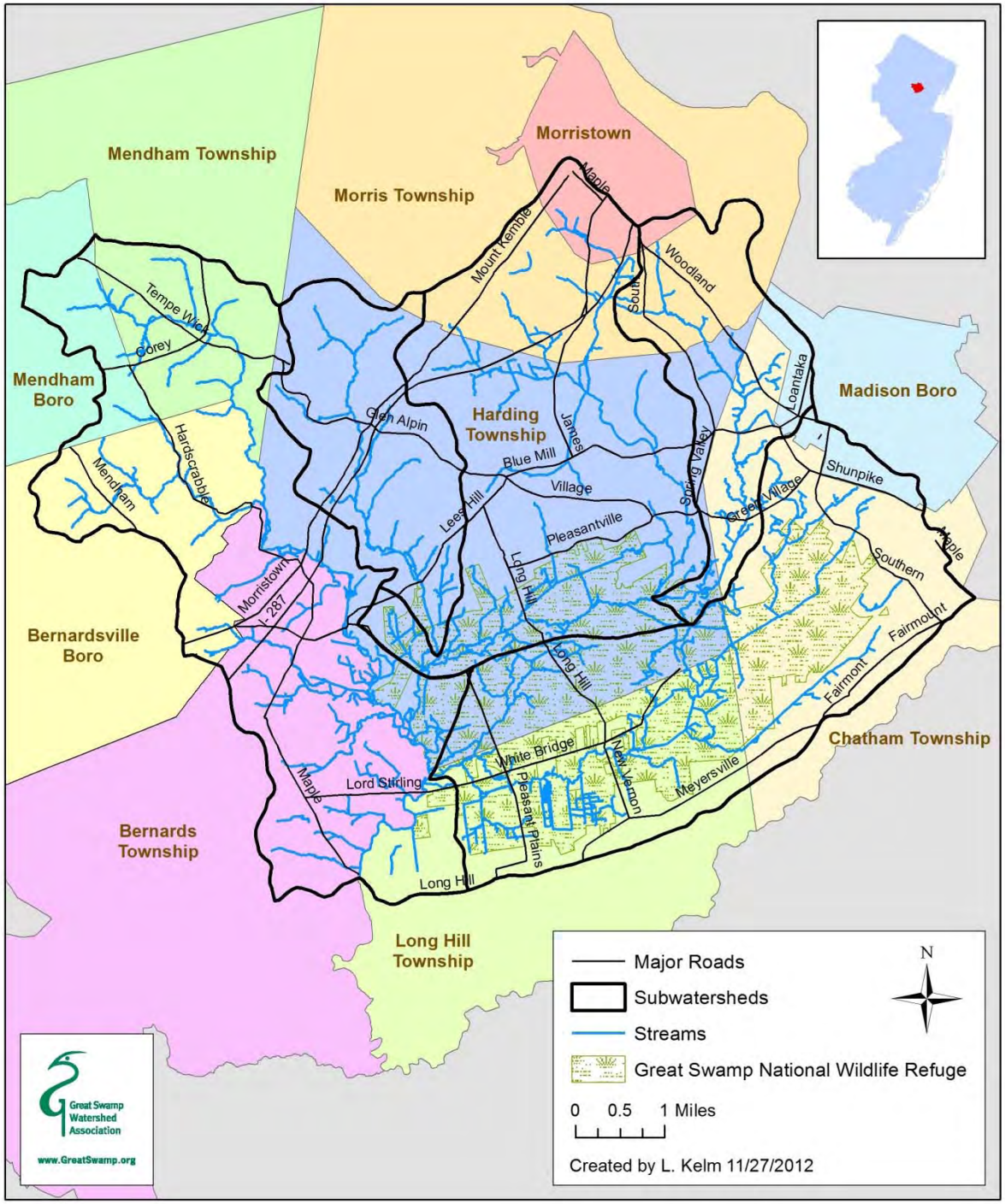
Great Swamp Watershed Association

www.GreatSwamp.org

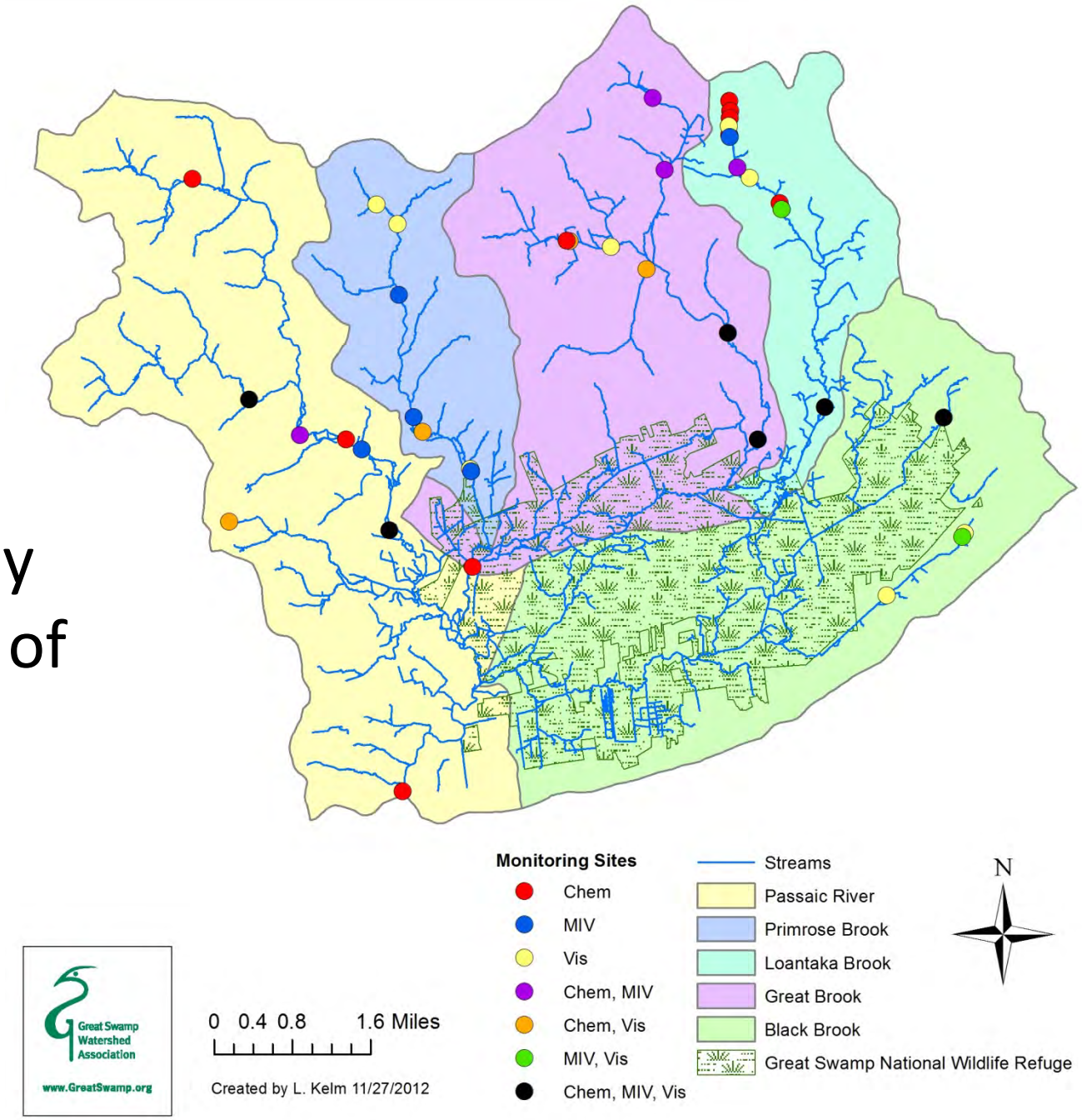
The State of the Streams in the Great Swamp Watershed

