Westford Stream Monitoring 2014 Results

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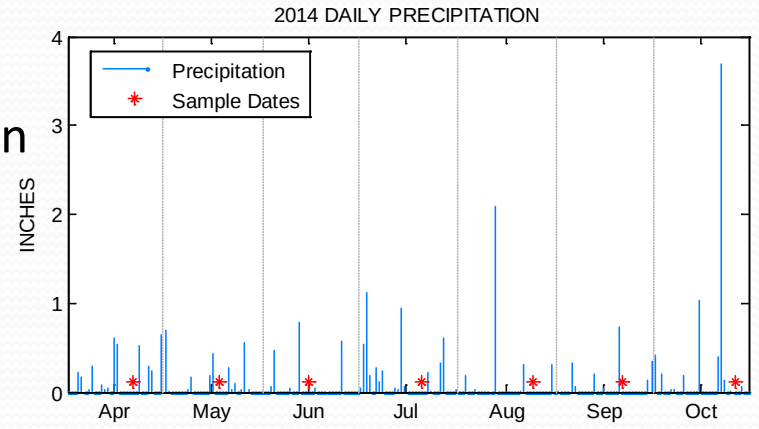
Outline

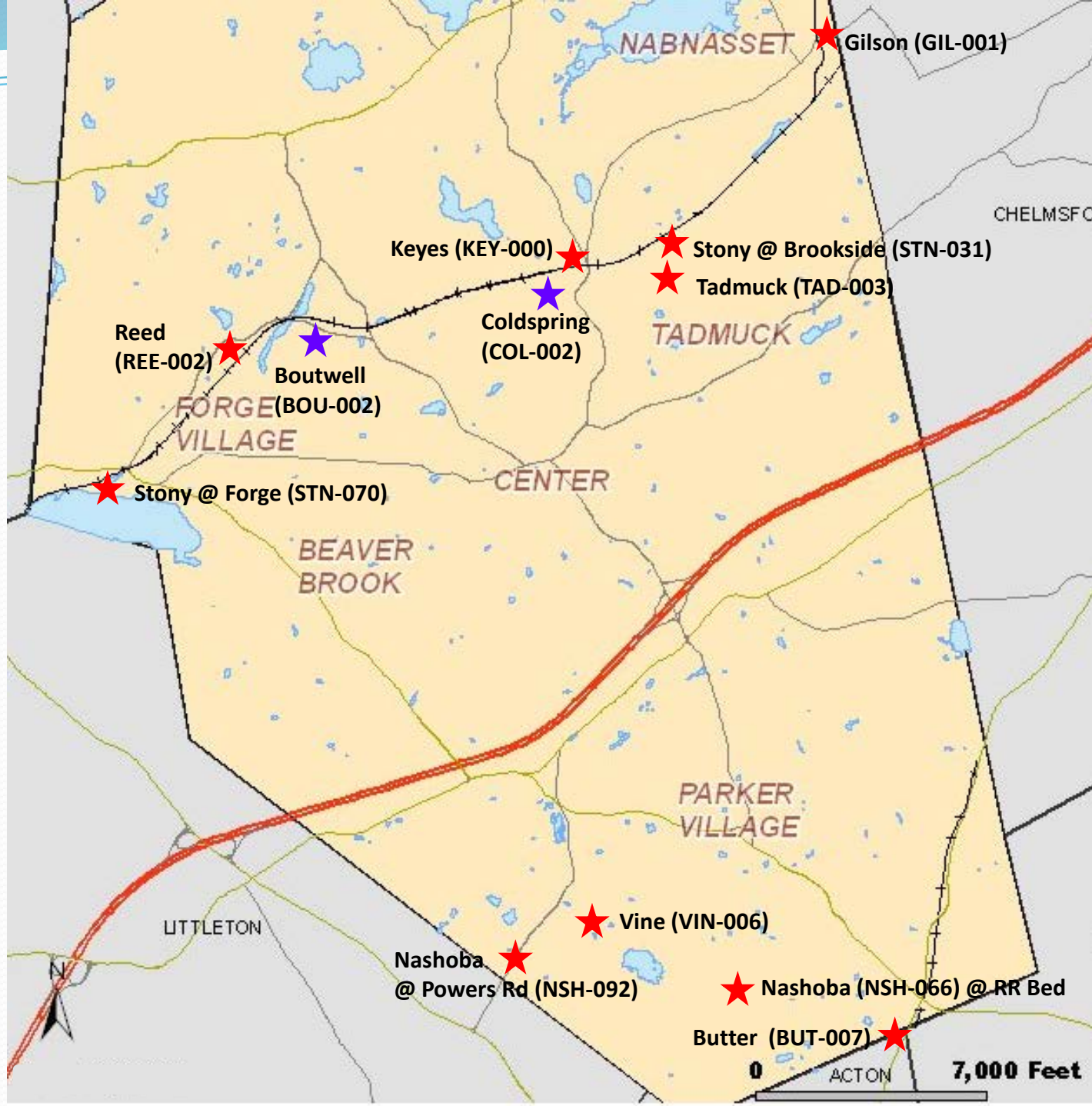
- Regular stream monitoring
  - 2 new sites/brooks: Boutwell, Coldspring Brooks
  - High nutrients (P, N) in Reed, Boutwell, Coldspring
  - Changes from previous years
    - Lower summer temperatures
    - Dissolved oxygen better for Keyes Brook than in 2013
    - Less phosphorous in Nashoba, Vine Brooks
    - Less nitrate in Gilson Brook
- Special studies
- 2015 Proposal

