



Assessing the Wood-Pawcatuck Watershed Association's Water Quality Monitoring Program

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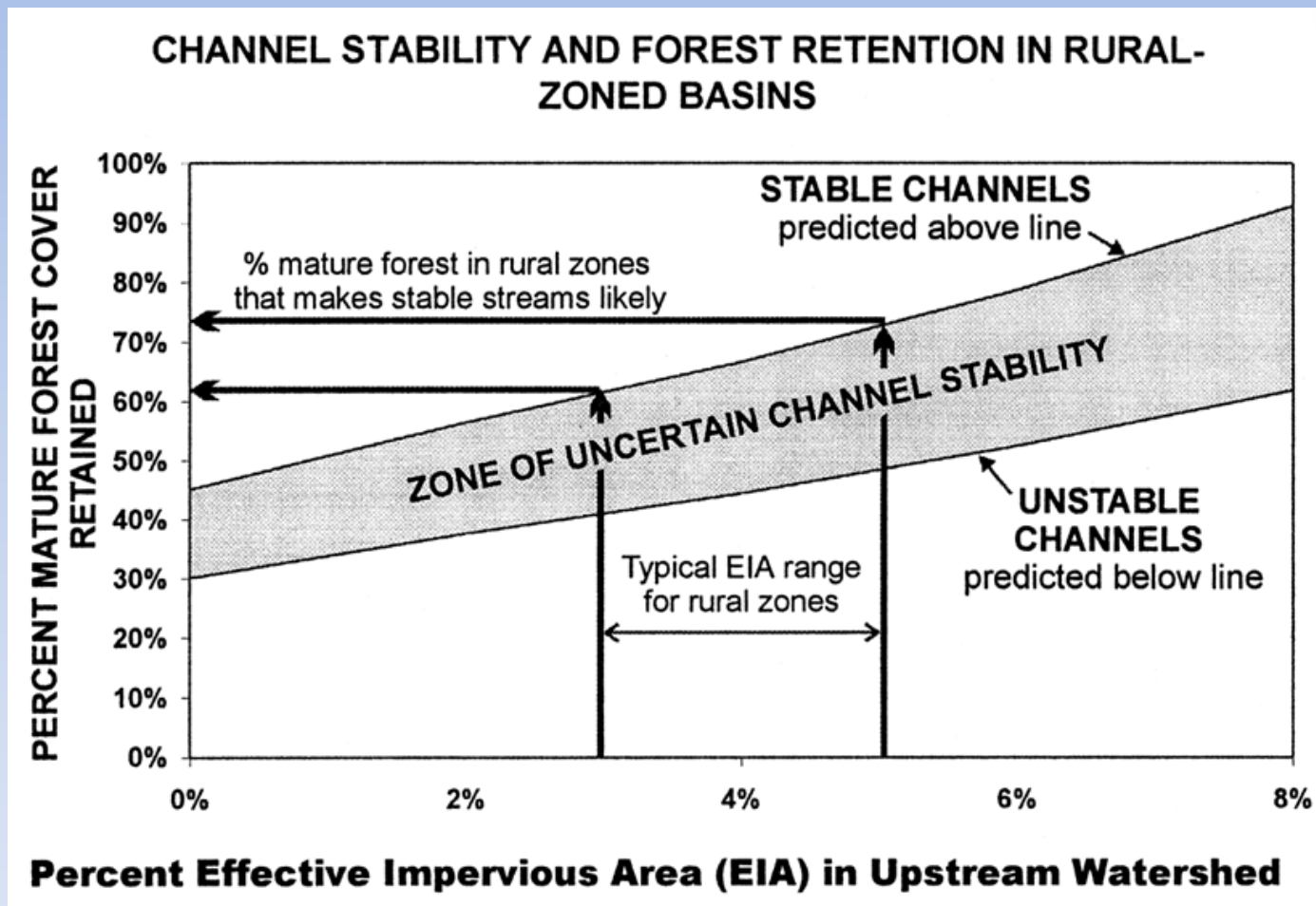
Overall Goals of Water Quality Monitoring Program

- **STATUS** of the waters of the Wood-Pawcatuck Watershed?
- **TRENDS**: Are they improving, declining, or stable?
- **PROBLEM ID**: Is there a glaring problem to investigate?
- **SPATIAL COVERAGE**: Are we “covering” the whole watershed?
- **STORMWATER EFFECTS**: Where are we seeing them?
- **DATA**: Are we sampling the right parameters to provide us the information we want?