Laura Kelm
Director of Water Quality Programs
June 11, 2013


Mendham Township
Morristown
Morris Township
Mendham Boro
Harding Township
Madison Boro
Bernardsville Boro
Chatham Township
Bernards Township
Long Hill Township
Tempe Wick
Corey
Hardscrabble
Mendham
Glen Alpin
Mount Kemble
Maple
South
Woodland
James
Blue Mill
Village
Lees Hill
Pleasantville
Long Hill
Morristown
287
Spring Valley
Loantaka
Green Village
Shunpike
Maple
Southern
Fairmount
Fairmount
White Bridge
Lord Stirling
Maple
New Vernon
Meyersville
Pleasant Plains
Long Hill
Major Roads
Subwatersheds
Streams
Great Swamp National Wildlife Refuge
N
0 0.5 1 Miles
Created by L. Kelm 11/27/2012
Great Swamp Watershed Association
www.GreatSwamp.org

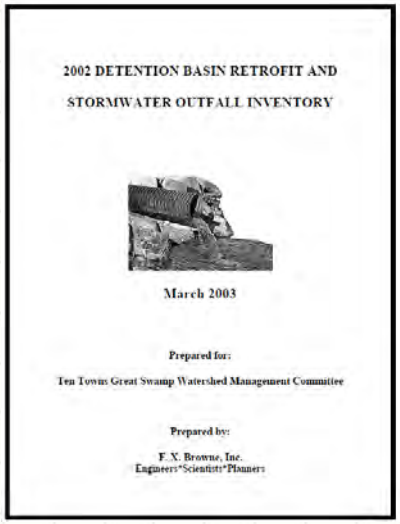
Water Monitoring Sites

- Sites have any combination of data:
  - Chemical
  - Visual
  - MIV



Why a State of the Streams?

- Past reports limited in scope – one watershed or one parameter
- Need to look at data sets together to see the big picture


2002 DETENTION BASIN RETROFIT AND

STORMWATER OUTFALL INVENTORY

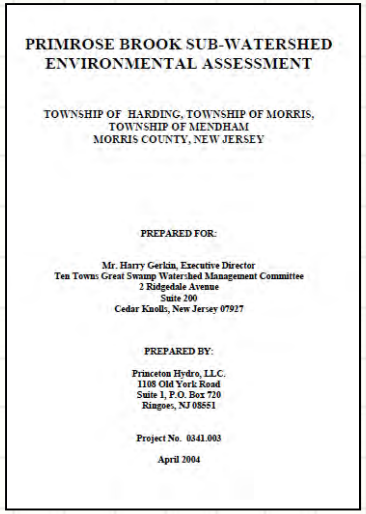
March 2003

Prepared for:

Ten Towns Great Swamp Watershed Management Committee

Prepared by:

F. X. Browne, Inc.
Engineers*Scientists*Planners


PRIMROSE BROOK SUB-WATERSHED
ENVIRONMENTAL ASSESSMENT

TOWNSHIP OF HARDING, TOWNSHIP OF MORRIS,
TOWNSHIP OF MENDHAM
MORRIS COUNTY, NEW JERSEY

PREPARED FOR:

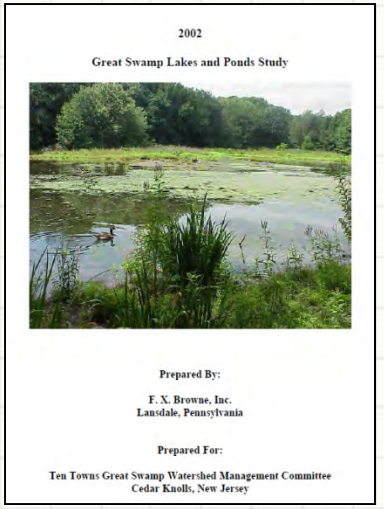
Mr. Harry Gerkin, Executive Director
Ten Towns Great Swamp Watershed Management Committee
2 Ridgedale Avenue
Suite 200
Cedar Knolls, New Jersey 07927

PREPARED BY:

Princeton Hydro, LLC.
1108 Old York Road
Suite 1, P.O. Box 720
Ringoes, NJ 08551

Project No. 0341.003

April 2004


2002

Great Swamp Lakes and Ponds Study

Prepared By:

F. X. Browne, Inc.
Lansdale, Pennsylvania

Prepared For:

Ten Towns Great Swamp Watershed Management Committee
Cedar Knolls, New Jersey

Project Goals

- Data trends
- Unnoticed pollutants
- Reasons for improvements
- Potential future actions
  - Educational efforts
  - Restoration sites
  - Advocacy

Data Included in Analysis

- Chemical Monitoring
  - 1999-2012 + past USGS data when available
  - DRP, Total P, Total N, TSS, TDS
  - *Only baseflow*
- Macroinvertebrate Assessments
  - 2000-2011
- Visual Assessments
  - 2004-2012
- Flow
  - As needed from watershed outlet
- Precipitation
  - As needed and available

