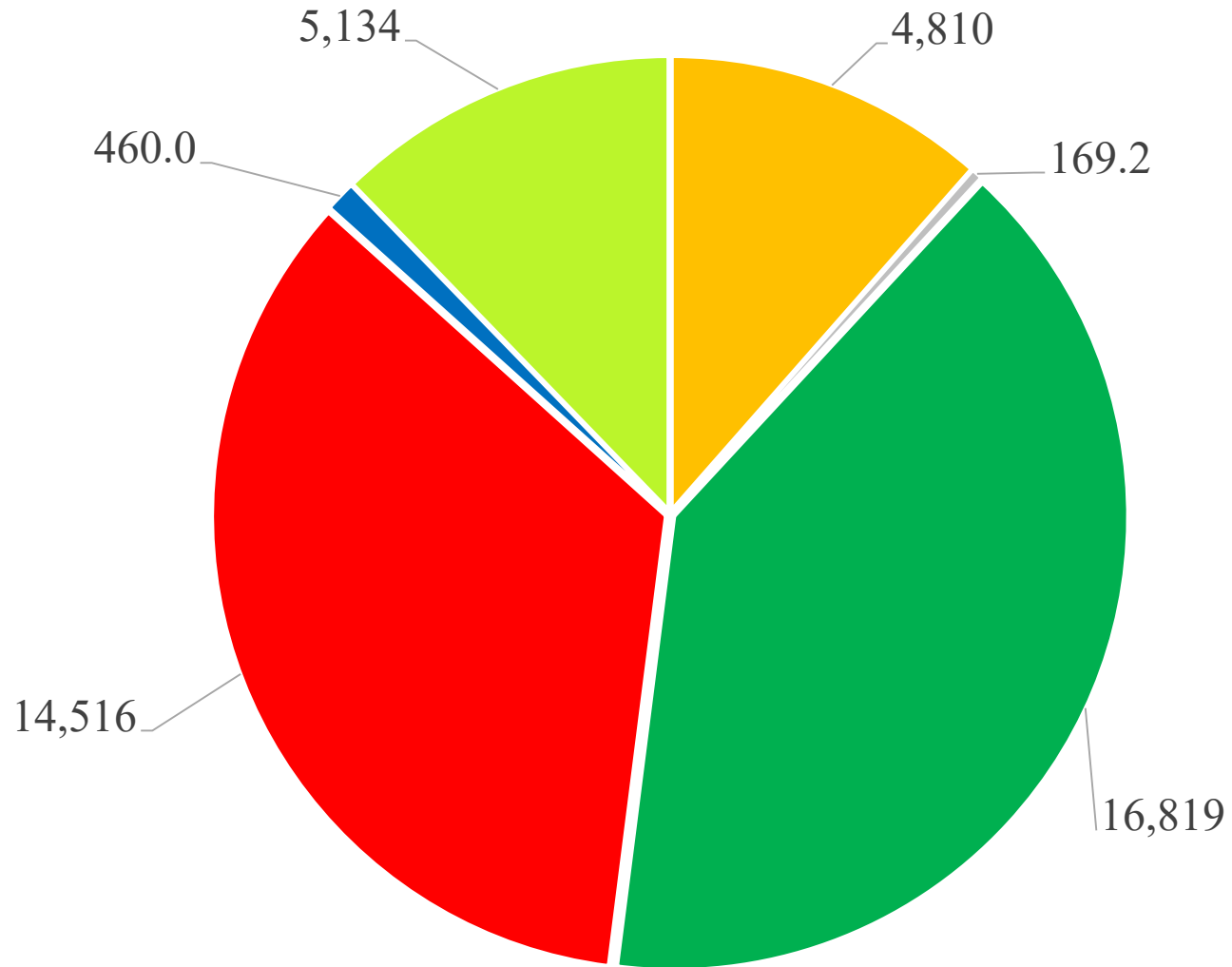
Lamington Study Area - Total Suspended Solids Loads by Land Use