Sampling Overview

- Sampled 10 streams, 12 sites
  - Original 10 sites April, June, August, Oct
  - 2 new sites (Boutwell, Coldspring) May, July, September, October
- Coordinated with OARS
- River observation forms
- YSI meters for dissolved oxygen, temperature, pH, conductivity
- Bottle samples analyzed by Nashoba Analytical Laboratory for nitrates, ortho-phosphorous, total phosphorous (P)
- Weather data provided by Larry Mack
  - Most sampling 2+ days after significant rain
  - Rained previous 24 hours before 9/21 sampling (Boutwell, Coldspring)



Sampling Sites



Key to Site IDs

Brook (Reed)

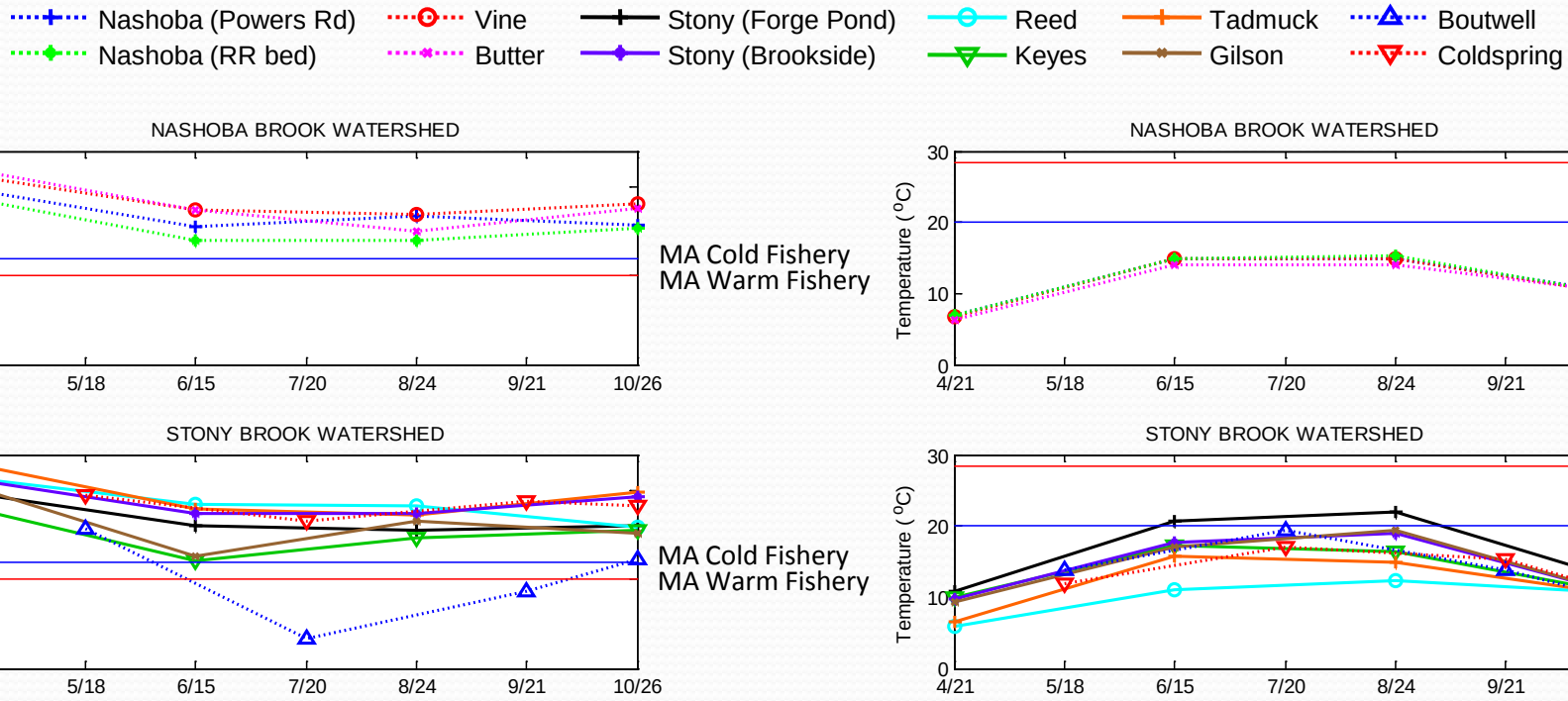
↓

REE-002

↑

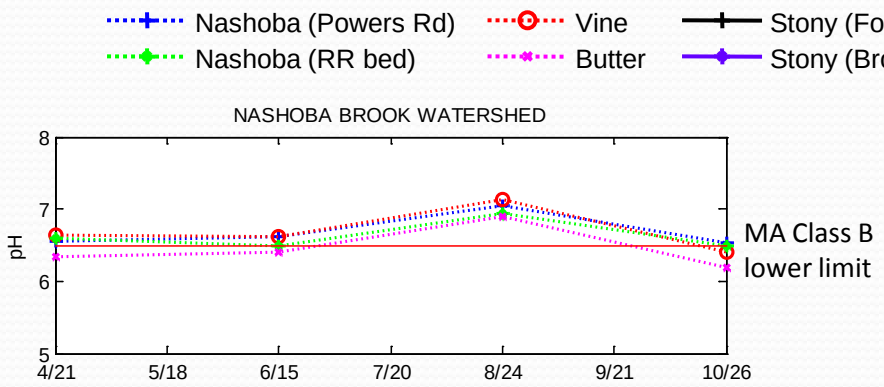
Distance (0.2 mile) to the river it flows into (Reed flows into Stony Brook)