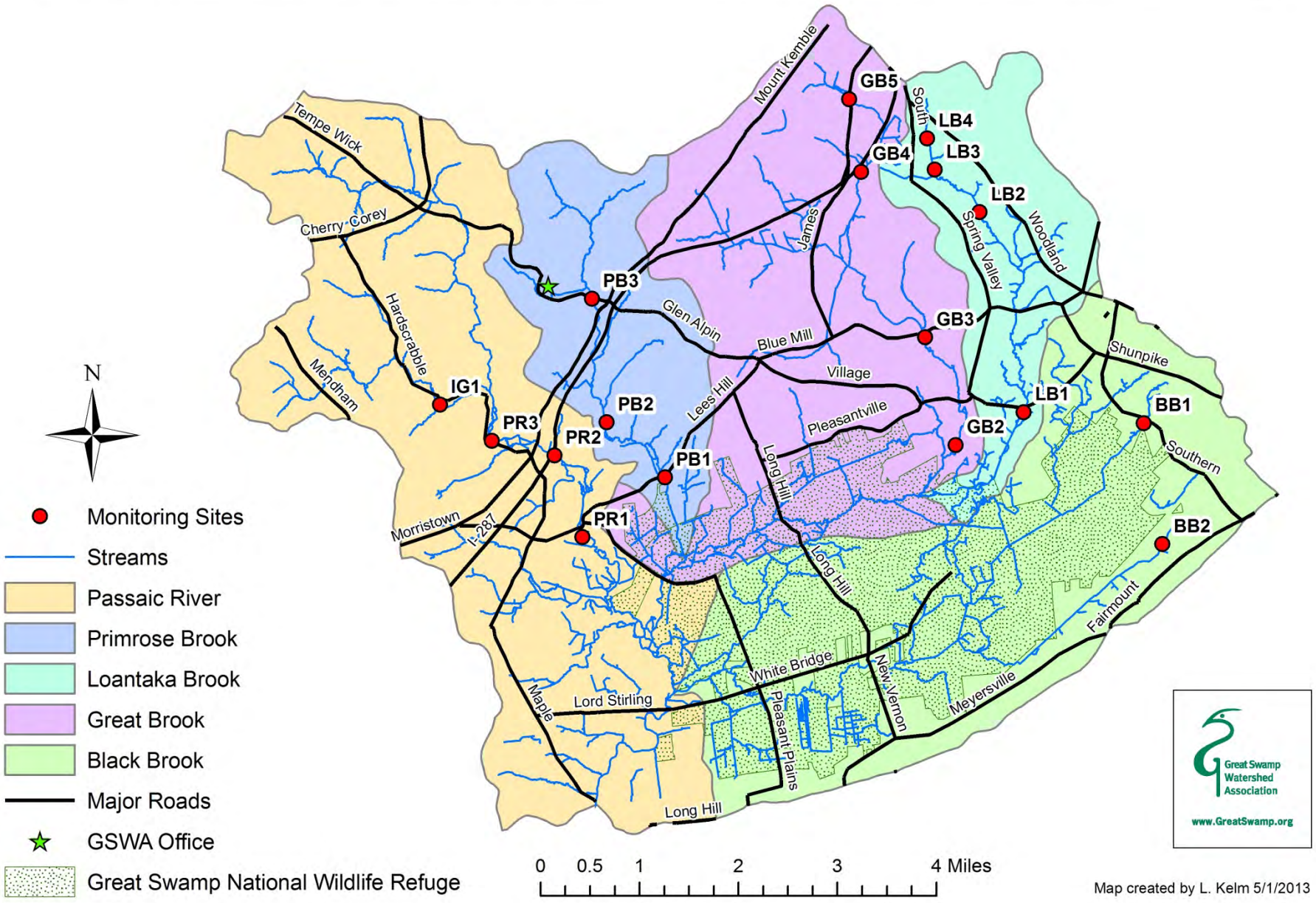
Methods

- Chemical and MIV
  - Look at each site separately
  - Find outliers for each parameter
  - Graph for trends
  - Compare sites and parameters
- Visual
  - Used to interpret other findings
  - Less useful for this project

Macroinvertebrates

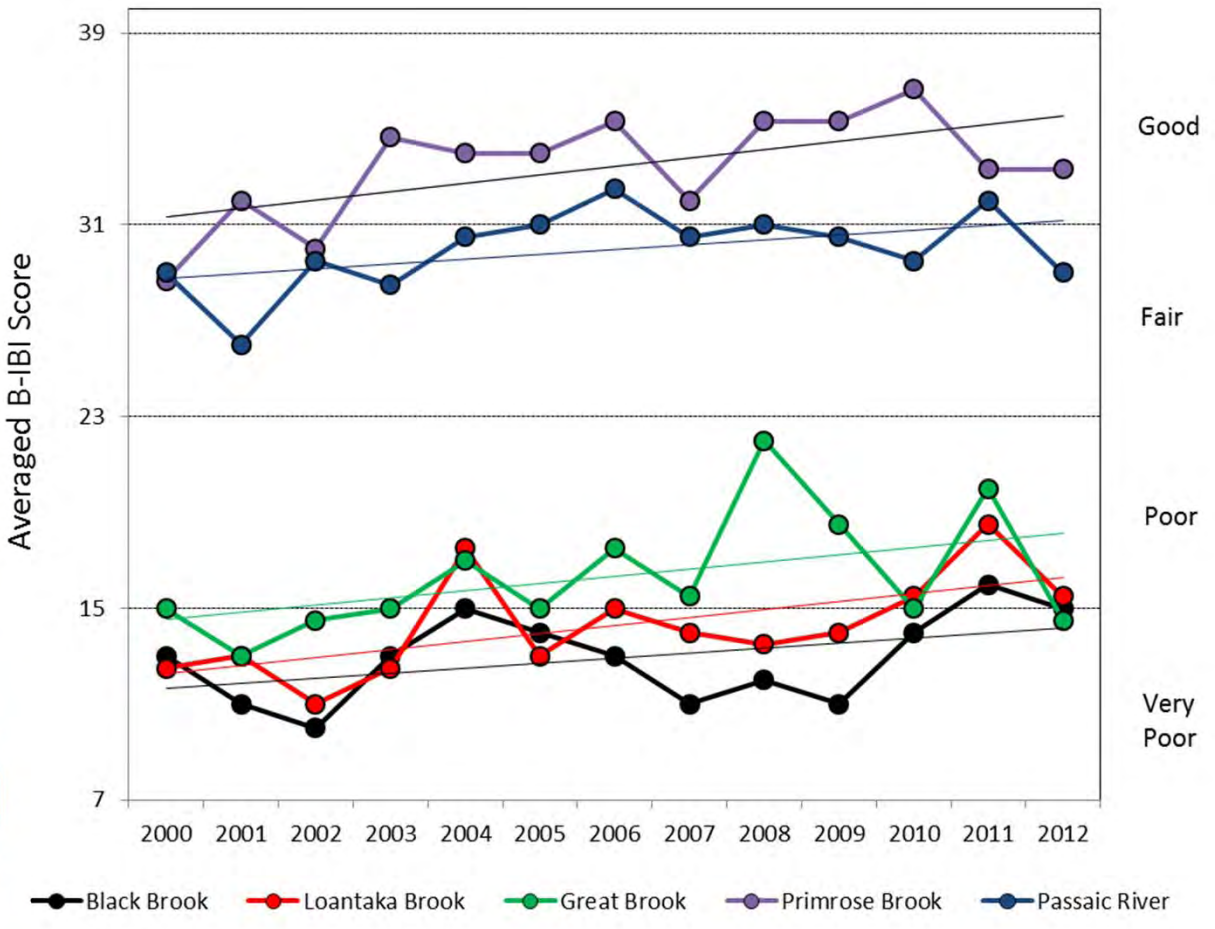
- Aquatic invertebrates and larvae/nymphs of terrestrial insects
- Live in stream for a few week to a few years
- Indicate long-term water quality

