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

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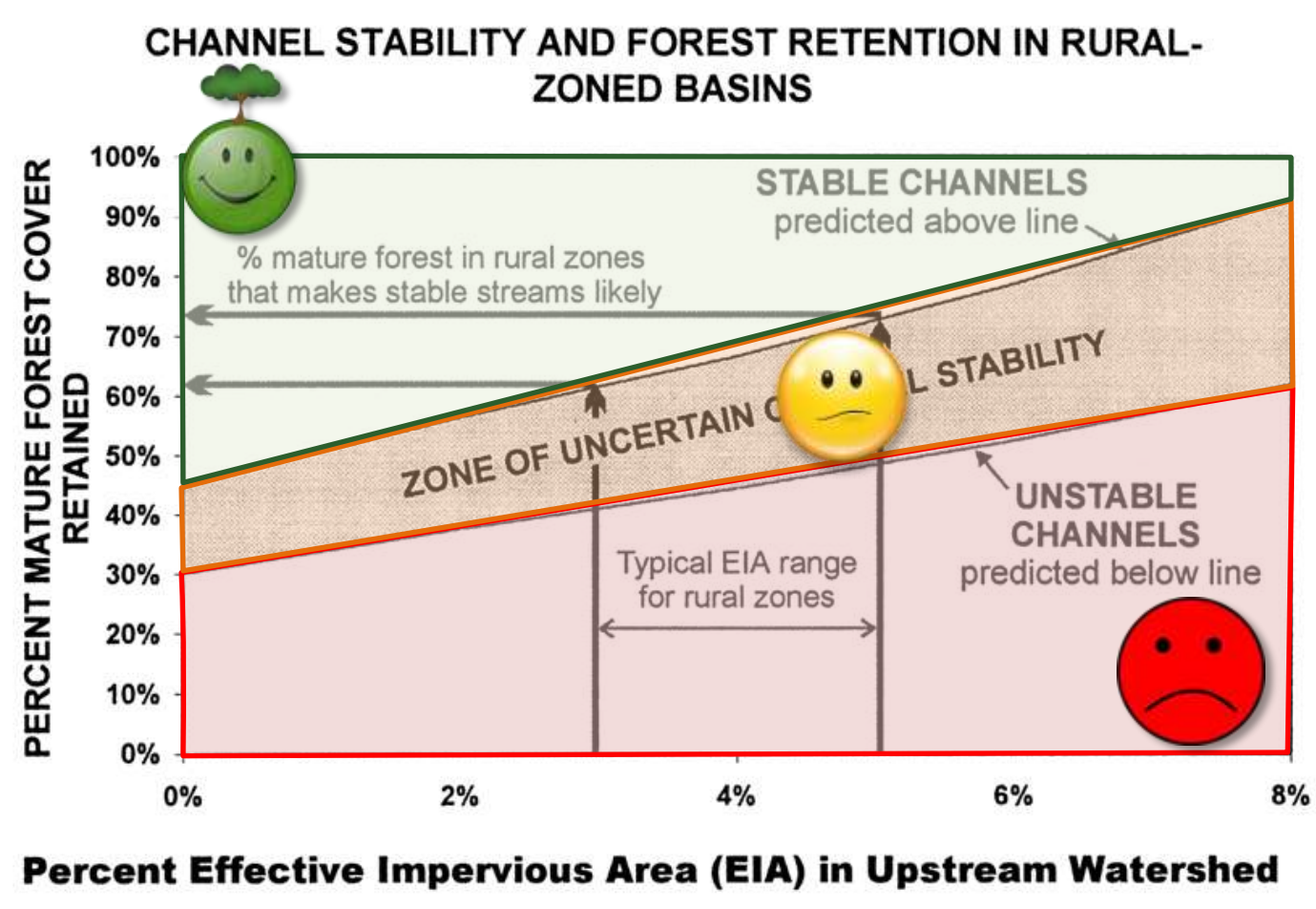
# Overall Goals of Water Quality Monitoring Program

- 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?