Data Gathering

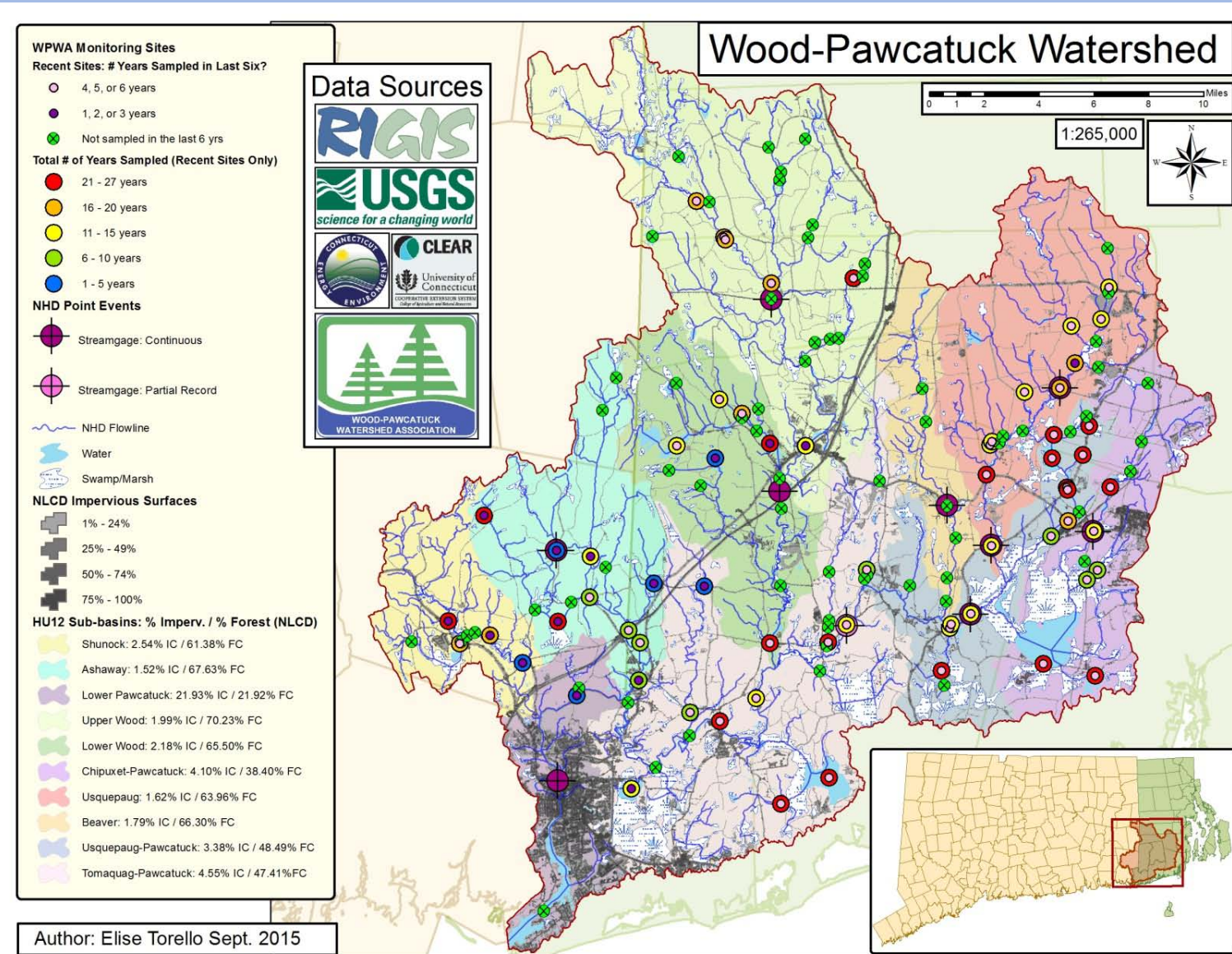
- **What data do we have?** (Where, when, how much)
- **Total Phosphorus (TP) monitoring data**
- **Geographic Information Systems:**
 - **USGS National Hydrography Dataset: HU12 sub-basins, river and stream segments, waterbodies, stream gage locations**
 - **National Land Cover Database: Impervious and Forest Cover**
 - **RI DEM, RIGIS, and UCONN CLEAR: dam locations**

Impervious and Forest Cover: Big Impacts on Water Quality



From D.B. Booth, D. Hartley, and R. Jackson. 2002. Forest Cover, Impervious-Surface Area, and the Mitigation of Stormwater Impacts. JAWRA Journal of the American Water Resources Association

Active (2014) and Recent Sites



Assessing Our Current Water Quality Monitoring Program

28 years

165 sites

70,000+ data points

2014 sites (47)

14 ponds, 33 rivers/streams



Other recent sites (17)

