Foots Pond

Great Swamp Watershed Association

Protecting the waters of the Passaic River region, from source to sea.

WATERKEEPER® ALLIANCE AFFILIATE

ACCREDITED LAND TRUST ACCREDITATION COMMISSION

Great Swamp Watershed Association 2017 Watershed Report Card

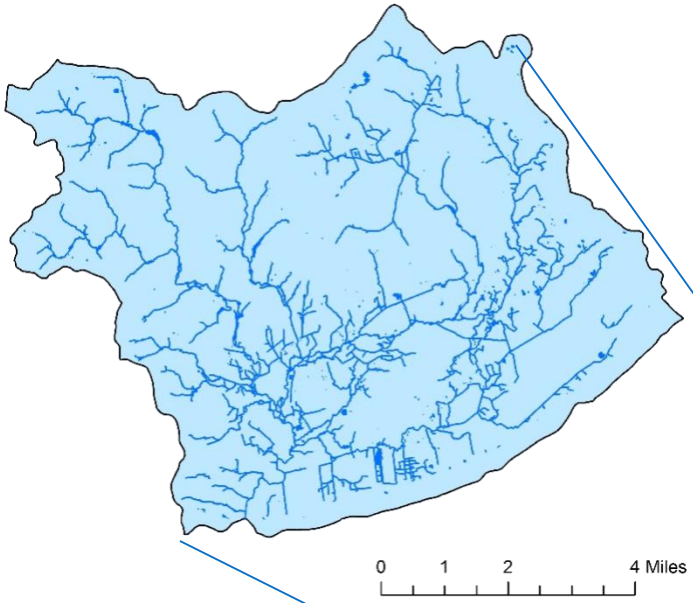
Keeping our waters clean for everyone

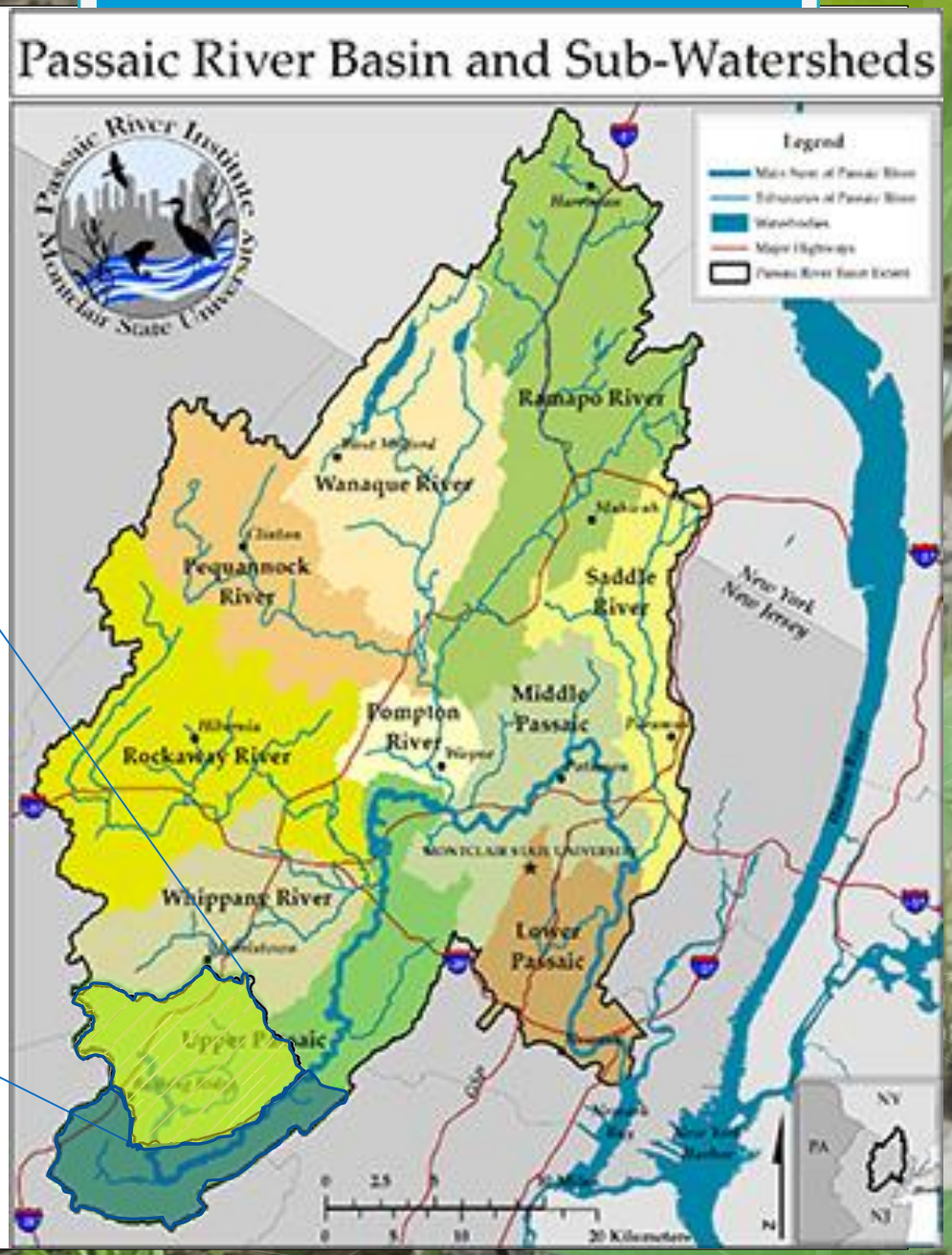
Sandra LaVigne
Director of Water Quality Programs