Macroinvertebrate Monitoring Sites in the Great Swamp Watershed



Macroinvertebrate Findings

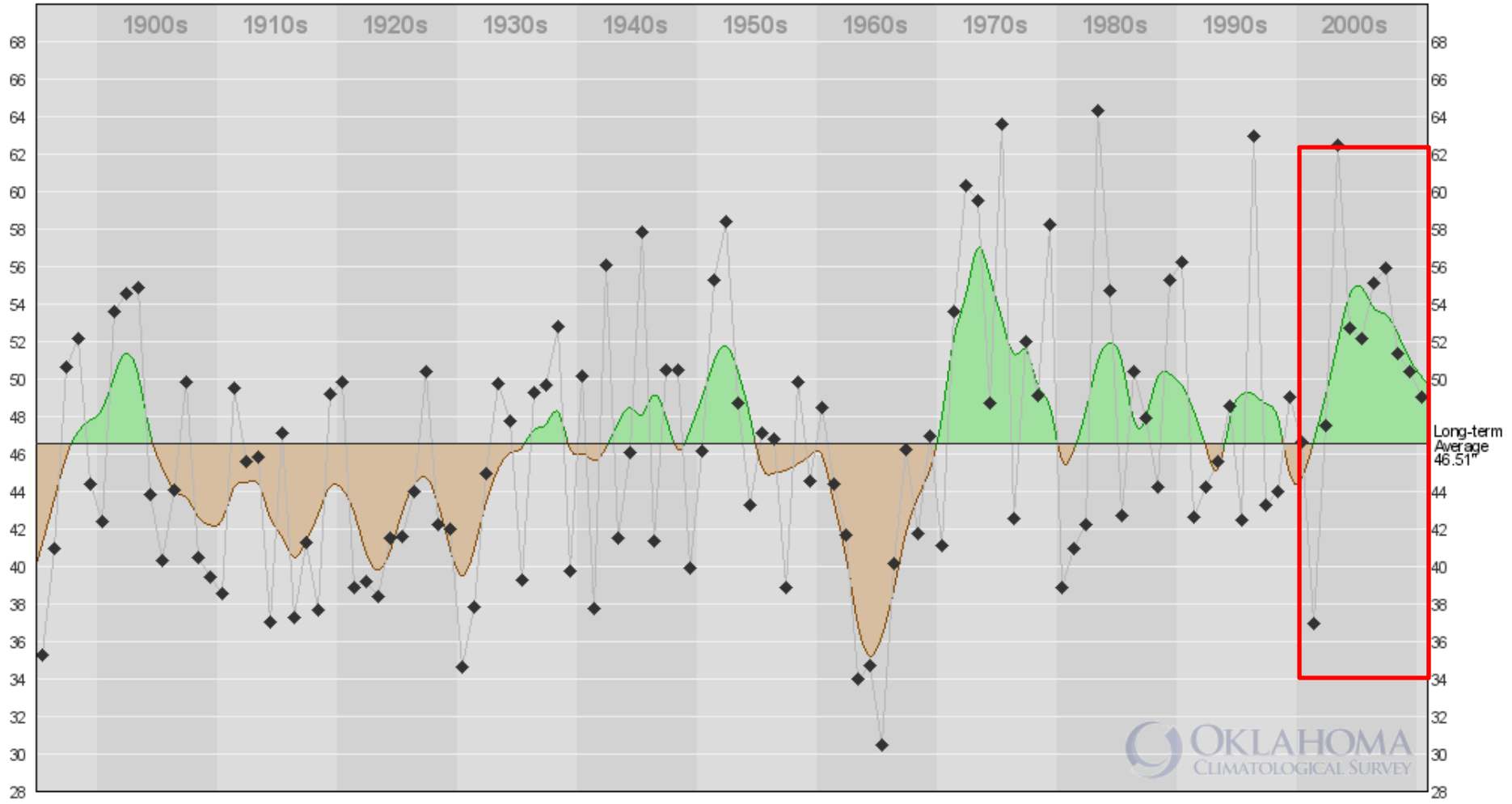
Averaged Annual B-IBI Scores, 2000-2012



MIV Findings Explained

- Annual variability at many sites
- Overall increasing trend
- Regional impacts to streams?
  - Sampling date
  - Precipitation

Annual Precipitation in Northern NJ



USDA ars

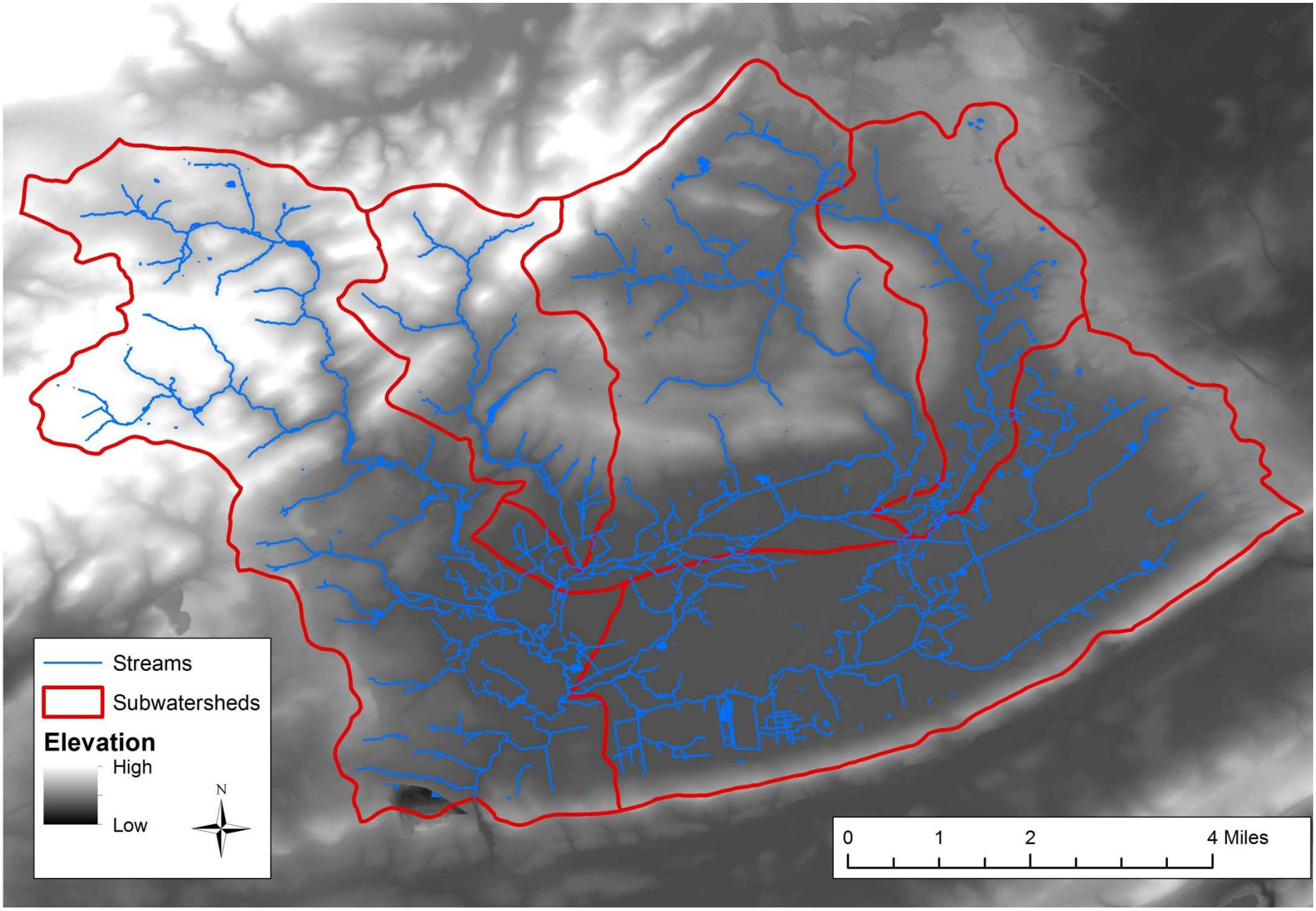
Annual Precipitation History with 5-year Tendencies
NJ-CD1 (Northern): 1895-2010