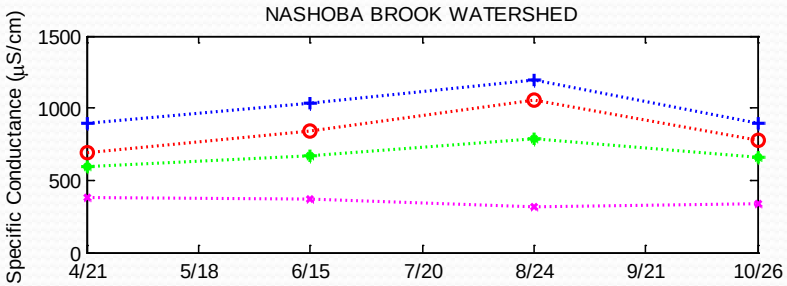
Dissolved Oxygen and Temperature

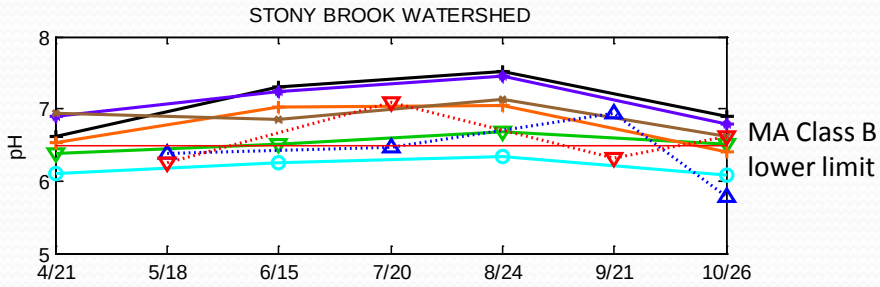


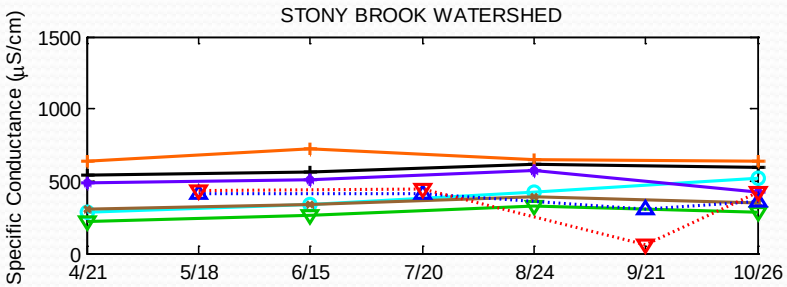
- Dissolved oxygen consistent with previous years
  - Recommend 24-hr study at multiple locations for Boutwell Brook
- Streams slightly cooler than previous years
- Most streams could support fish populations
  - Vine Brook has a healthy crawfish population
  - Nashoba Brook near RR bed has mussels