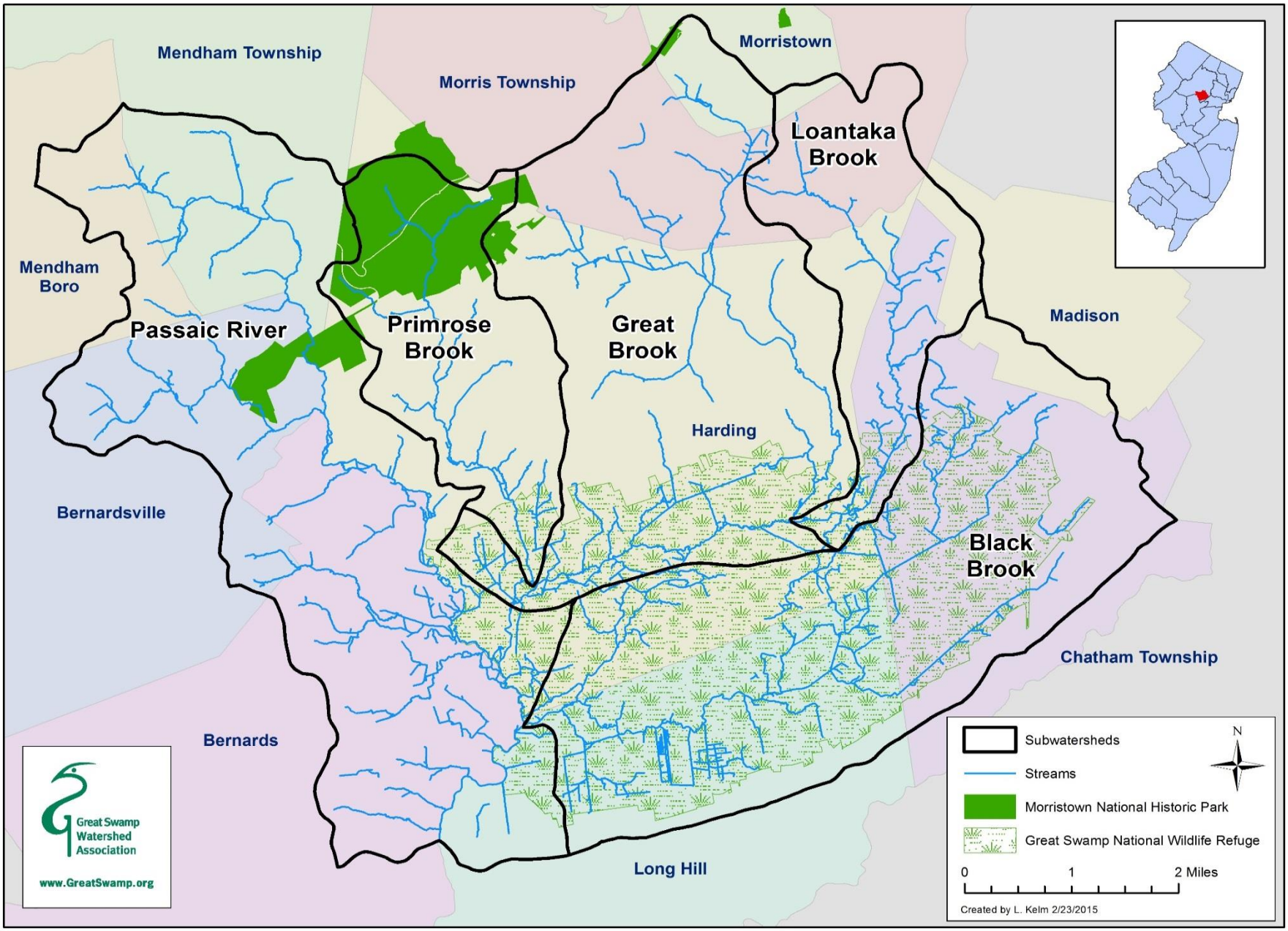
Our Mission – One River, One Community

- Great Swamp Watershed Association is dedicated to protecting and improving the water resources of the Passaic River region, from the Great Swamp headwaters to Newark Bay, for present and future generations. Through education, advocacy, science, land preservation, and stewardship, in collaboration with partners, we work to instill our communities with an awareness of water's effect on health and the beauty of the environment, from source to sea.

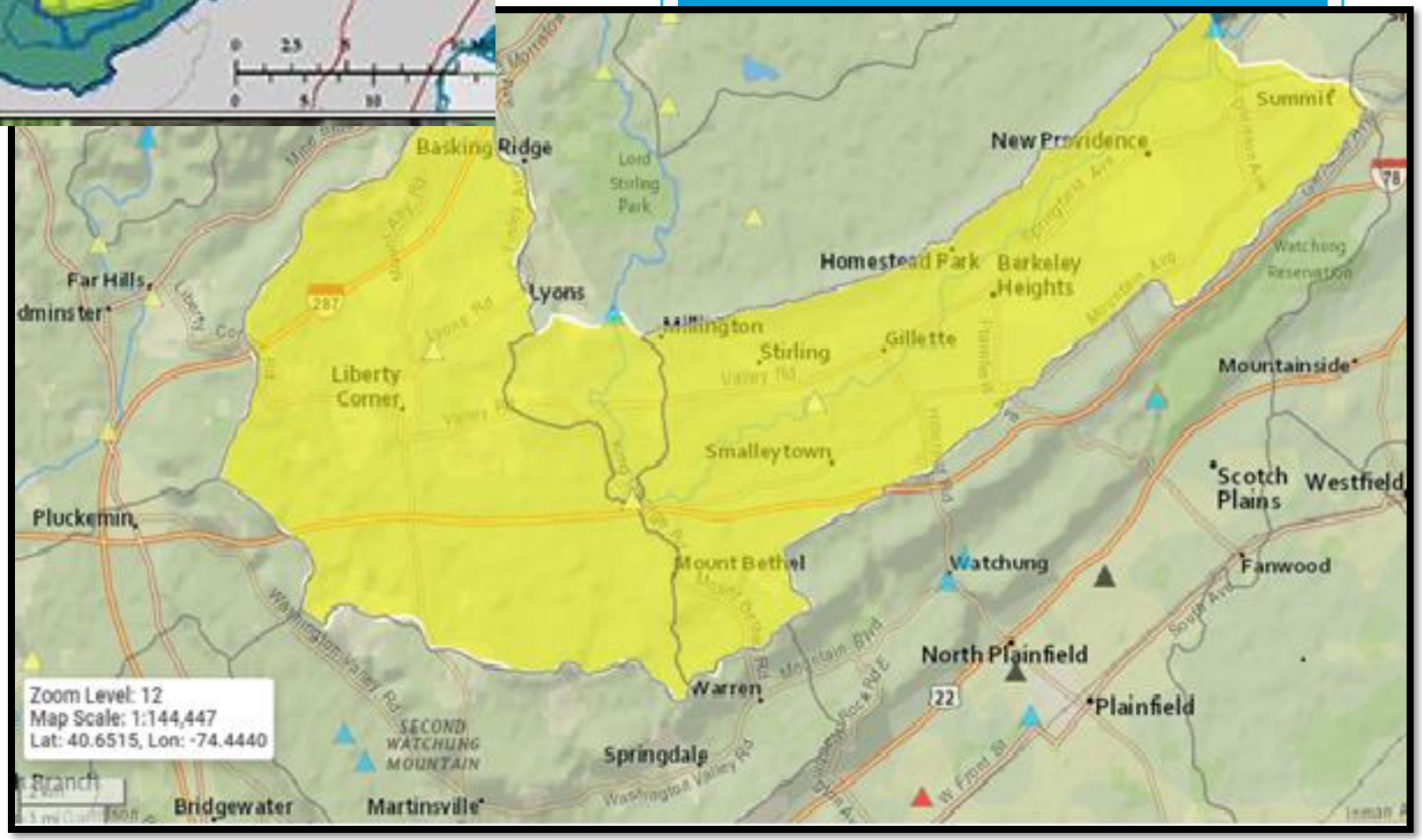
Great Swamp watershed
(headwaters of the Passaic River)