Wetter historical periods
Drier historical periods
Individual Annual precipitation value

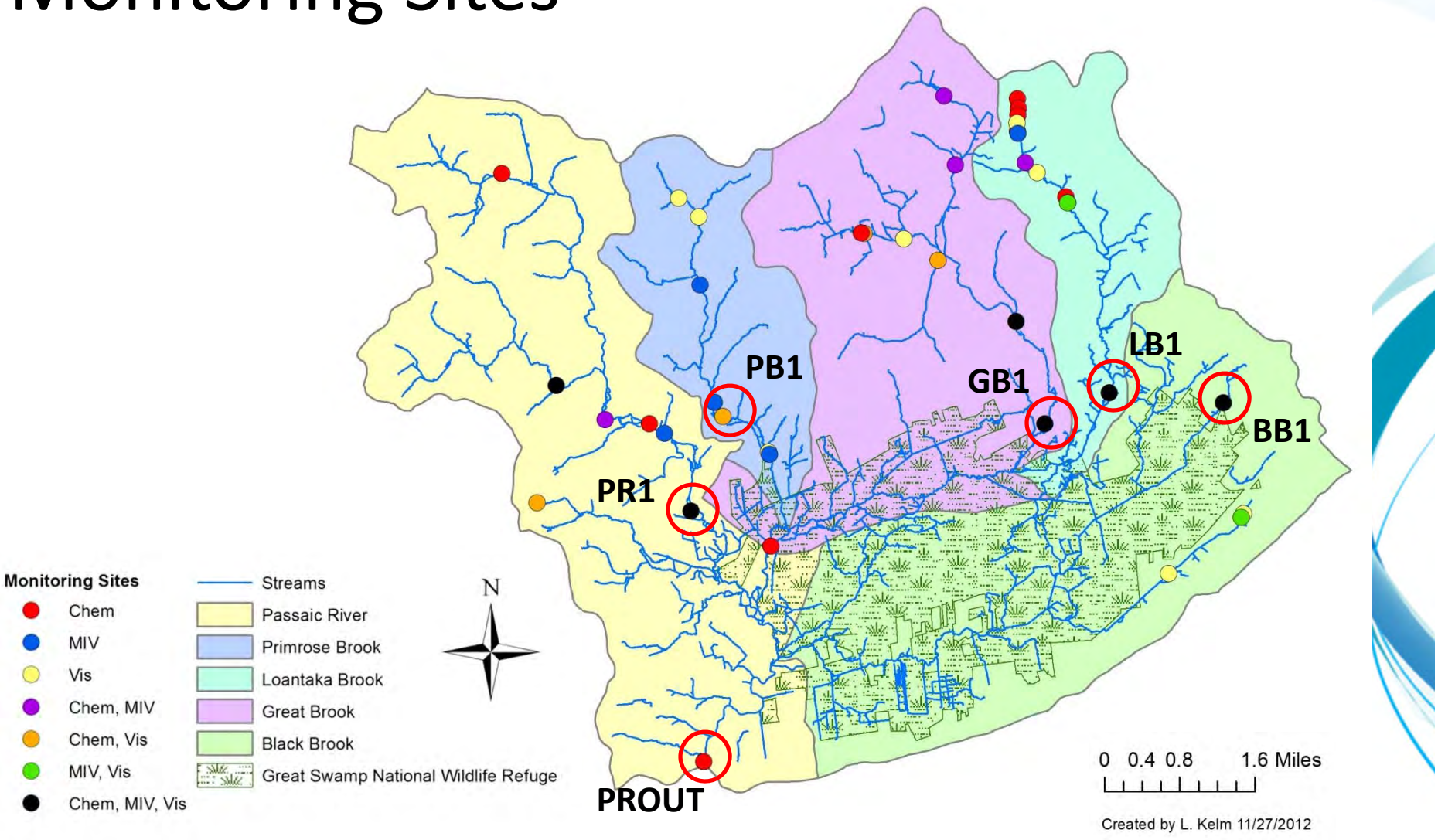
Source: NJ State Climatologist, climate.rutgers.edu/stateclim_v1/data/timeseries_2006/trace.NJ-CD01.prcp.Annual.png

Impacts to Macroinvertebrates

- Impoundments
  - Warm water, low DO, sediment?
- Golf courses
  - Nutrients, warm water, low DO
- Major roads
  - Road salt, misc. from cars
- High density development
  - Road salt, nutrients
- Eastern vs. western streams


Streams
Subwatersheds
Elevation
High
Low
N
0
1
2
4 Miles

Chemical Monitoring Sites



Phosphorus

- Necessary for plant and animal life
- From fertilizer, human and animal waste, decaying organic matter, soils
- Excess in water bodies acts like fertilizer
  - Aquatic plants grow → plants die → fall to bottom → decomposed by bacteria → low dissolved oxygen

Findings: Phosphorus

- Highest values in summer at all sites
  - Fertilizer usage?
- 3 sites with total P averages near NJ State Std.
  - LB1 (.167 mg/l) - exceeded standard 65%
  - BB1 (.084 mg/l) - exceeded standard 25%
  - PROUT (.097 mg/l) - exceeded standard 42%

Phosphorus Sources?