# The Assessment: Data Gathering

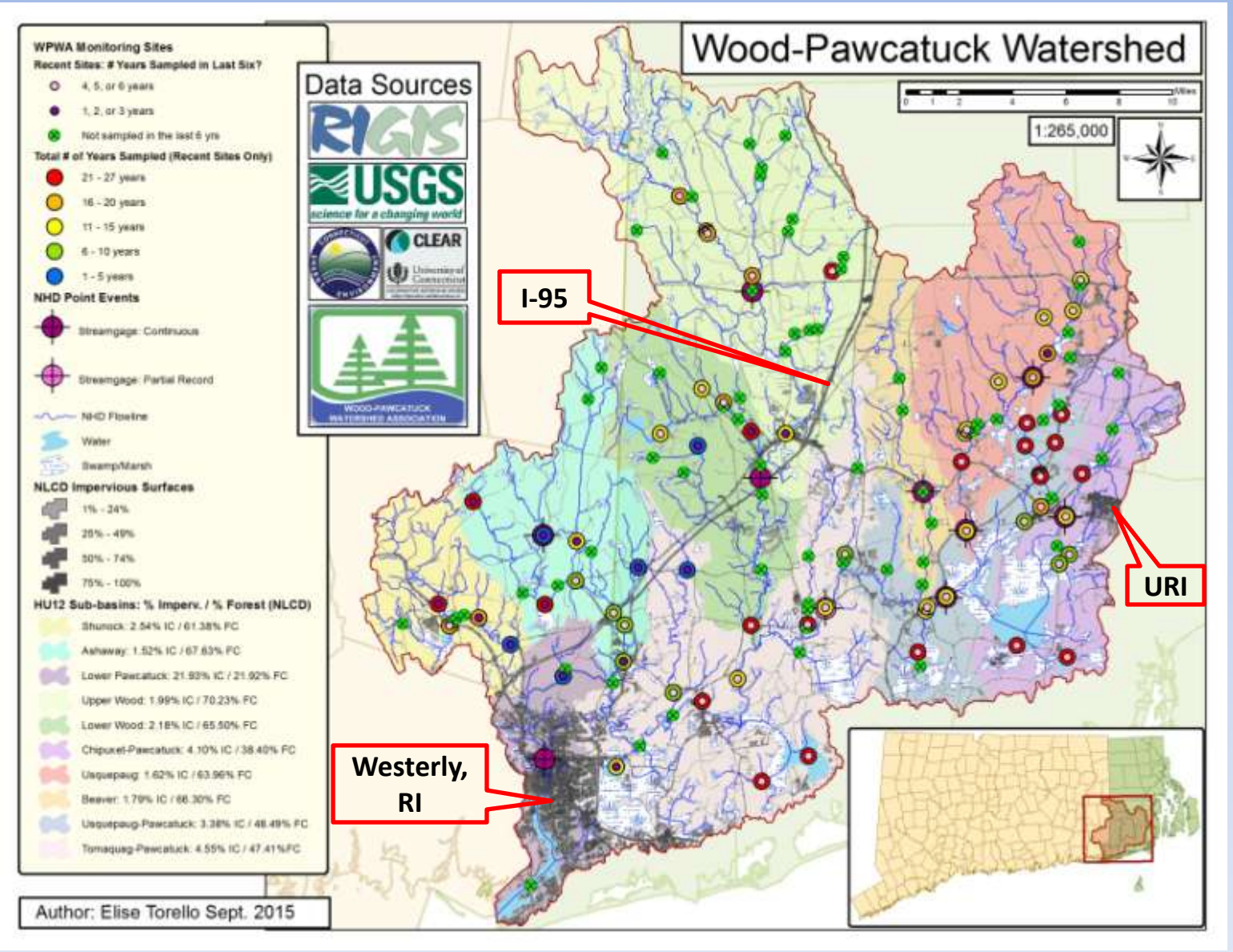
- **What data do we have? (Where, when, how much)**
- **Total Phosphorus (TP) monitoring data**
- **Geographic Information Systems:**
  - **Sub-basin Boundaries**
  - **River and Stream Segments**
  - **Water Bodies**
  - **Sream Gage Locations**
  - **Impervious and Forest Cover**