5 ponds, 12 rivers/streams

Tier 1 Sites:
Keep Monitoring
Add new sites if
needed

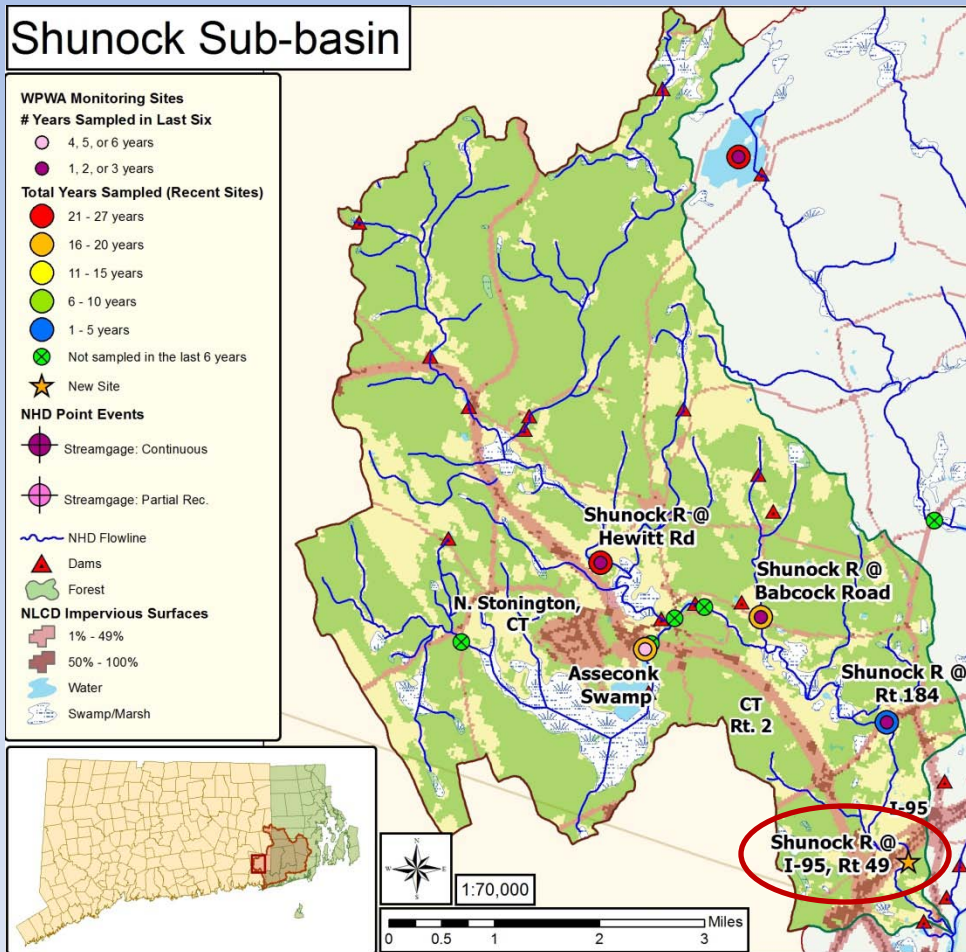
Tier 2 Sites:
Keep if \$\$ Allows

Tier 3 Sites:
Will Miss the Least

Questions Kept in Mind:

- Is there at least one site in each sub-basin or larger stream/river?
- Are there any sites that can be dropped or monitored less frequently? (Compare TP data)
- Is there a reference site in each sub-basin? Should there be?
- Are there site(s) near concentrations of impervious cover to capture stormwater effects?
- Are there sites at all stream gages? Should there be?
- Is there a site at the bottom of each sub-basin?
- Are there enough sites on the Pawcatuck River?

Shunock River Sub-basin

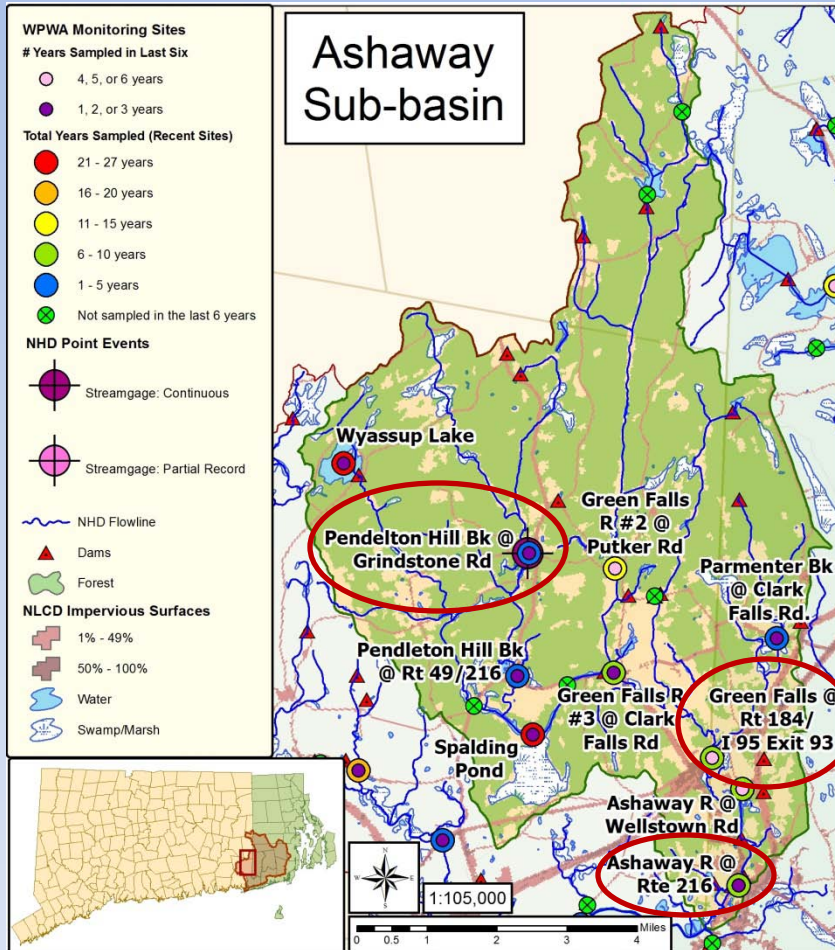


- Entirely in CT
- 10,591 ac (42.9 km²)
- Largely undeveloped
2.5% IC, 61.4% FC
- Booth model: stable
- NO active sites
- 4 recent sites (NSCLA supported)

Recommend:

- One new tier 1 site near bottom of basin below I-95
- The rest tier 2 or 3

Ashaway River Sub-basin

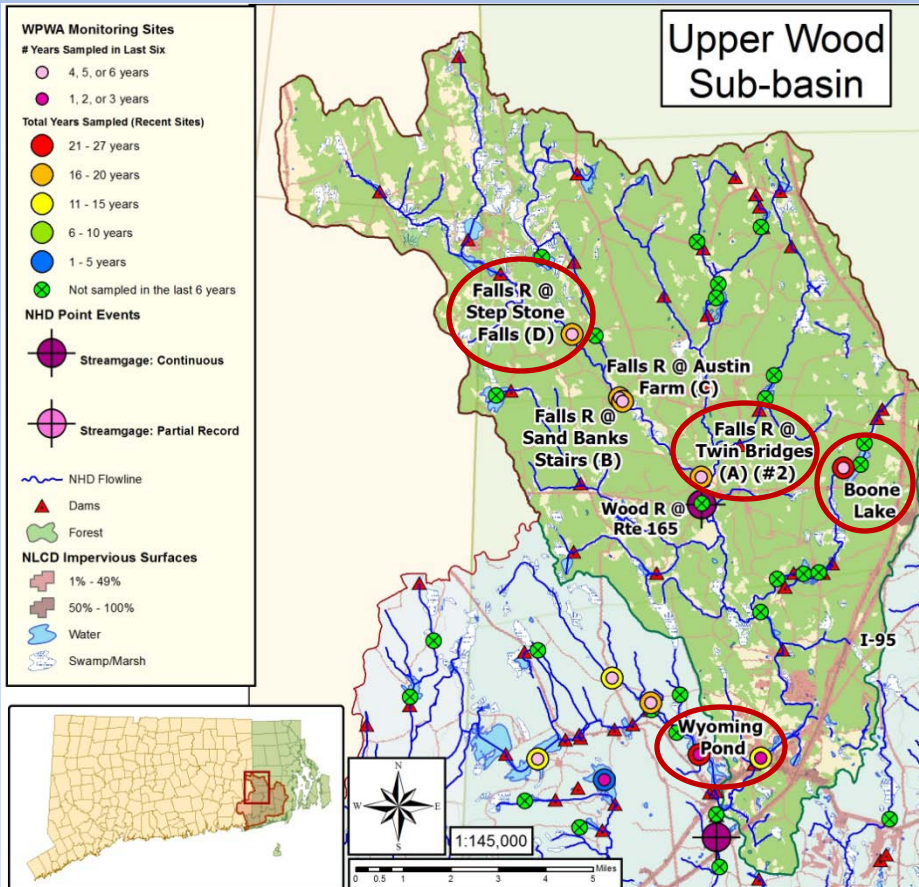


- Mostly in CT
- 17,832 ac (72.2 km²)
- Least developed sub-basin
1.5% IC, 67.6% FC
- Booth model: stable
- 5 active sites
- 5 recent sites

Recommend:

- Three tier 1 sites: at stream gage, below I-95, near bottom of basin
- The rest tier 2 or 3

Upper Wood River Sub-basin



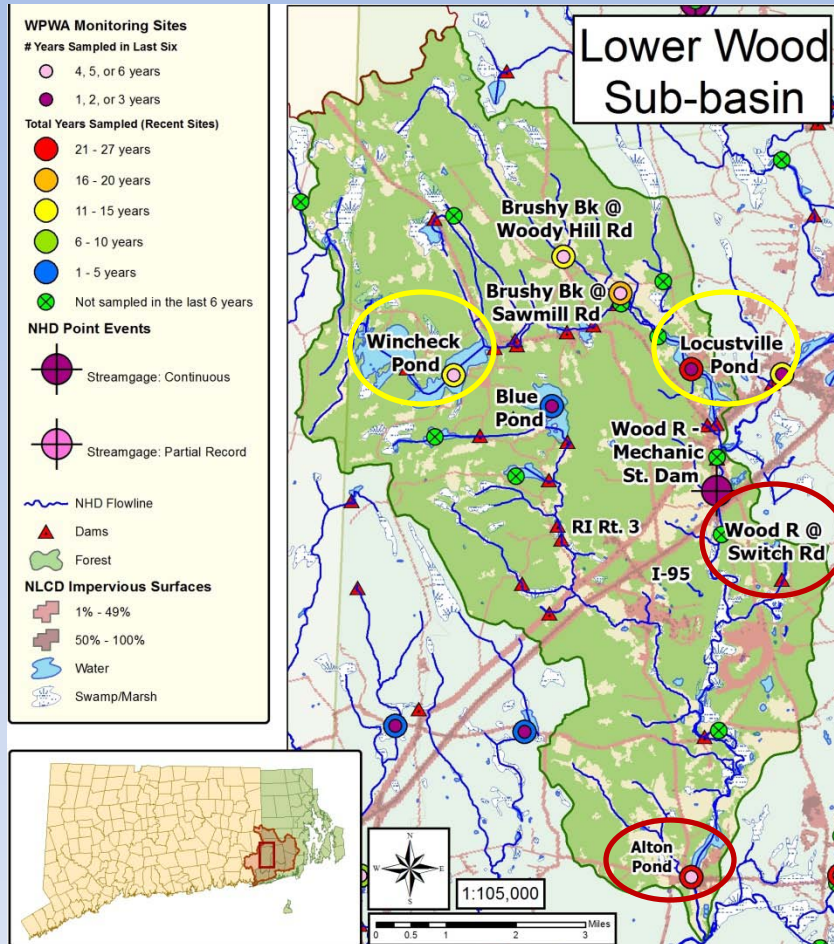
- Mostly in RI, largest basin
- 39,073 ac (158.1 km²)
- Largely undeveloped
2.0% IC, 70.2% (highest) FC
- Booth model: stable
- 5 active sites
- 1 recent site

Recommend:

- Four tier 1 sites: upstream, near stream gage, in lake, near bottom of basin in highly impacted pond
- The rest tier 3

Expect the unexpected: TP at Falls R (D) HIGHER than Falls R (A)!
(upstream reference site—NOT!)