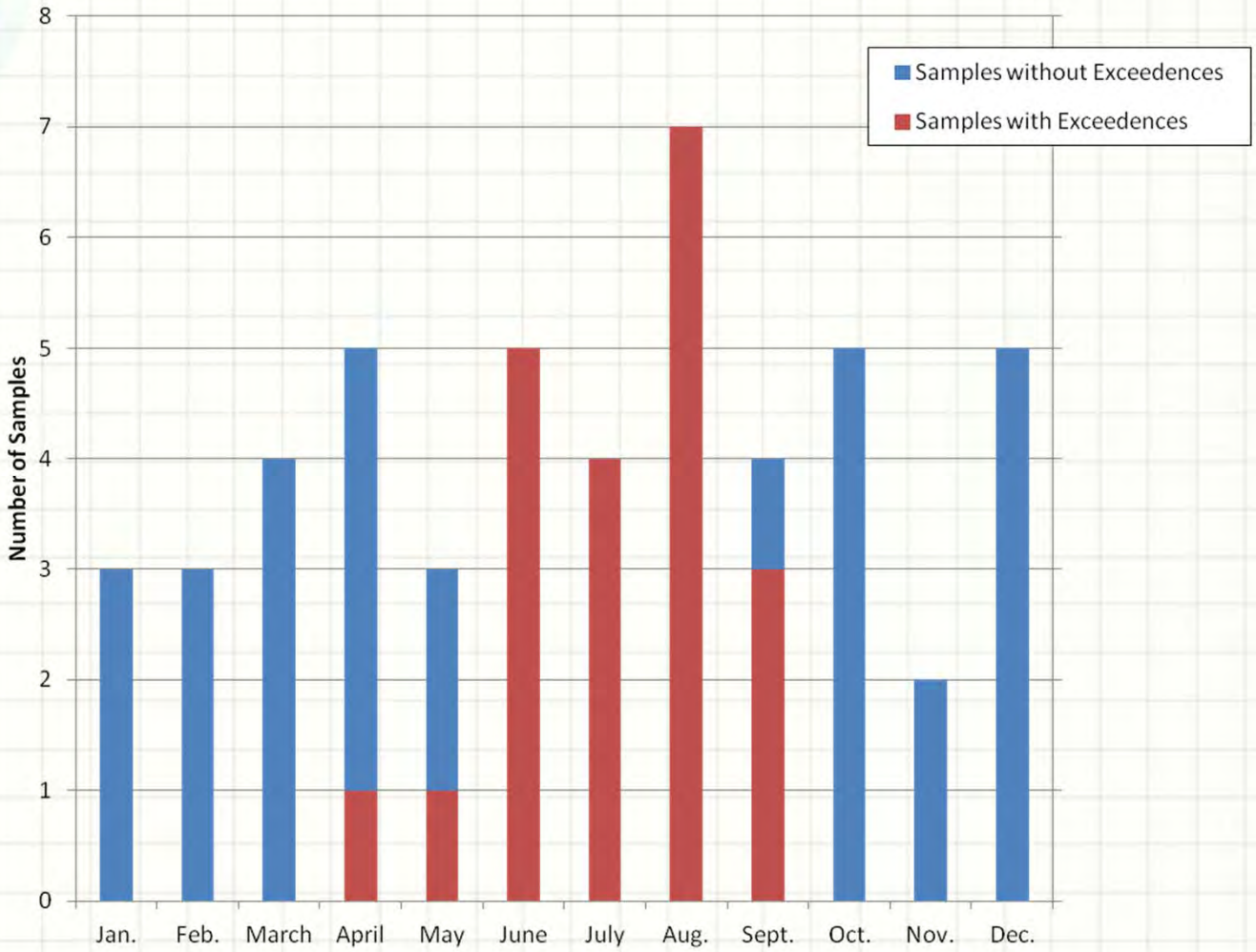
- Loantaka Brook
  - Ball fields by Morris Twp. municipal buildings
  - Seton Hackney Stables
  - Woodland WPCU
  - Kitchell Pond
- PROUT
  - Conglomeration of water quality in all other streams

Phosphorus in Black Brook

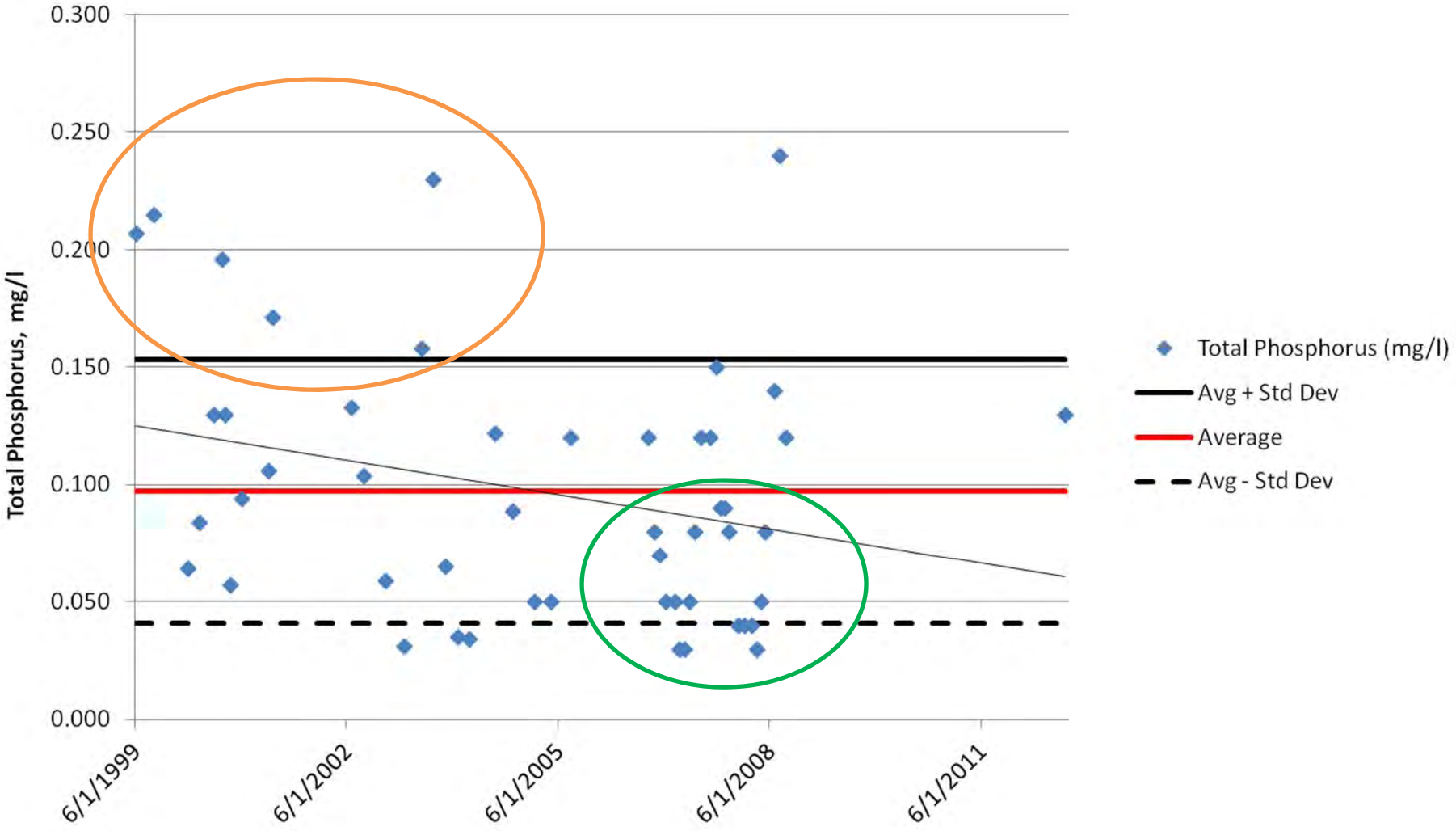
- 2 factors working against BB1
  - Near headwaters → low flow
  - Downstream from Fairmount Country Club
- GSWA's GB5 site in similar situation with similar results
- Contrast with Loantaka Brook
  - Headwaters = low flow, low TP
  - Downstream = higher TP


•Riparian buffer?
•Warm water → low dissolved oxygen
Lake Rd
County Rte 647
647
Woodmont Dr
Farm Rd
Noe Ave
Fairmount Country Club