pH and Specific Conductivity



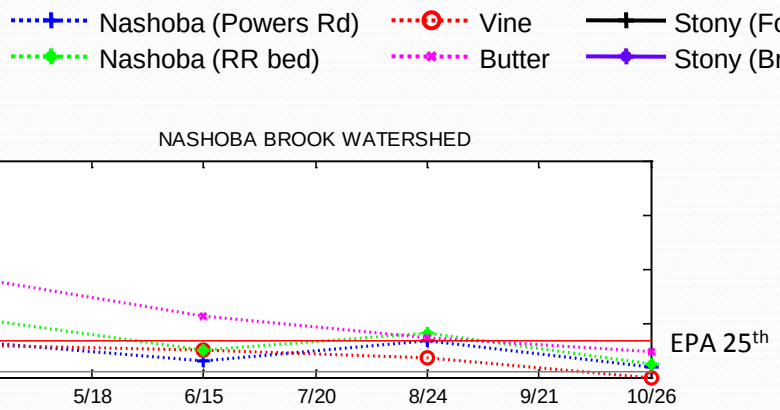


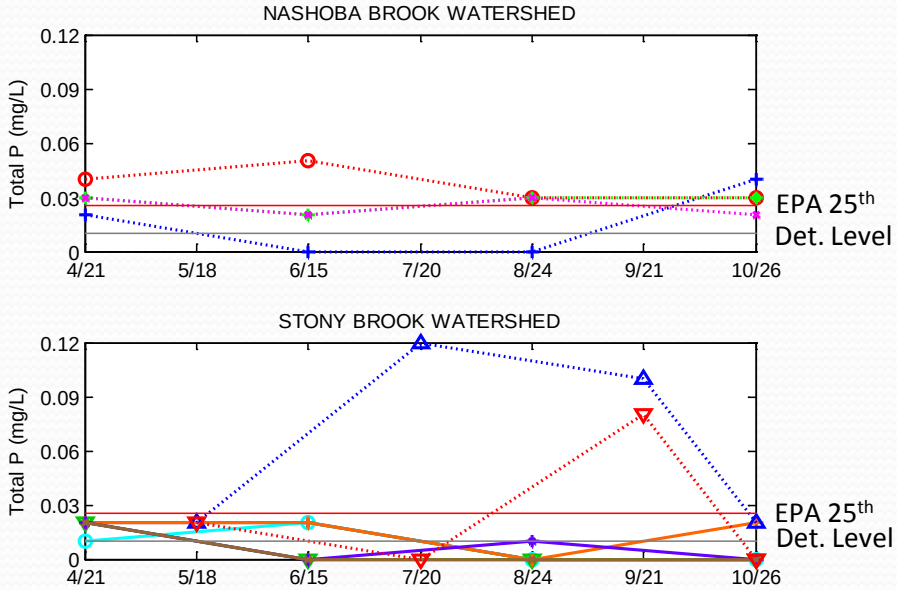




- Specific conductance is water conductivity normalized for 25-deg C temperature
  - Allows comparison over time (different ambient temperatures)
  - TBD if high values in Nashoba Brook naturally occurring (rock substrate) or due to contamination (road salt, etc.)
- pH is consistent with previous years
  - Unknown why the drop for Boutwell Brook in October

Nitrate and Total Phosphorous

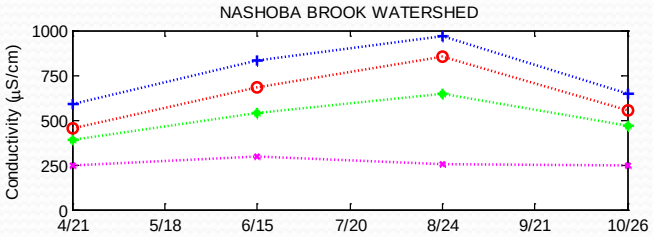


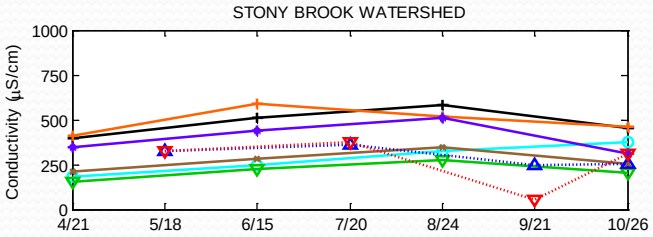


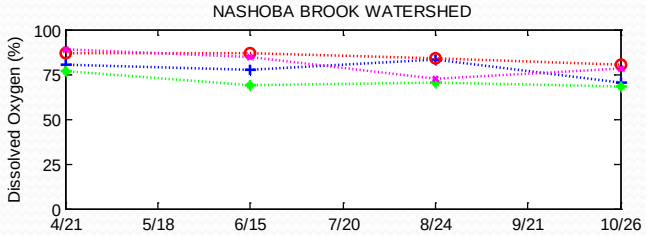
- Nitrate level high for Reed and Coldspring Brooks
  - See special study results for Reed Brook
  - Recommend special study for Coldspring Brook
- Total P very high for Boutwell and Coldspring Brooks; others in good range
  - Sampled after rain on 9/21
  - P removed from laundry detergents and fertilizers in 2012