# 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

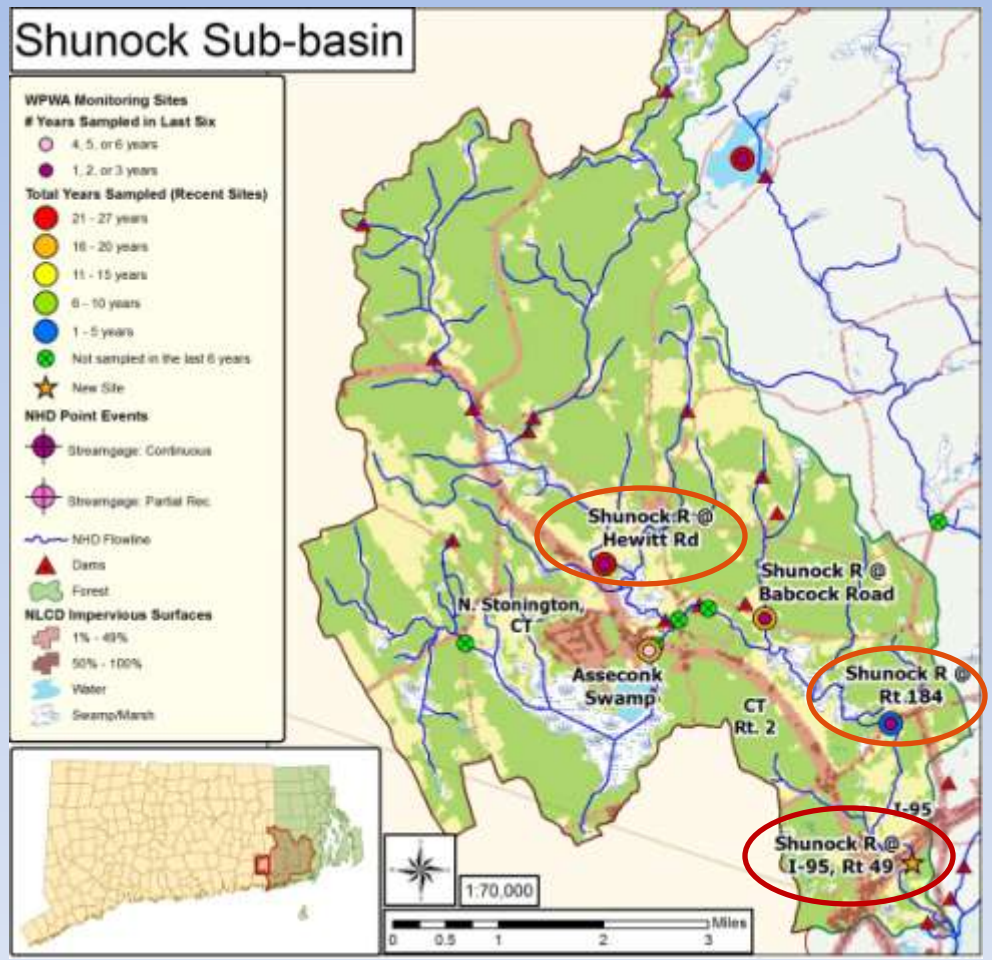
Tier 2 Sites:
Keep if $$ Allows

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 (or should there be) a reference site in each sub-basin?
- 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