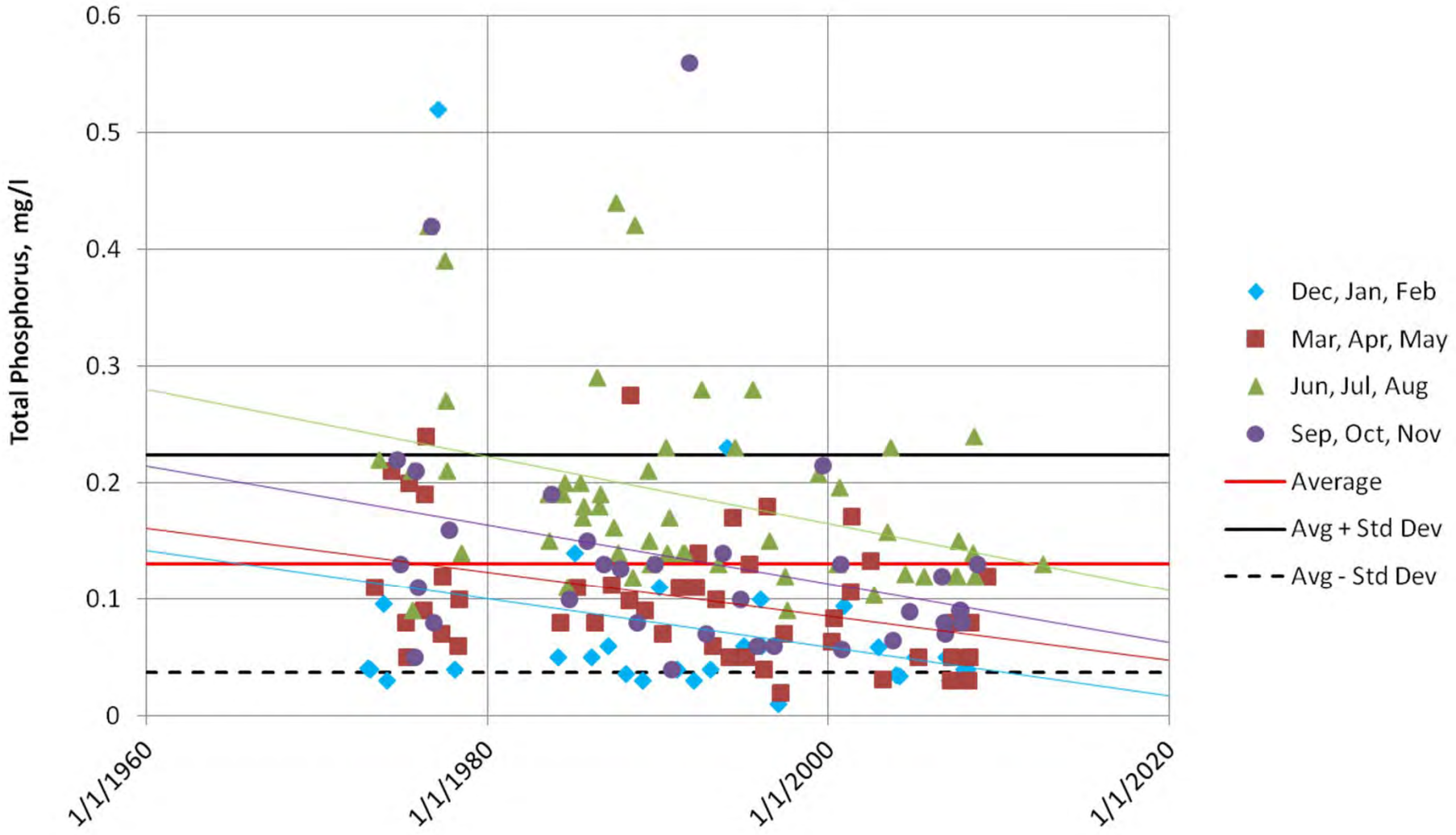
Total Phosphorus Exceedences at PROUT 1999-2012



Decreasing Total Phosphorus at PROUT 1999-2012



Seasonal Total Phosphorus at PROUT 1972-2012



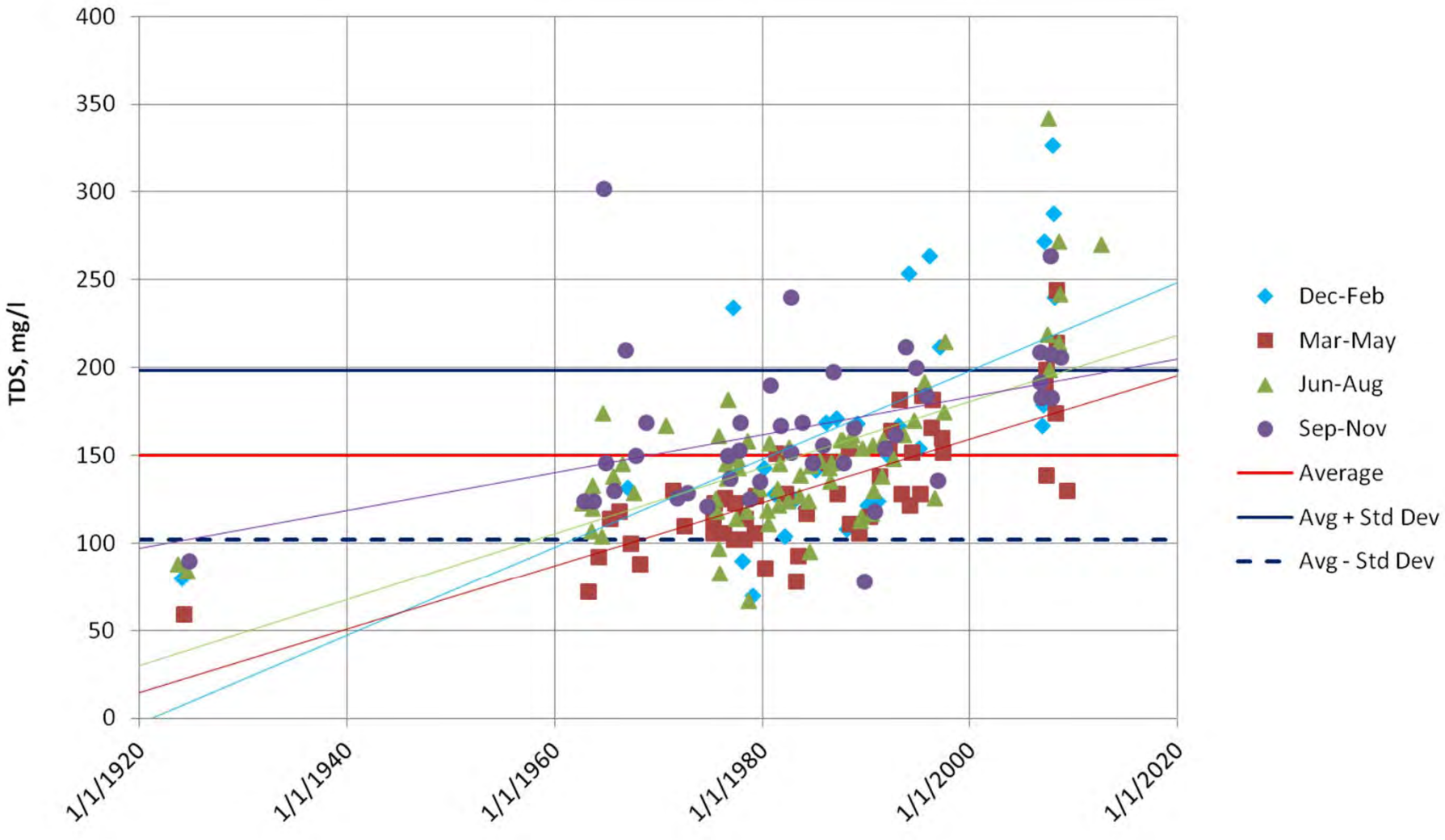
USGS Trends

- USGS report *Trends in the Quality of Water in New Jersey Streams, Water Years 1998-2007*:
  - Decreasing TP at 12/17 stations including site on Dead River and Passaic River at Two Bridges
  - Increasing TDS at 24/70 stations including Dead River and Passaic River at Two Bridges