Lower Wood River Sub-basin



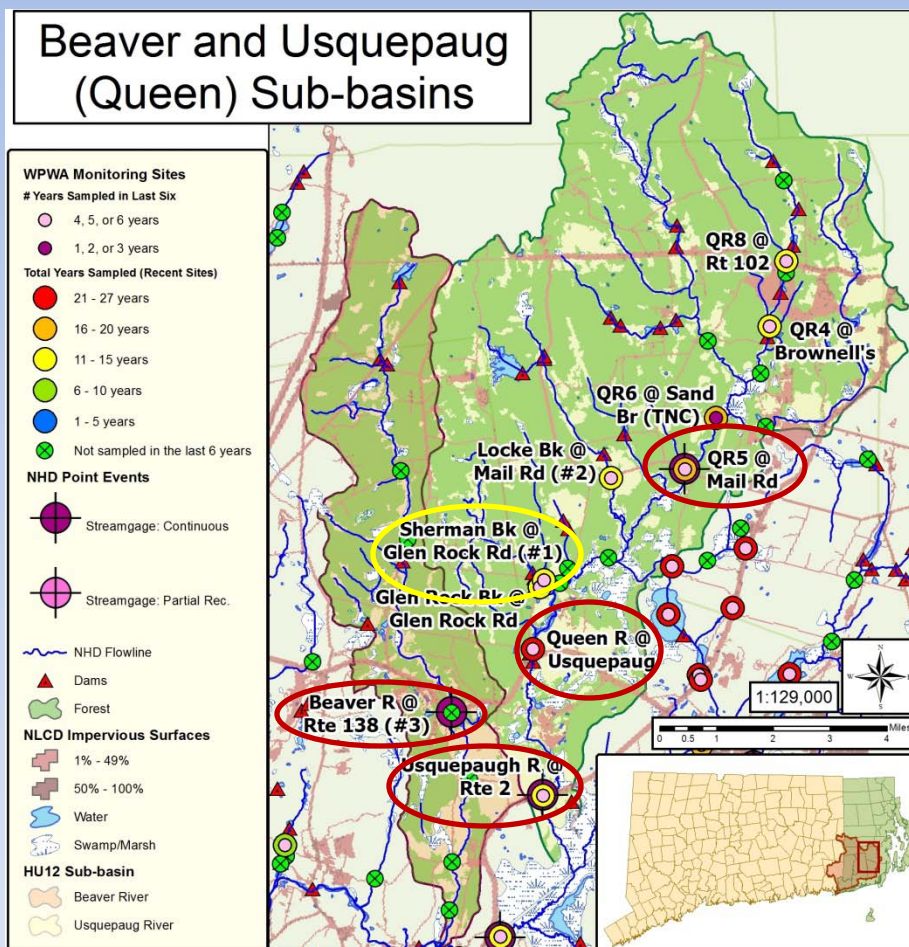
- Mostly in RI
- 18,309 ac (74.1 km²)
- Largely undeveloped
2.2% IC, 65.5% FC
- Booth model: stable
- 5 active sites
- 1 recent site

Recommend:

- Two tier 1 sites: near stream gage (re-activate old site), near bottom of basin in impacted, unstable pond
- The rest tier 2 or 3

Wincheck and Locustville Ponds: low TP, active volunteers and pond associations.
Sample in alternate years?

Beaver and Usquepaug (Queen) River Sub-basins



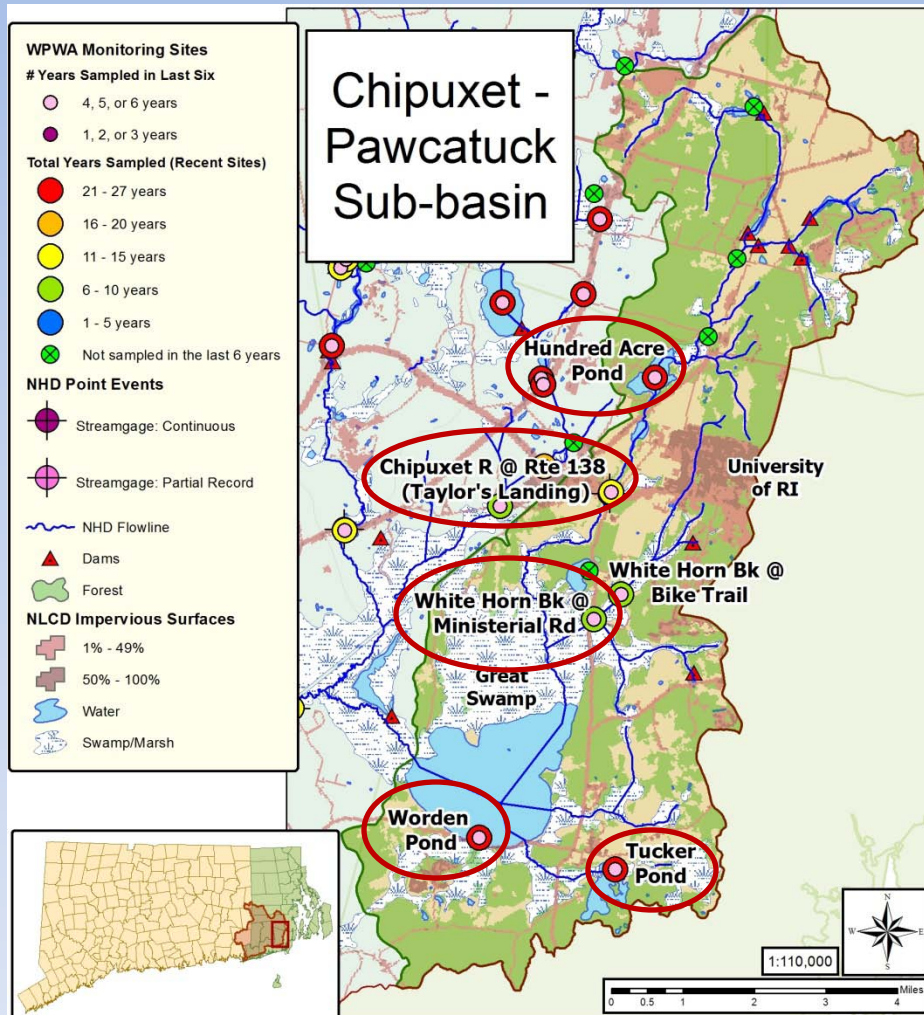
- Beaver R. 7,901 ac (32.0 km²) – smallest sub-basin
 - 1.8% IC, 66.3% FC
- Queen R. 23,333 ac (94.4 km²)
 - 1.6% IC, 64.0% FC
- Booth model: stable for both
- BR: NO active or recent sites
- QR: 6 active and 3 recent sites