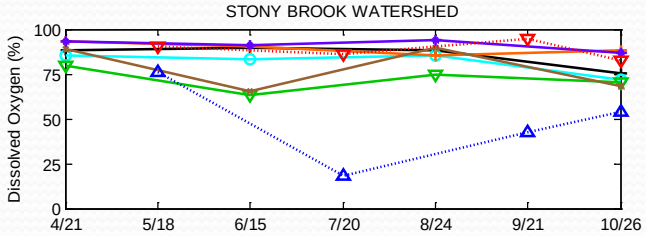
EPA 25th : 25% of US river samples at or below this level (2002 report)

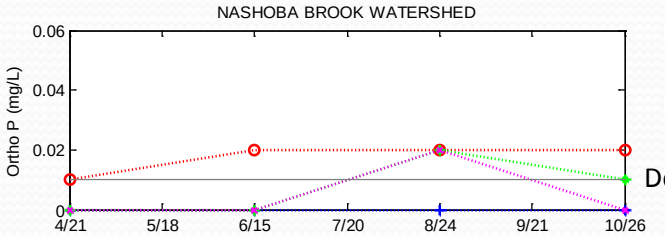
Other Results (No References)

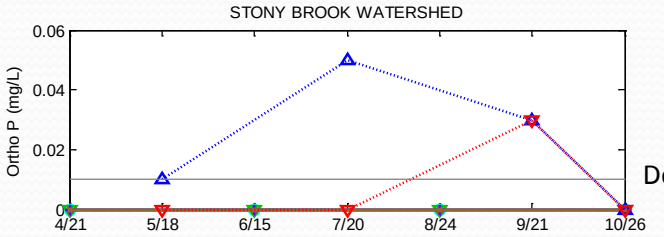


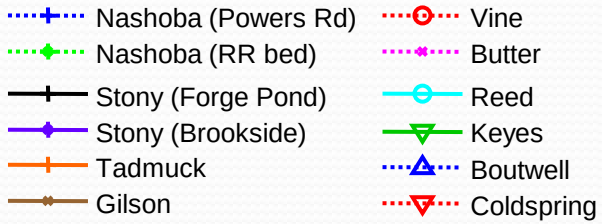












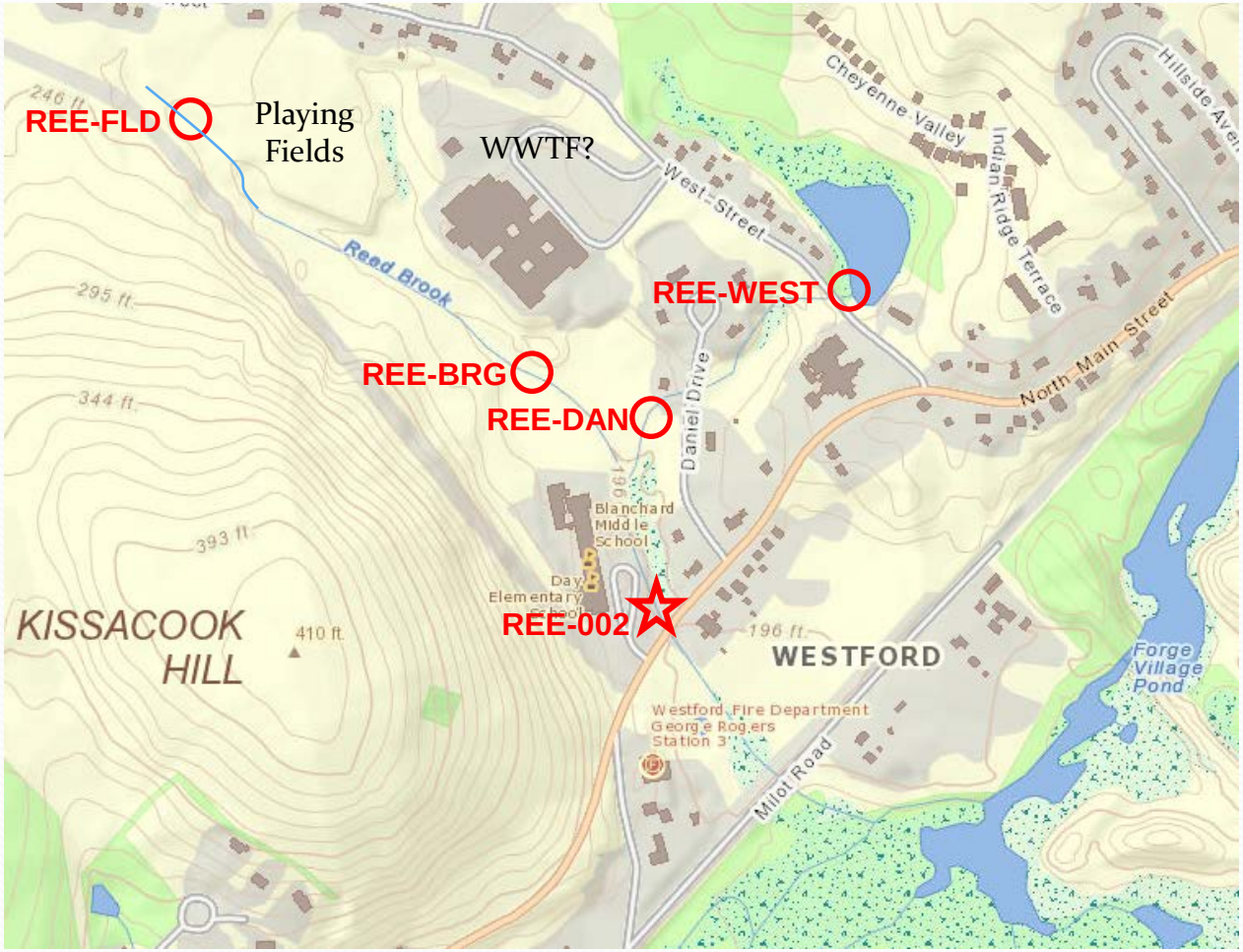
Outline

- Regular Stream Monitoring

- Special studies
  - Reed Brook (high nitrates)
    - Inconclusive as to source
    - Source is somewhere between West Road and Daniel Drive
    - Blanchard Middle School fields not the primary source
  - Vine Brook Tributary (very low pH)
    - Meter sampling at 6 locations
    - Consistently in low 4's
    - Conclusion: Naturally low pH due to slow flow, many oak leaves (high tannic acid)