South Branch Study Area

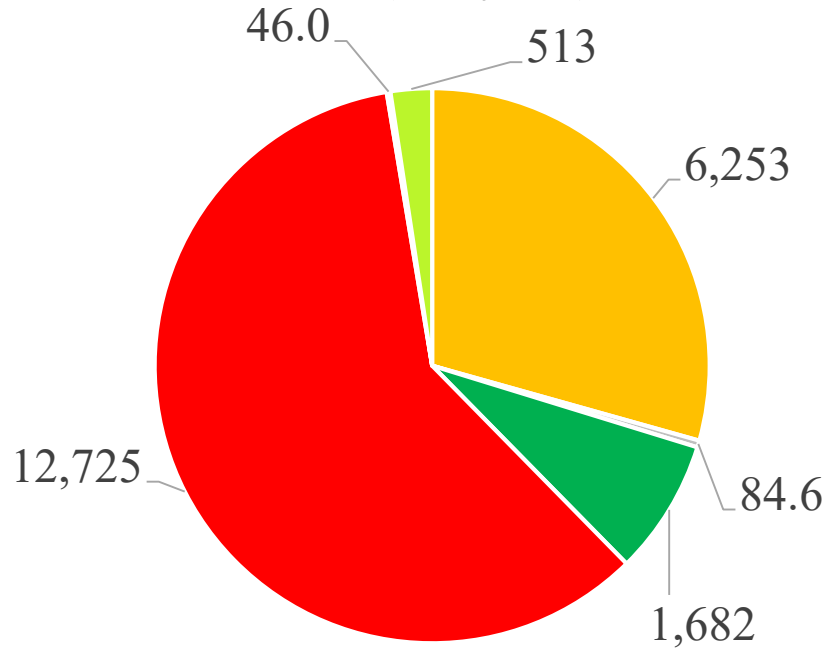
General Land Use Category	Area (acres)	TP (lbs/yr)	TN (lbs/yr)	TSS (lbs/yr)
Agriculture	4,810	6,253	48,103	1,443,091
Barren Land	169.2	84.6	845.8	10,150
Forest	16,819	1,682	50,457	672,755
Urban	14,516	12,725	121,145	1,702,144
Water	460.0	46.0	1,380	18,400
Wetlands	5,134	513	15,401	205,343
Total	41,908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

South Branch Study Area - Land Use Distribution (acres)



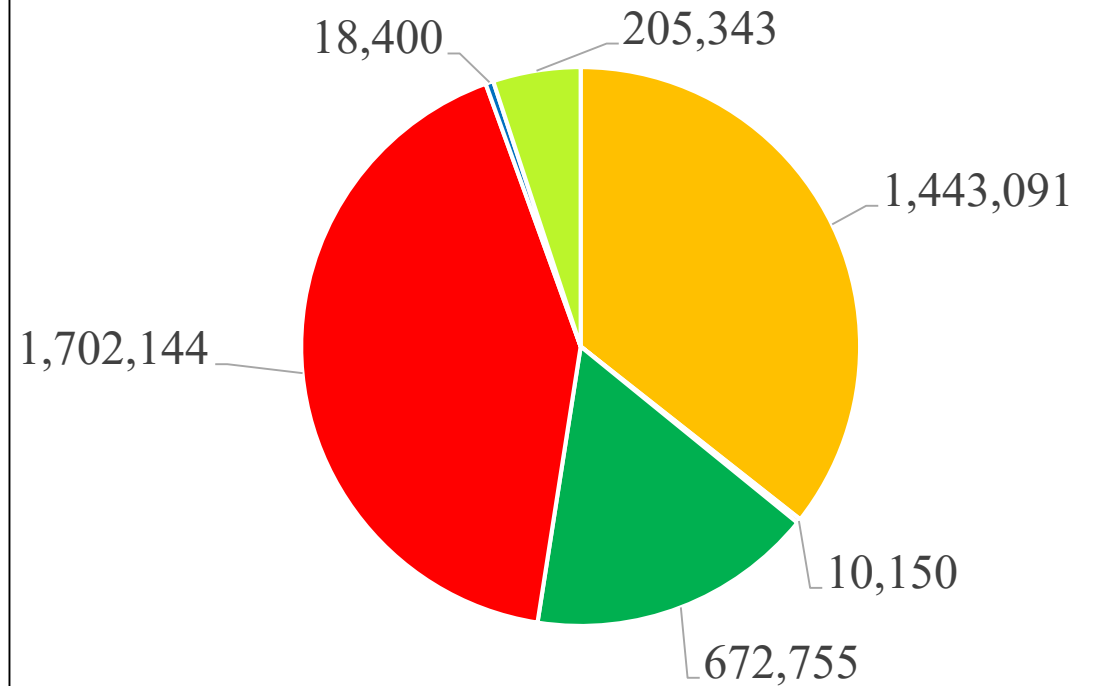
■ Agriculture ■ Barren Land ■ Forest ■ Urban ■ Water ■ Wetlands