Recommend:

- BR: re-activate one tier 1 site at stream gage
- QR: Three tier 1 sites: at stream gage, in an improving impoundment, and at the bottom of the sub-basin
- The rest tier 2 or 3

Sherman Bk @ Glen Rock Rd. is higher priority tier 2 as “upstream” site

Chipuxet - Pawcatuck Sub-basin

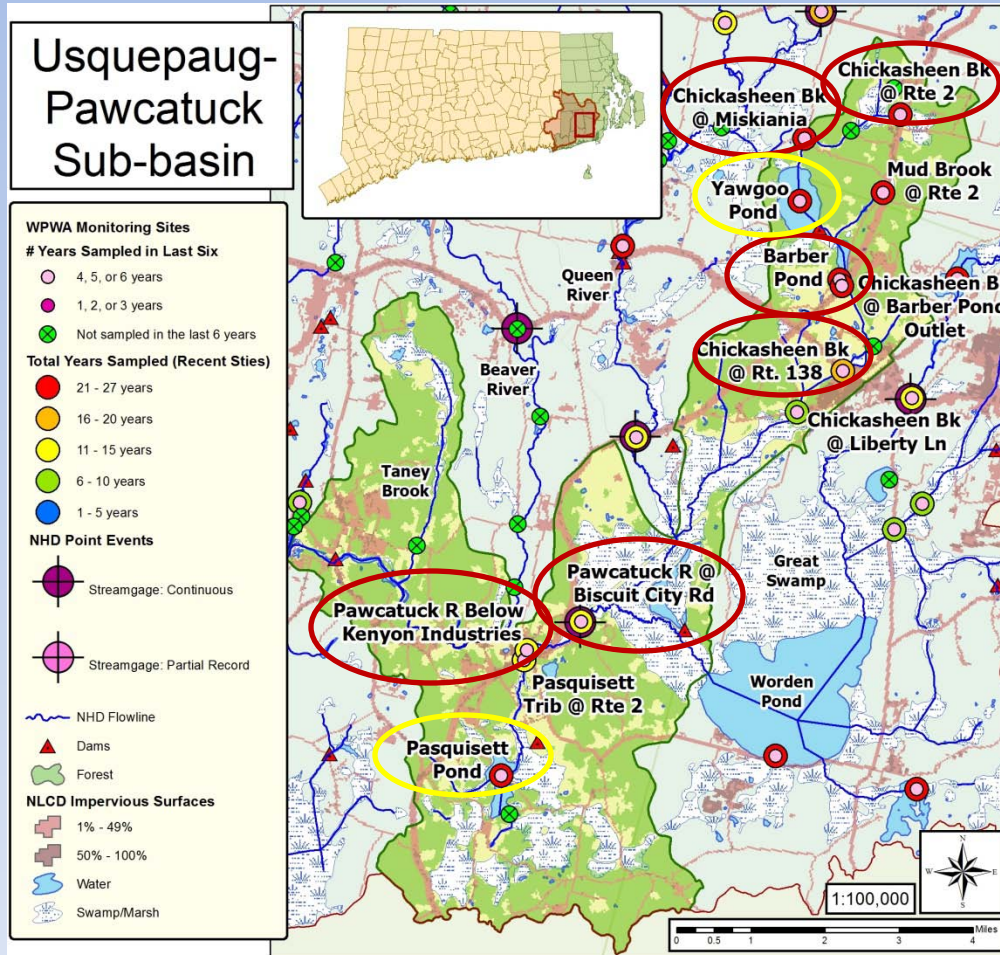


- 16,451 ac (66.6 km²)
- 4.1% IC (URI), 38.4% FC (Worden Pond, Great Swamp)
- Booth model: unstable
- 5 active sites
- 1 recent site

Recommend:

- Five tier 1 sites: 2 natural ponds, 1 impoundment, 1 river (at stream gage), 1 stream (comes out of URI)
- The last is tier 3