- 2015 Proposal

Reed Brook Sampling Sites & Results



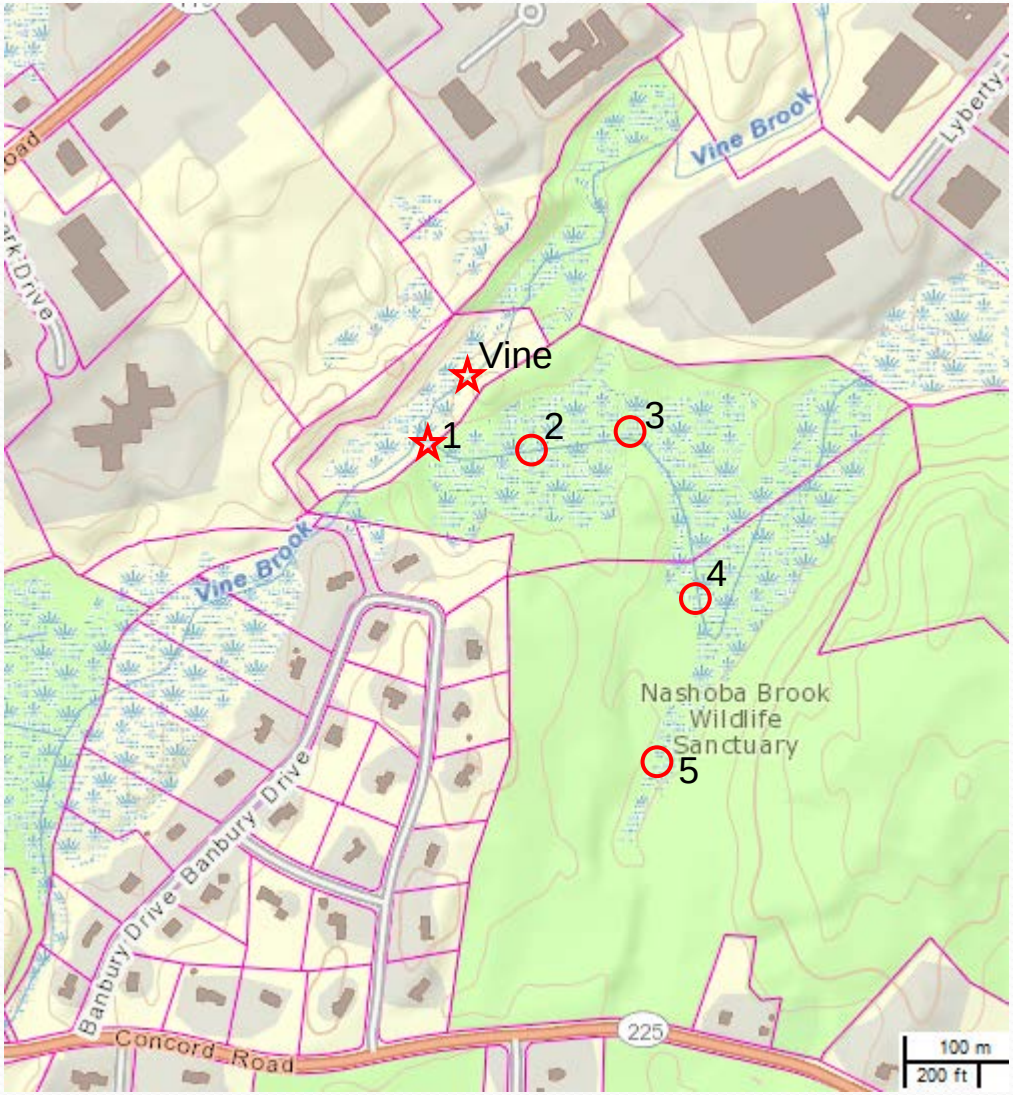
Nitrate (mg/L)

Site	6/15	8/24
REE-FLD	0.32	--
REE-BRG	0.47	ND
REE-WEST	--	0.06
REE-DAN	1.30	1.60
REE-002	1.20	1.70

Vine Brook Tributary

- Sampled 2013 sites monthly
  - Vine Brook pH: 6.10 – 6.57
  - Tributary pH: 3.96 – 4.48
- Enough water to sample along tributary on 10/25/15
  - Shallow depth
  - Slow moving
  - Lots of leaves in the water – oak, maple
  - Stream ended at a stone wall on the MA Audubon property
  - Did not find the segment going towards Lyberty Way

Site	Cond. (uS/cm)	Spec. Cond. (uS/cm)	DO (mg/L)	pH	Temp. (C)
1	344.4	457	2.09	3.98	12.1
2	379.4	494.8	3.11	4.07	12.8
3	291.3	383.9	3.05	4	12.4
4	146.7	195.5	2.22	3.9	11.9
5	121	161.9	2.72	4.65	11.8



Outline

- Regular Stream Monitoring
- Special studies
- 2015 Proposal
  - Monitor all named streams in Westford
  - Reduced sample frequency since have monthly baseline for most streams
    - North of Rt 495 in April, June, August, November
    - South of Rt 495 in May, July, September, November
  - Special study for Coldspring due to high nutrients

Coldspring Brook: Possible Sites