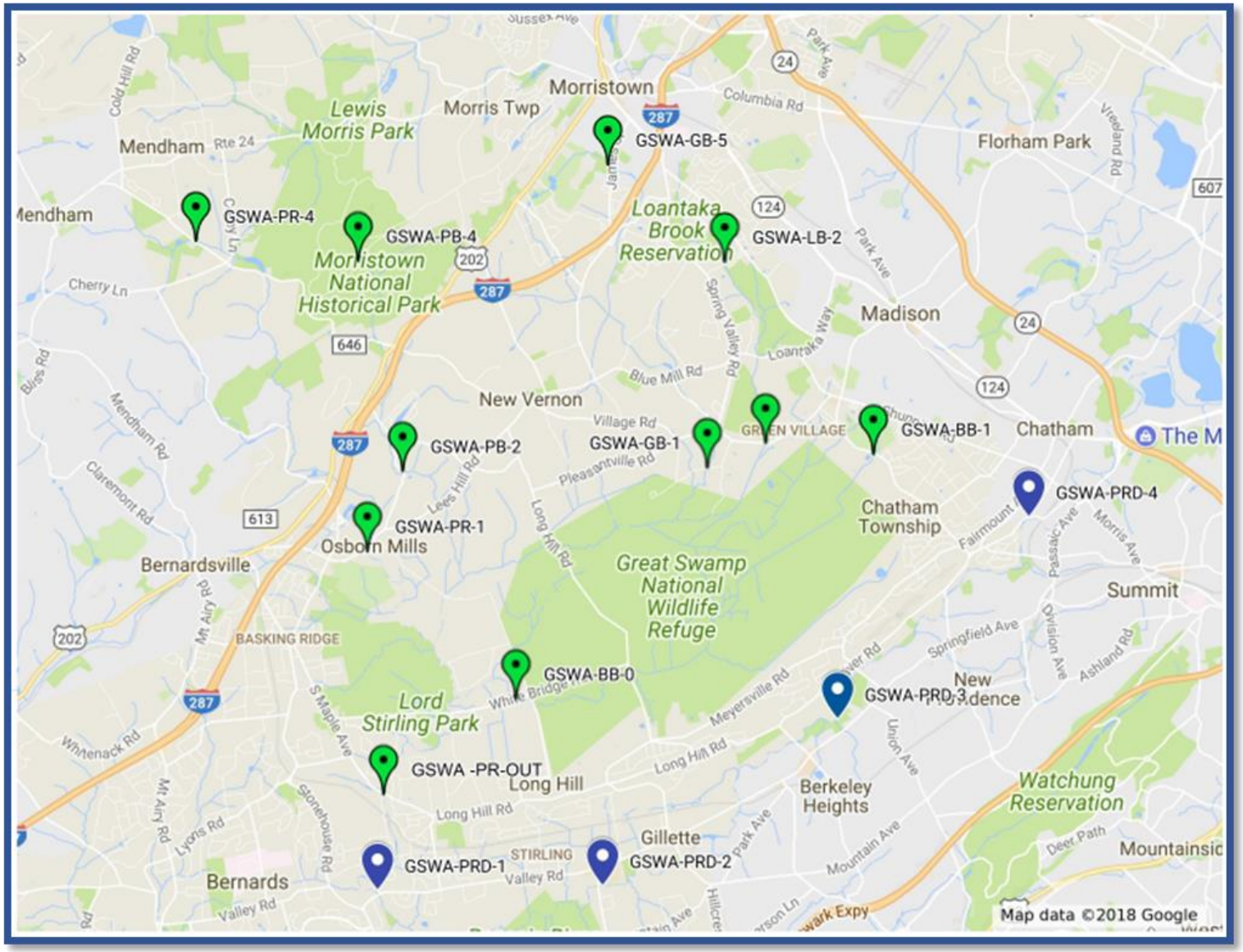





Mendham Township
Morris Township
Morristown
Loantaka Brook
Mendham Boro
Passaic River
Primrose Brook
Great Brook
Madison
Harding
Bernardsville
Black Brook
Chatham Township
Bernards
Long Hill
Great Swamp Watershed Association
www.GreatSwamp.org
Subwatersheds
Streams
Morristown National Historic Park
Great Swamp National Wildlife Refuge
N
0
1
2 Miles
Created by L. Kelm 2/23/2015

Expanded GSWA Sampling




GSWA-GB-5
GSWA-PR-4
GSWA-PB-4
GSWA-LB-2
GSWA-PB-2
GSWA-GB-1
GSWA-BB-1
GSWA-PRD-4
GSWA-PR-1
GSWA-BB-0
GSWA-PRD-3
GSWA -PR-OUT
GSWA-PRD-1
GSWA-PRD-2
Morristown
Morris Twp
Lewis Morris Park
Mendham
Florham Park
Loantaka Brook Reservation
Morristown National Historical Park
Madison
New Vernon
Chatham
Chatham Township
Osborn Mills
Bernardsville
Great Swamp National Wildlife Refuge
Summit
BASKING RIDGE
Lord Stirling Park
Long Hill
Berkeley Heights
Watchung Reservation
Gillette
Bernards
Mountainsic
Map data ©2018 Google

Water Quality Monitoring

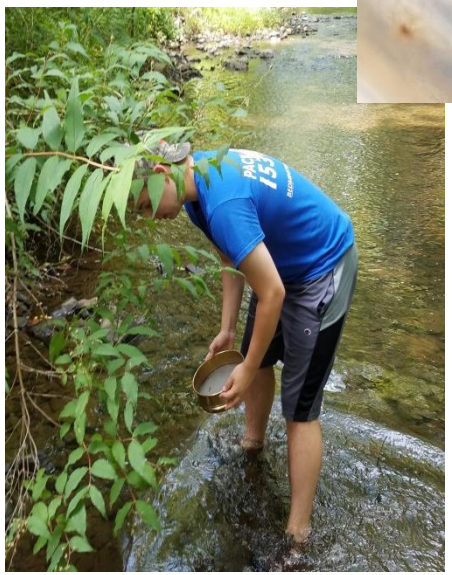
- Chemical Monitoring
  - 4 times per year
  - Handheld meters
  - Lab analysis
- All five streams
- Watershed outlet
- 4 Downstream Locations
- Macroinvertebrate Sampling
- Bacterial Monitoring
- Visual Stream Assessments
  - NJDEP protocol
  - Fall and Spring
  - 25 sites

Chemical Parameters

- **pH**
- **Temperature**
- **Dissolved Oxygen**
- **Flow**
- **Nitrogen**
  - Nitrate
  - Nitrite
  - Total Kjeldahl Nitrogen
  - Ammonia
- **Phosphorus**
  - Total Phosphorus
  - Soluble Reactive Phosphate
- **Road Salt**
  - Total Dissolved Solids
  - Sodium
  - Chloride
  - Conductivity
- **Water Clarity**
  - Turbidity
  - Total Suspended Solids

Visual Assessments

- NJDEP protocol; training led by NJDEP Watershed Ambassadors
- Fall/Winter training is just Visual Assessment
- Spring training includes macroinvertebrate sampling

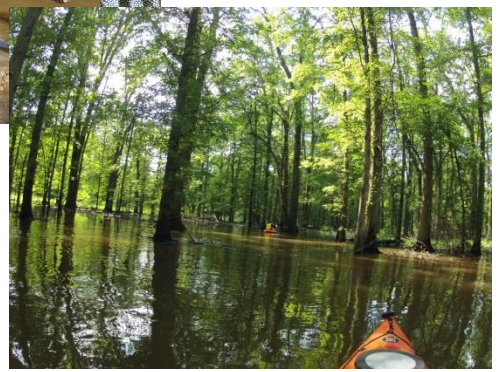


Macroinvertebrate Assessments

- Annual Survey, since 2000
- Macros collected in June/July
- Meter data and visual assessment collected concurrently informs results

E. Coli bacteria

- Indicator of fecal pollution
- Health implications
- Monitor sites watershed wide once yearly in summer over 5 weeks
- Sites selected represent areas where people or pets are likely to be in contact with water



2017 Water Quality Report Card

- Goals:
  - Answer “How’s the water?”
  - Understandable for general audience
  - Include full year WQ data
  - Short length
  - Recommend actions

How the Grades Were Created

- Grades based on water quality standards set by NJDEP or U.S. EPA
- Where no standards exist, grades based on ecological impact
- 2 highest grades pass standard
- 2 lower grades fail standard
- Lots of math!