Usquepaug (Queen) - Pawcatuck Sub-basin



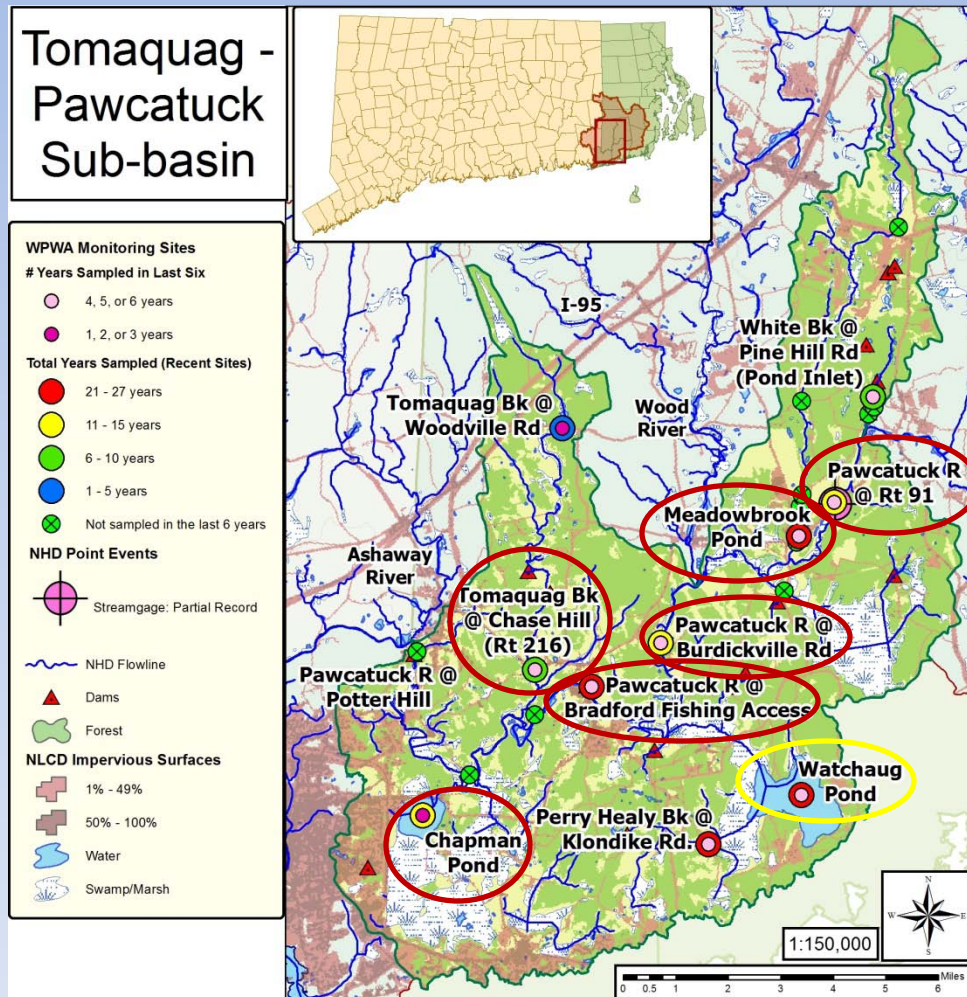
- 13,574 ac (54.9 km²)
- 3.4% IC, 48.5% FC (turf farms)
- Booth model: uncertain
- 12 active sites

Recommend:

- Six tier 1 sites: 1 pond, 3 on Chickasheen, 2 on Pawcatuck R. (one at stream gage)
- The rest tier 2 or 3

- Pasquisett and Yawgoo Ponds are tier two—perhaps sample in alternating years?
- Should we sample Barber Pond outlet instead of in the pond?

Tomaquag - Pawcatuck Sub-basin



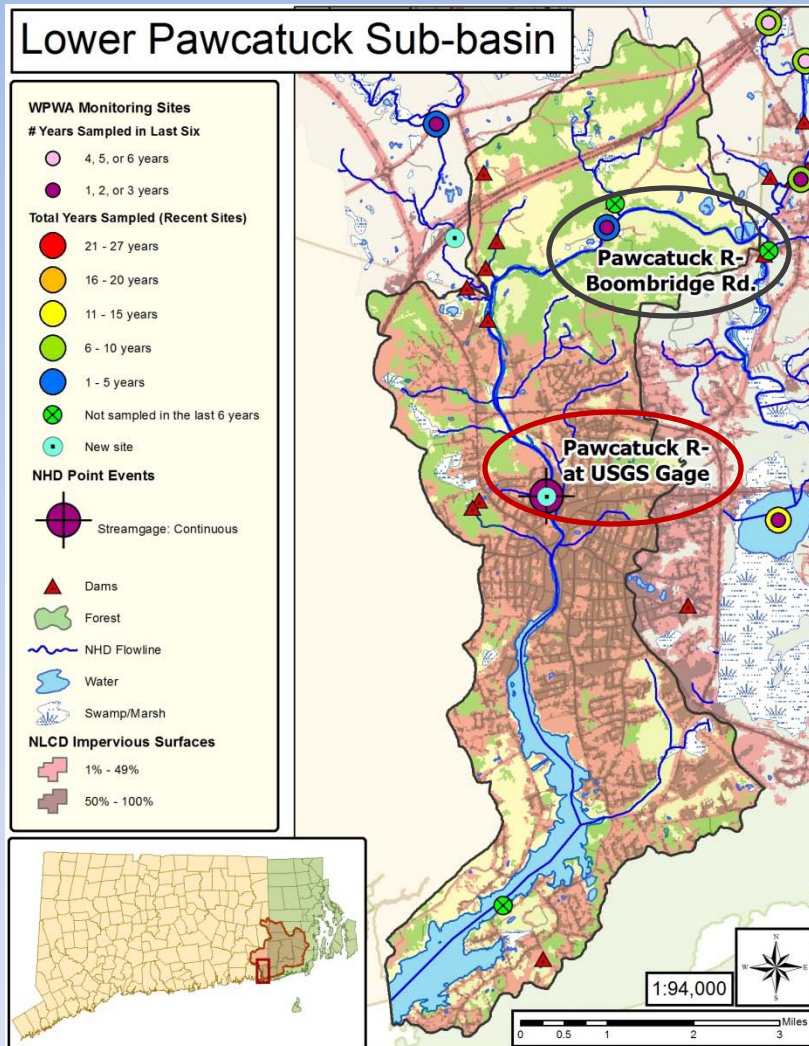
- 36,499 ac (147.7 km²)
- 4.6% IC, 47.4% FC
- Booth model: borderline uncertain/unstable
- 9 active sites
- 1 recent site

Recommend:

- Six tier 1 sites: 2 ponds, 1 on Tomaquag Brook, 3 on Pawcatuck R. (one at stream gage)
- The rest tier 2 or 3

- Watchaug Ponds is tier two—perhaps sample every other year?