Total Dissolved Solids

- Past GSWA monitoring showed Na, Cl main constituents, especially in winter
  - Road salt impact
- Problematic for plants and animals that depend on increasingly saline streams
- Problematic for water supply
  - Cl = taste; Na = sodium restrictions?

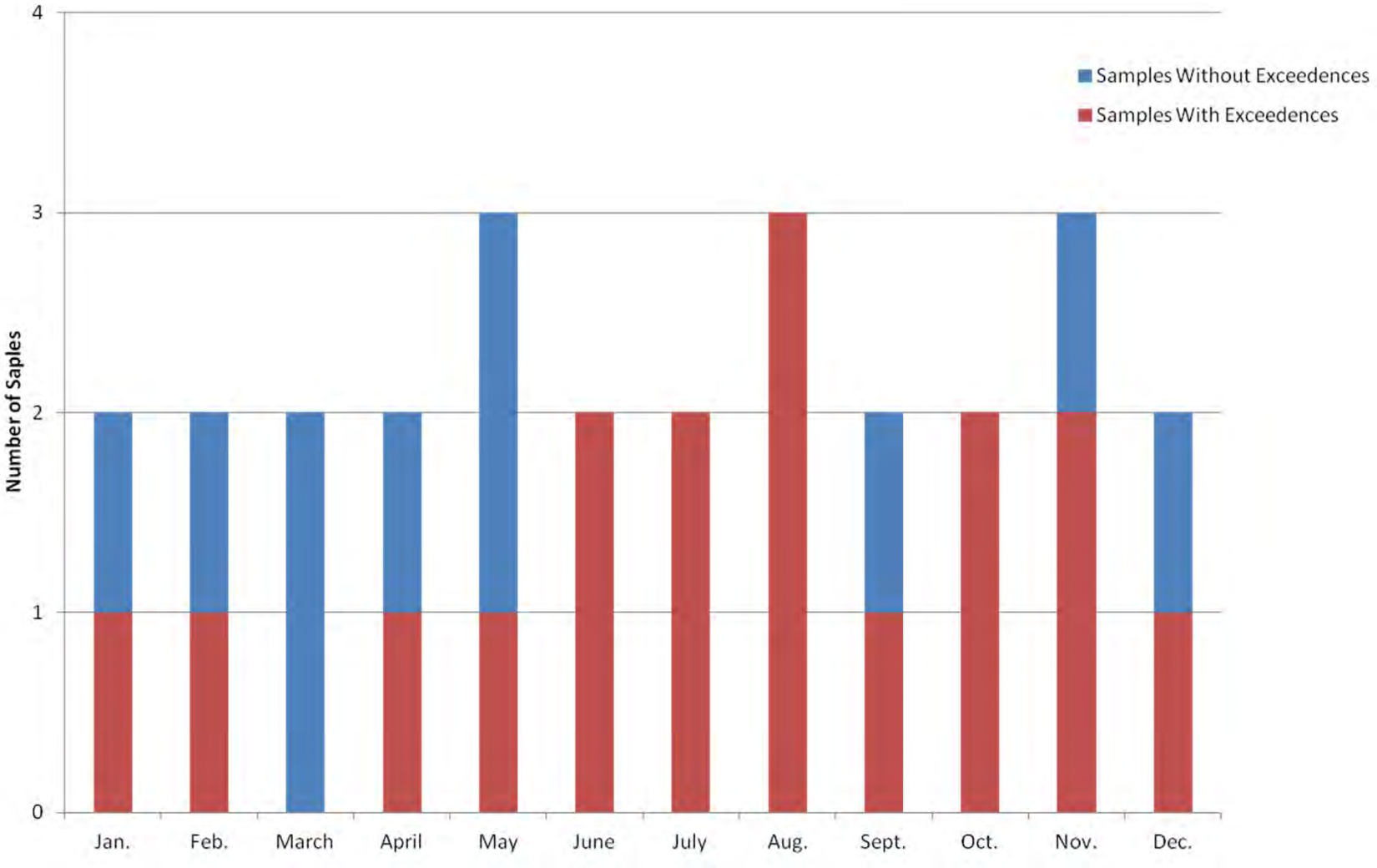
Seasonal Total Dissolved Solids at PROUT 1923-2012



Findings: Total Dissolved Solids

- 2 sites with averages near NJ State Standard:
  - LB1 (560 mg/l), BB1 (433 mg/l)
  - LB1 exceeded 63%

Total Dissolved Solids Exceedences at LB1 2005-2008



TDS and WPCUs

- WPCU = Water Pollution Control Utility (wastewater treatment plant)
- 2 in watershed – Morris Twp. (LB), Chatham Twp. (BB)
- High TDS in effluent from both plants
  - High TDS in influent?
- Poor MIV communities downstream from both plants

Stream Rankings

- Primrose Brook
- Passaic River (PR1)
- Great Brook
- Black Brook
- Loantaka Brook

- Black Brook poorest for MIVs, Loantaka Brook poorest for chem

Common Threats to Our Streams

- Stormwater runoff
- Nutrients – geese?
- Impoundments
- Golf courses
- Road salt

Stormwater Runoff

- Education and outreach programs for individuals
  - Rain barrel/rain garden
- Outreach to municipal and county entities
  - Pervious pavement, etc.


Porous Asphalt


Pavers

Riparian Buffers

- Reduce runoff
- Shade streams
- Can reduce geese
- Help absorb pollutants
- Good for impoundments too!

Golf Courses

- Start the conversation
- Improve riparian buffer
  - Shade stream
  - Reduce runoff
  - Discourage geese
- Fertilizer/pesticide use

Road Salt

- Continue road salt seminars
- Advocate for salt brine use and smart salting practices

Next Steps

- Continue monitoring; expand when possible
  - Primrose Brook, Black Brook 2014-2016
  - All 6 TTC sites? All 5 streams at once?
- Continue analysis: stormflow data, DO, pH, land use, WPCU influent vs. effluent data
- Regional discussions are essential to implement recommendations

Questions?

Laura Kelm

Director of Water Quality Programs

Great Swamp Watershed Association

lkelm@greatswamp.org

973-538-3500, ext. 16

Great Swamp Watershed Association

www.GreatSwamp.org