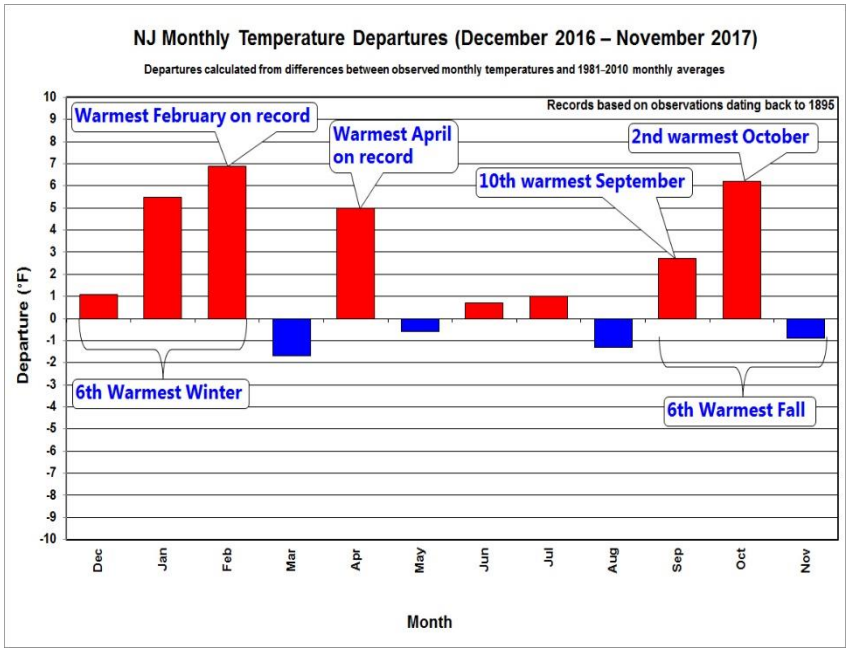
2017 Results

Stream	Macro-invertebrates	Visual Stream Assessment	Bacteria	Dissolved Oxygen	Water Temperature	pH	Road Salt	Water Clarity	Nitrogen	Phosphorus
Black Brook	Poor	Good	Very Poor ↓	Good ↑	Excellent ↑	Good	Good ↑	Excellent	Good ↑	Poor ↑
Great Brook (main stem)	Good ↑	Good ↓	Very Poor ↑	Excellent ↑	Excellent ↓	Excellent	Good ↑	Good ↓	Poor ↓	Good
Bayne Brook			Good ↑		Excellent					
Silver Brook		Poor ↑	Very Poor ↓	Good	Excellent	Good				
Loantaka Brook	Poor ↑	Good ↓	Very Poor	Excellent ↑	Excellent ↓	Excellent	Poor ↑	Good	Very Poor ↓	Poor ↑
Primrose Brook (main stem)	Good ↓	Good ↓	Poor	Excellent ↑	Excellent ↑	Excellent	Excellent ↑	Excellent ↑	Excellent ↓	Excellent ↑
Passaic River (Headwaters)	Good ↓	Good ↑		Excellent ↑	Good ↓	Excellent	Excellent ↑	Excellent ↑	Good ↓	Excellent
Indian Grave Brook	Excellent									
Passaic River Watershed Outlet	Poor	Excellent	Very Poor ↓	Excellent	Excellent	Excellent	Good	Excellent ↑	Excellent ↓	Good ↑
Passaic River (Upper Passaic)										
Millington (below outlet)	Good	Poor	Very Poor	Excellent	Excellent	Excellent	Good	Poor	Excellent	Good
Berkley Hts (below Dead River)		Very Poor	Very Poor	Excellent	Excellent	Excellent	Good	Very Poor	Very Poor	Poor
Summit (Stanley Park)	Poor	Good		Excellent	Excellent	Excellent	Good	Poor	Very Poor	Poor

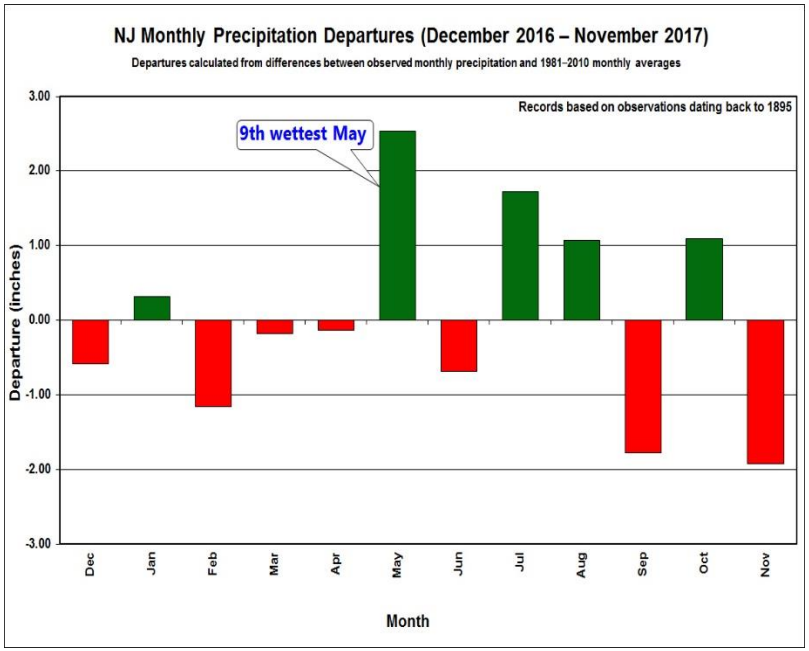
Climate Effects

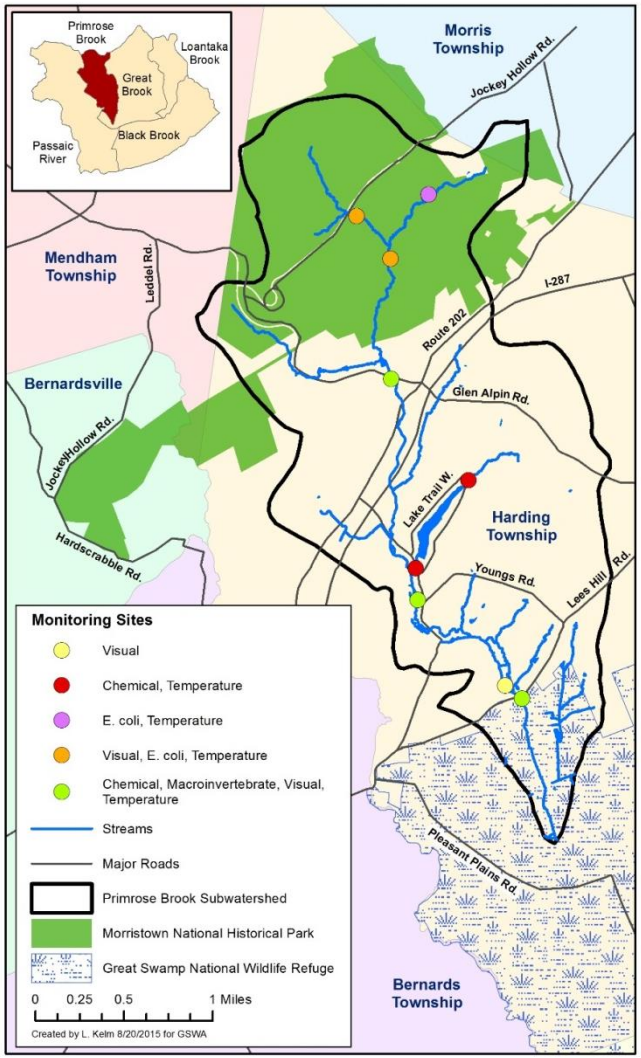
Rutgers State Office of Climatology Monthly Departures