Lower Pawcatuck Sub-basin



- 10,147 ac (41.1 km²)
- 21.9% IC (Westerly, RI and Pawcatuck, CT)
- 21.9% FC
- Booth model: unstable
- NO active sites
- 1 recent site

Recommend:

- One new tier 1 site at stream gage
- One tier 2 at Boombridge Rd.

Save the Bay samples three sites in the estuary.

Conclusions

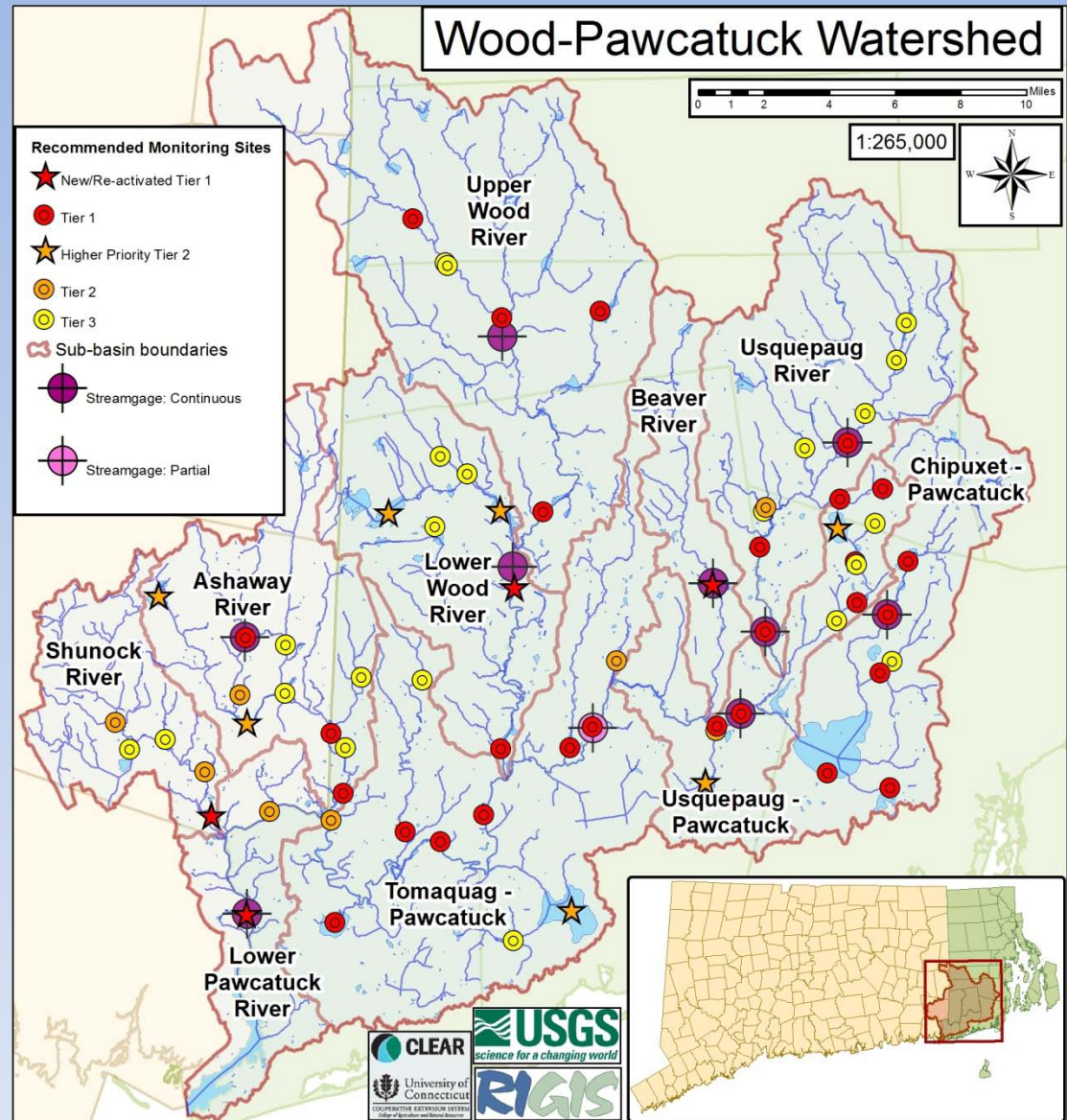
- Overall, spatial coverage is good!
- Have sites at or near most stream gages
- Reference sites: hard to place, not predictable—use reference value instead (13 ug/L TP based on our existing data)
- 47 sites in 2014; 28 of these plus 4 new or re-activated sites assigned to tier one (32 total)
- WPWA would pay for 22 of these (WPWA paid for 32 sites in 2014)
- 15 sites assigned to tier two; 22 in tier three

Map of Watershed with Tiers

Tier 1: 32
(28 existing, 2 new,
2 re-activated;
WPWA pays for 22)

Tier 2: 12

Tier 3: 22



Lingering Questions/Issues

- How many sites do we want to pay for?
- Do we want to sample some tier two ponds every other year for temporal continuity?
- Can we convince lake associations to support their sites?
- Do we want monitors of tier two lakes to continue monitoring “free” parameters (temp, DO, Secchi depth)?
- Should we add conductivity to our sampling parameters to catch stormwater effects?
- When can we process temperature logger data, and do we want to expand deployments?