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



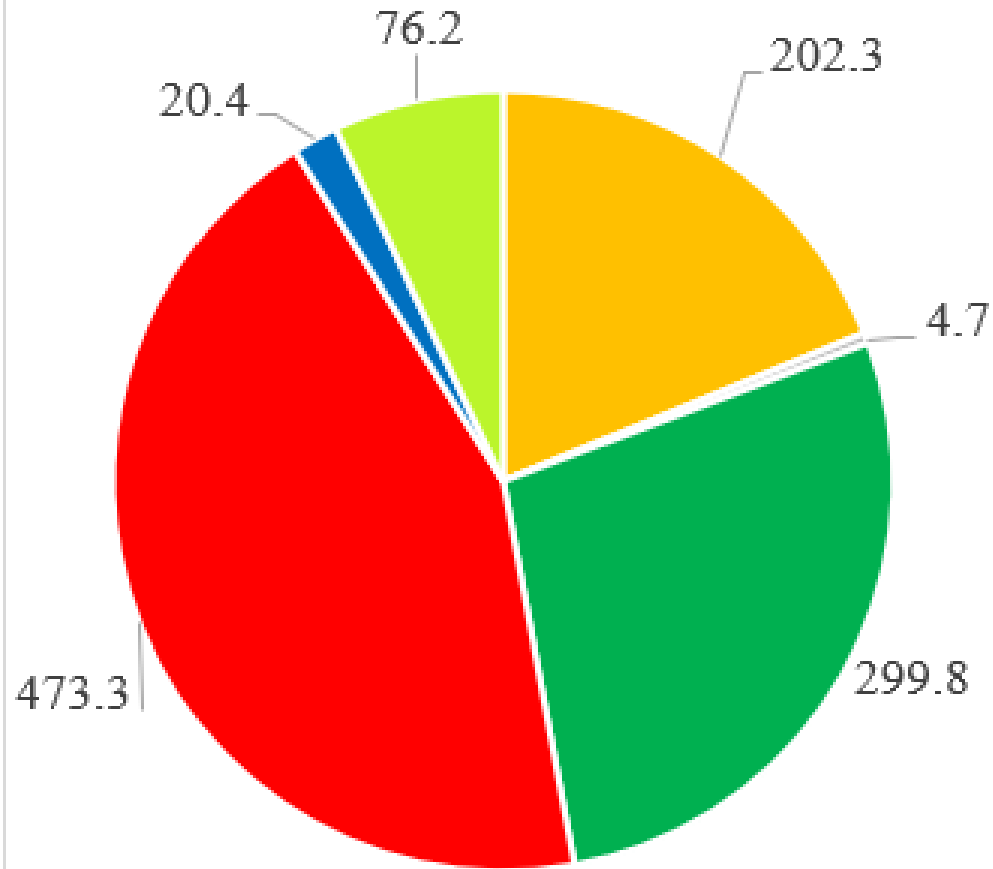
■ Agriculture ■ Barren Land ■ Forest
■ Urban ■ Water ■ Wetlands

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



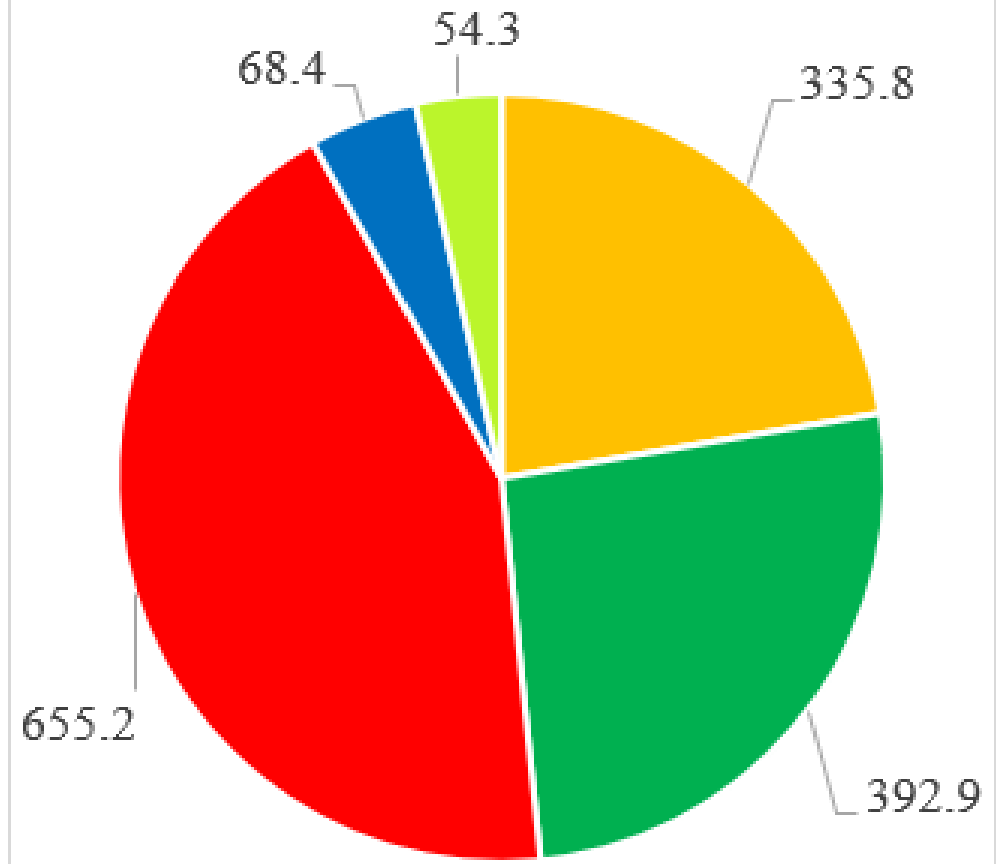
■ Agriculture ■ Barren Land ■ Forest
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HUC 2040105030010 - Total Phosphorus Loads by Land Use (lbs/year)



■ 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?

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Rutgers Cooperative Extension

Water Resources Program

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