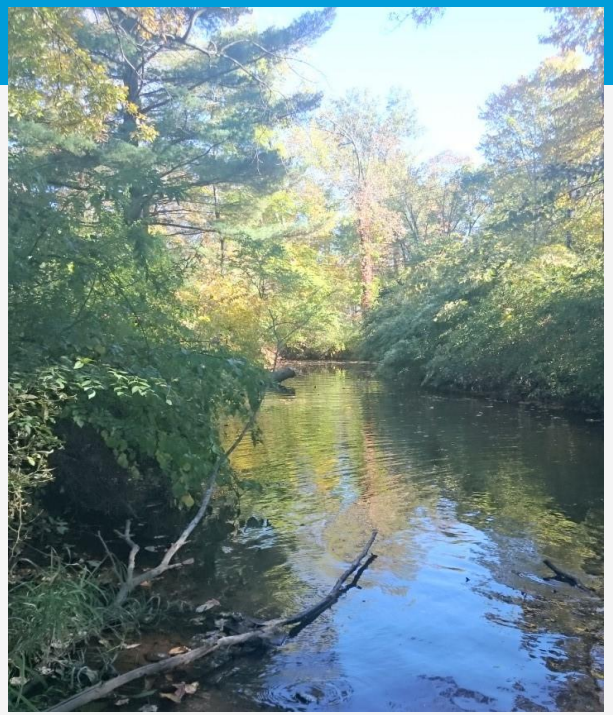
Temperature



Precipitation







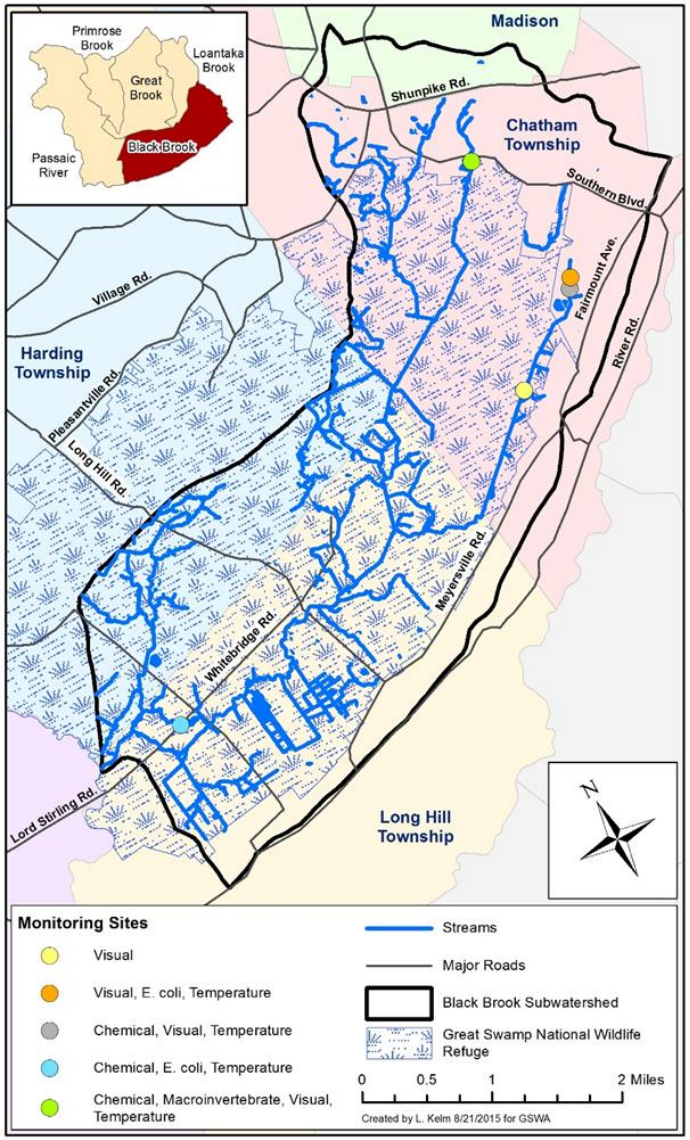
Primrose Brook

- Healthiest stream in watershed
- Headwaters in forested areas
- Mount Kemble Lake tributary

Primrose Brook

Category	Primrose Brook (Main Stem)		
	2015	2016	2017
Macro-invertebrates	Good ↑	Good ↑	Good ↓
Visual Stream Assessment	Good	Good ↓	Good ↓
Bacteria	Good ↓	Poor ↓	Poor
Dissolved Oxygen	Excellent	Excellent ↑	Excellent ↑
Water Temperature	Excellent	Excellent ↑	Excellent ↑
pH	Excellent	Excellent	Excellent
Road Salt	Excellent	Excellent ↑	Excellent ↑
Water Clarity	Excellent	Excellent ↑	Excellent ↑
Nitrogen	Excellent ↑	Excellent	Excellent ↓
Phosphorus	Excellent	Excellent	Excellent ↑

- Macroinvertebrate population declined slightly
- Decreased road salt
- Bacteria remained the same
- Water temperature remains within NJ State standards
- Slight elevation in nitrogen



Black Brook
Whitebridge Rd

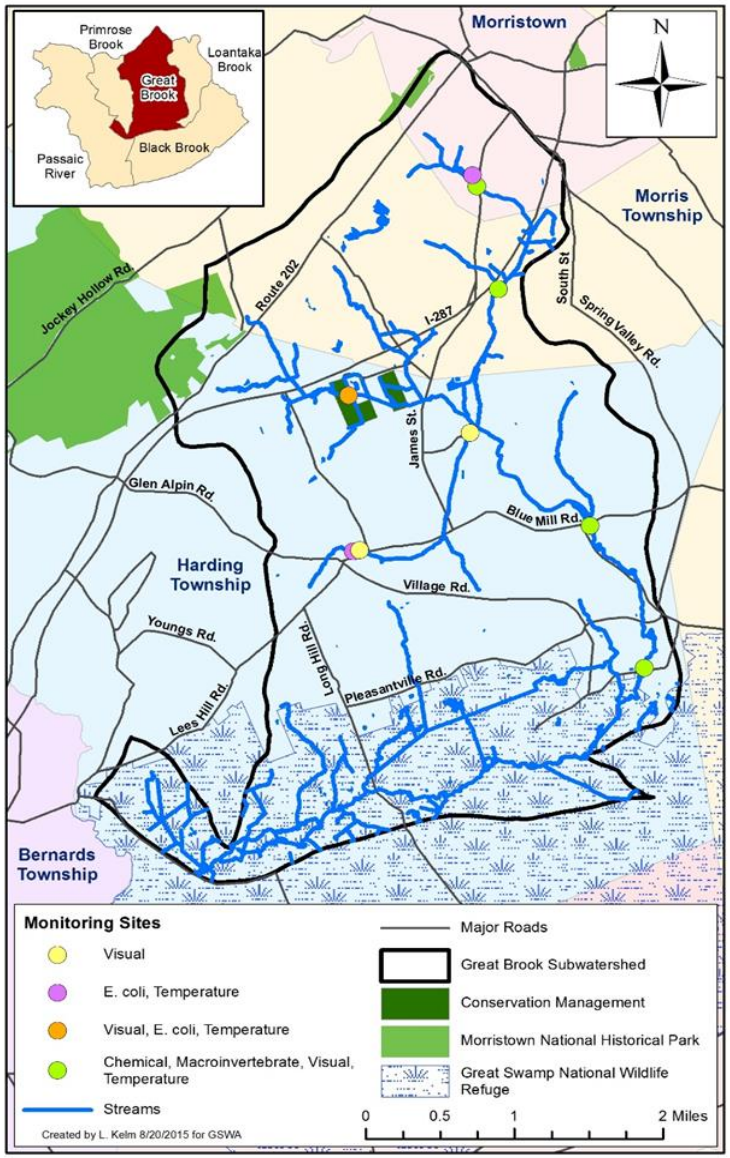
Black Brook

- Starts in developed area – upstream golf course
- Reduction in effluent flow from Chatham WWTP corresponded to nutrient reductions but not to decreased bacteria

Black Brook

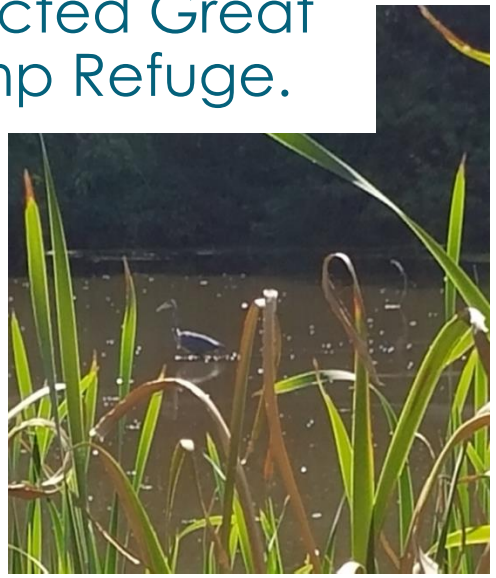
- Macroinvertebrates
  - Remained the same
- Bacteria Sampling
  - Elevated at all sites
- Nutrients
  - Continue to improve
- Road Salt
  - Similar to other sites in watershed – decreased on all dates

Category	2015	2016	2017
Macro-invertebrates	Very Poor ↓	Poor ↑	Poor
Visual Stream Assessment	Good ↑	Good	Good
Bacteria	Very Poor ↓	Very Poor ↑	Very Poor ↓
Dissolved Oxygen	Good	Good ↑	Good ↑
Water Temperature	Excellent	Excellent ↑	Excellent ↑
pH	Excellent	Good ↓	Good
Road Salt		Good ↑	Good ↑
Water Clarity	Excellent	Excellent	Excellent
Nitrogen	Very Poor ↑	Poor ↑	Good ↑
Phosphorus	Poor	Poor ↑	Poor ↑



Great Brook

- Headwaters well developed
  - High impervious surface cover
  - Lower portions flow through protected Great Swamp Refuge.



Foots Pond

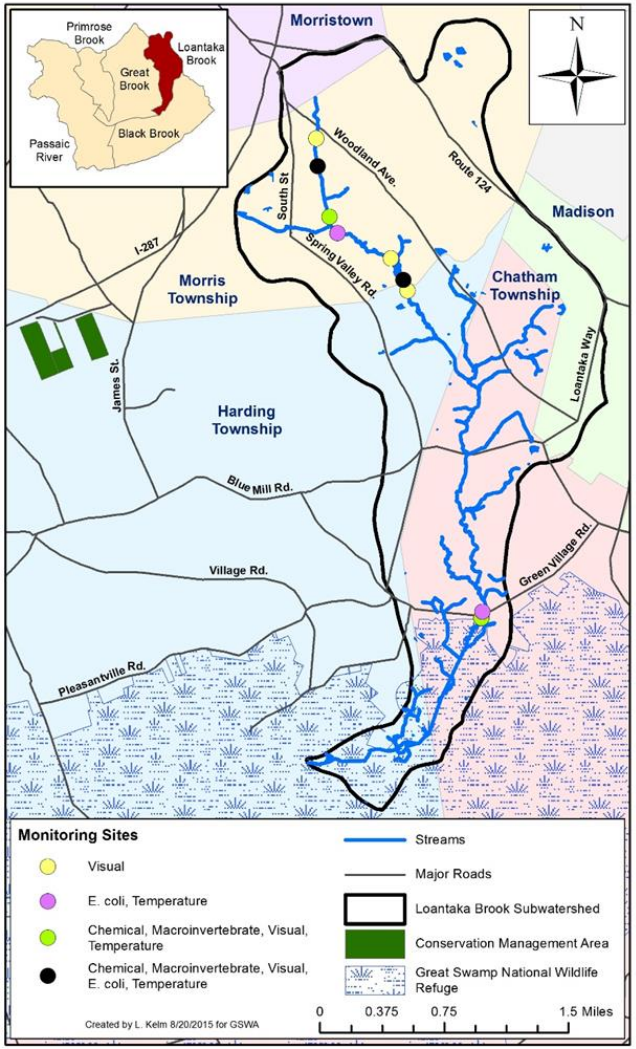
Category	Great Brook (Main Stem)			Silver Brook		
	2015	2016	2017	2015	2016	2017
Macro-invertebrates	Poor ↑	Poor ↑	Good ↑			
Visual Stream Assessment	Good	Good ↓	Good ↓	Poor	Poor ↑	Poor ↑
Bacteria	Good ↑	Very Poor ↓	Very Poor ↑	Very Poor ↓	Very Poor ↓	Very Poor ↓
Dissolved Oxygen	Excellent	Excellent ↑	Excellent ↑			Good
Water Temperature	Excellent	Excellent ↓	Excellent ↓	Excellent		Excellent
pH	Excellent	Excellent	Excellent			Good
Road Salt		Good ↑	Good ↑			
Water Clarity	Good	Good ↓	Good ↓			
Nitrogen	Good ↓	Good	Poor ↓			
Phosphorus	Good	Good	Good			

- Great Brook
  - Water Quality middle range
  - Bacteria slightly improved
  - Road salt improved
- Bayne Brook
  - Visual Assessments show improvements
  - Improved macroinvertebrates
- Silver Brook
  - Bacteria tracking continues

Stream Team Volunteers sampling Great Brook

Loantaka Brook

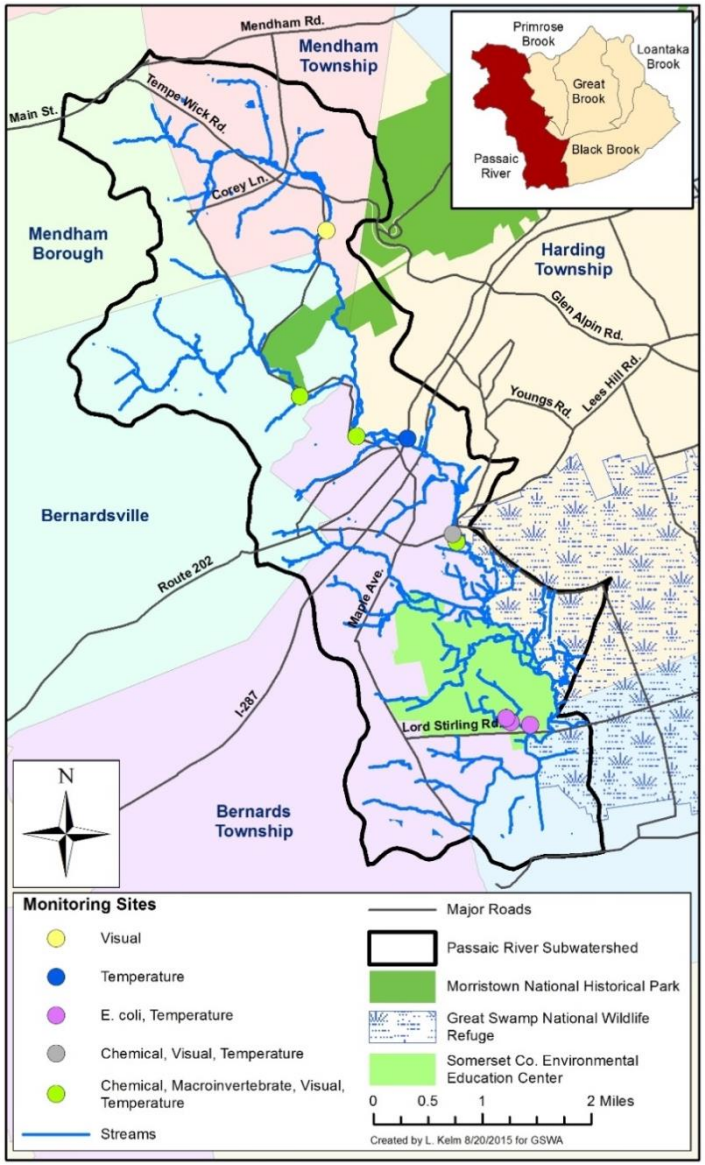
Category	2015	2016	2017
Macro-invertebrates	Very Poor ↓	Poor ↑	Poor ↑
Visual Stream Assessment	Good	Good ↓	Good ↓
Bacteria	Very Poor ↓	Very Poor ↓	Very Poor
Dissolved Oxygen	Excellent	Excellent ↑	Excellent ↑
Water Temperature	Excellent	Excellent ↓	Excellent ↓
pH	Excellent	Excellent	Excellent
Road Salt	Very Poor ↓	Poor ↑	Poor ↑
Water Clarity	Good	Good	Good
Nitrogen	Very Poor ↓	Very Poor	Very Poor ↓
Phosphorus	Very Poor ↓	Poor ↑	Poor ↑



Loantaka Brook

- Highly developed and channelized stream
- Improved buffer around pond decreasing nutrient loading
- Macroinvertebrate population improving

Chatham HS interns during Visual Assessment



Passaic River - Headwaters

- One of the healthiest Watershed streams (with Primrose Brook) north of Rt 202
- Large forested areas in upstream portions of subwatershed
- C1 water upstream of Osborn Pond

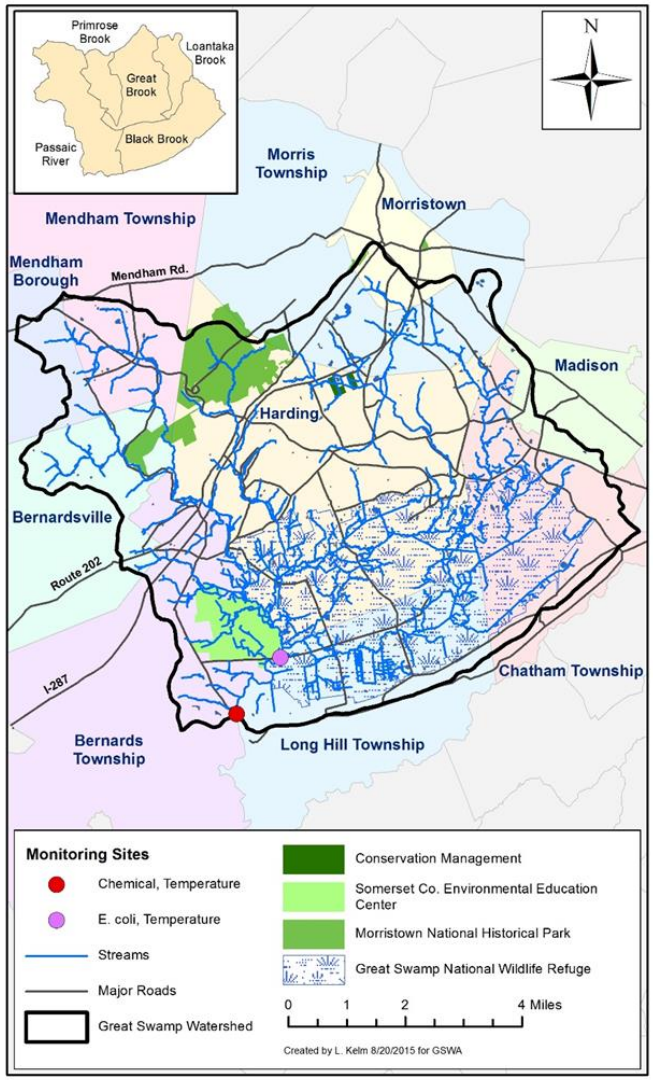
Passaic River

Category	Passaic River Headwaters		
	2015	2016	2017
Macro-invertebrates	Good ↑	Good ↑	Good ↓
Visual Stream Assessment	Good ↓	Good ↑	Good ↑
Bacteria			
Dissolved Oxygen	Excellent ↑	Excellent ↑	Excellent ↑
Water Temperature	Excellent ↑	Excellent ↑	Good ↓
pH	Excellent	Excellent	Excellent
Road Salt		Excellent ↑	Excellent ↑
Water Clarity	Good	Excellent ↑	Excellent ↑
Nitrogen	Excellent ↑	Excellent	Good ↓
Phosphorus	Excellent	Excellent	Excellent

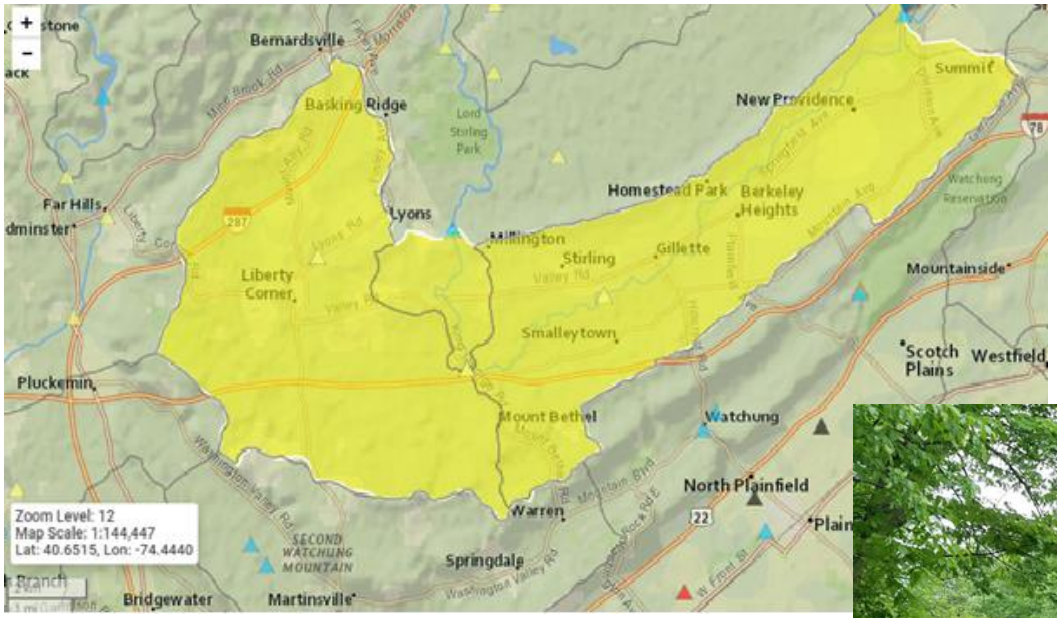
- Water temperatures elevated
- Increase in nitrogen
- Macroinvertebrate population – less diversity
  - New macro site

Great Swamp Watershed Outlet

Category	2015	2016	2017
Macro-invertebrates			Poor
Visual Stream Assessment			Excellent
Bacteria	Very Poor ↑	Very Poor ↓	Very Poor ↓
Dissolved Oxygen	Excellent ↓	Excellent	Excellent
Water Temperature	Excellent ↓	Excellent	Excellent
pH	Excellent	Excellent	Excellent
Road Salt		Good	Good
Water Clarity	Poor	Excellent ↑	Excellent ↑
Nitrogen	Excellent	Excellent	Excellent ↓
Phosphorus	Good	Good ↓	Good ↑



Passaic River – Upper Passaic



Passaic River – Upper Passaic

Category	Millington (Below the Gorge)	Berkley Hts (below Dead River)	Summit (Stanley Park)
	2017	2017	2017
Macro-invertebrates	Good		Poor
Visual Stream Assessment	Poor	Very Poor	Good
Bacteria	Very Poor	Very Poor	
Dissolved Oxygen	Excellent	Excellent	Excellent
Water Temperature	Excellent	Excellent	Excellent
pH	Excellent	Excellent	Excellent
Road Salt	Good	Good	Good
Water Clarity	Poor	Very Poor	Poor
Nitrogen	Excellent	Very Poor	Very Poor
Phosphorus	Good	Poor	Poor

- Predominantly developed area
- Water clarity effected by muddy bottom
- Nutrient loading compounded by effluent inputs

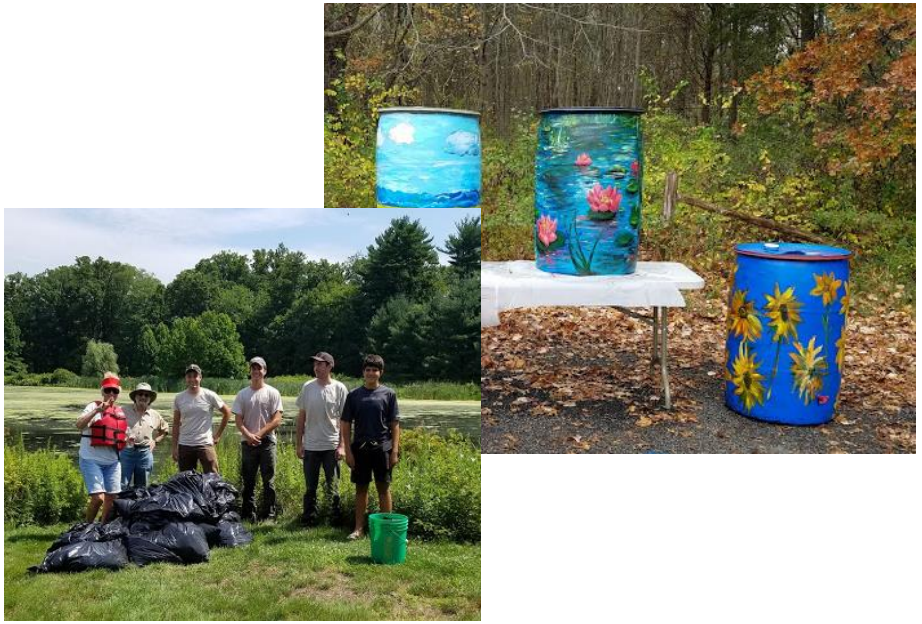
Common Issues

- Elevated temperatures corresponded to elevated bacteria and algae levels
- Buffer zones need improvement
- Impervious surfaces increase storm water runoff
  - Erosion
  - Nutrient inputs
  - Green infrastructure education needed

Above: Primrose Brook
Left: Erosion stabilization on the Upper Passaic River

Recommendations

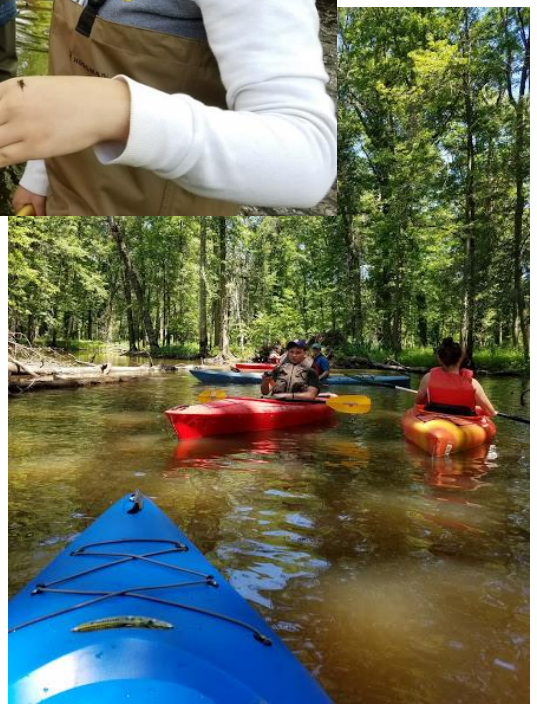
- Increase stream buffers
  - Plant natives and remove invasives
- Reduce road/sidewalk salt usage
- Maintain and regularly check septic and sewers
- Encourage green infrastructure
  - Rain gardens
  - Rain barrels



Microplastics

- Increasing community concern
- Designing methods to be used in small streams
- Baseline study to determine hot spots

Water quality effects everyone



Thank you!

- To GSWA staff
- To Stream Team Volunteers
- To generous donors

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Thank You!

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