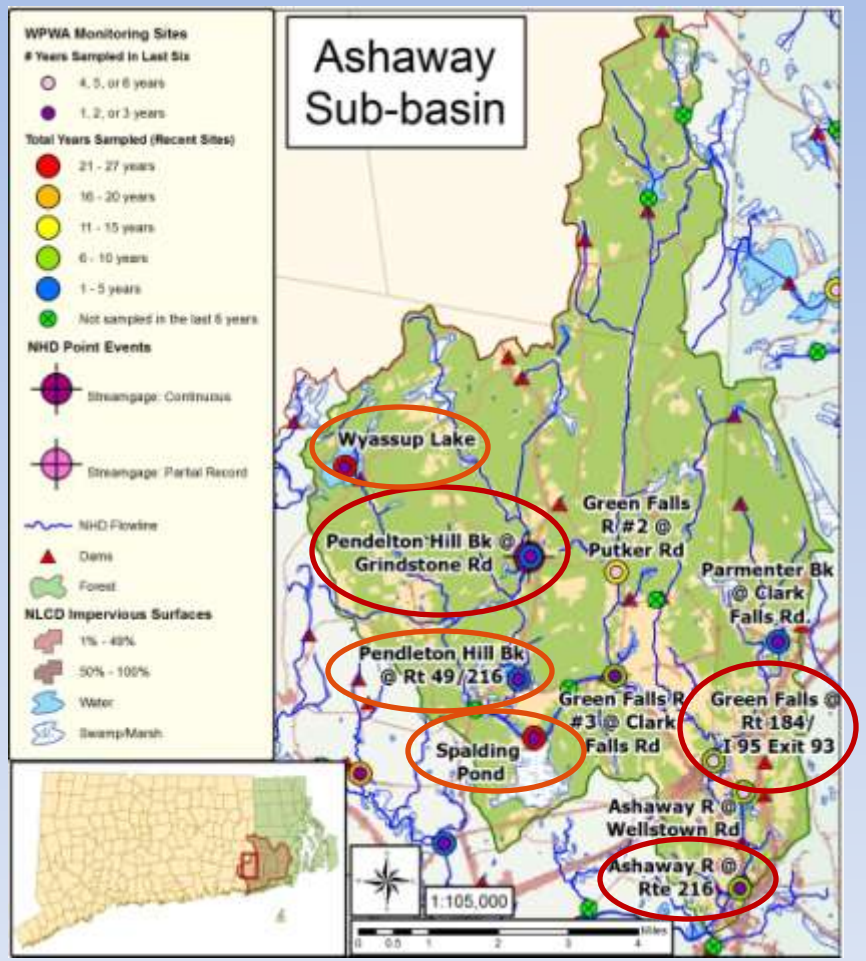



- Entirely in CT
- 10,591 acres
- Largely undeveloped
  2.5% IC, 61.4% FC
- Booth model: stable
- NO active sites
- 4 recent sites (NSCLA supported)

Recommend:

- One new tier 1 site near bottom of basin below I-95
- Two tier 2 sites (orange)

# Ashaway River Sub-basin

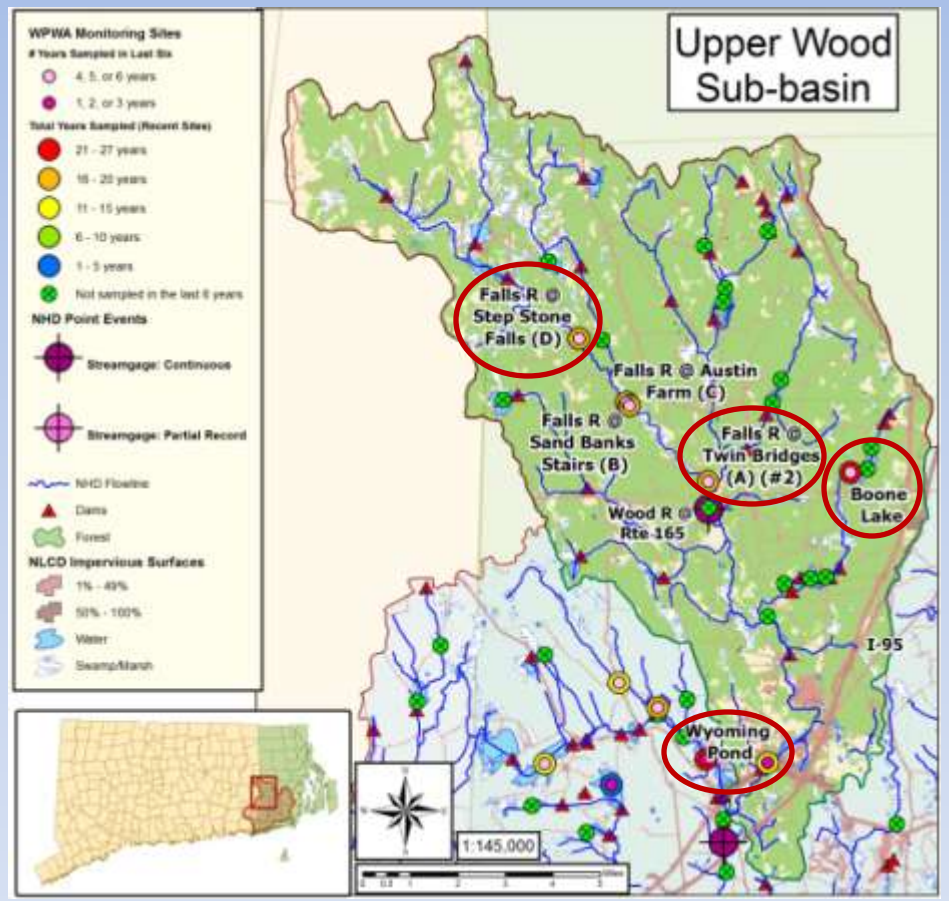



- Mostly in CT
- 17,832 acres
- Least developed sub-basin
  1.5% IC, 67.6% FC
- Booth model: stable
- 5 active sites
- 5 recent sites

Recommend:

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

# Upper Wood River Sub-basin



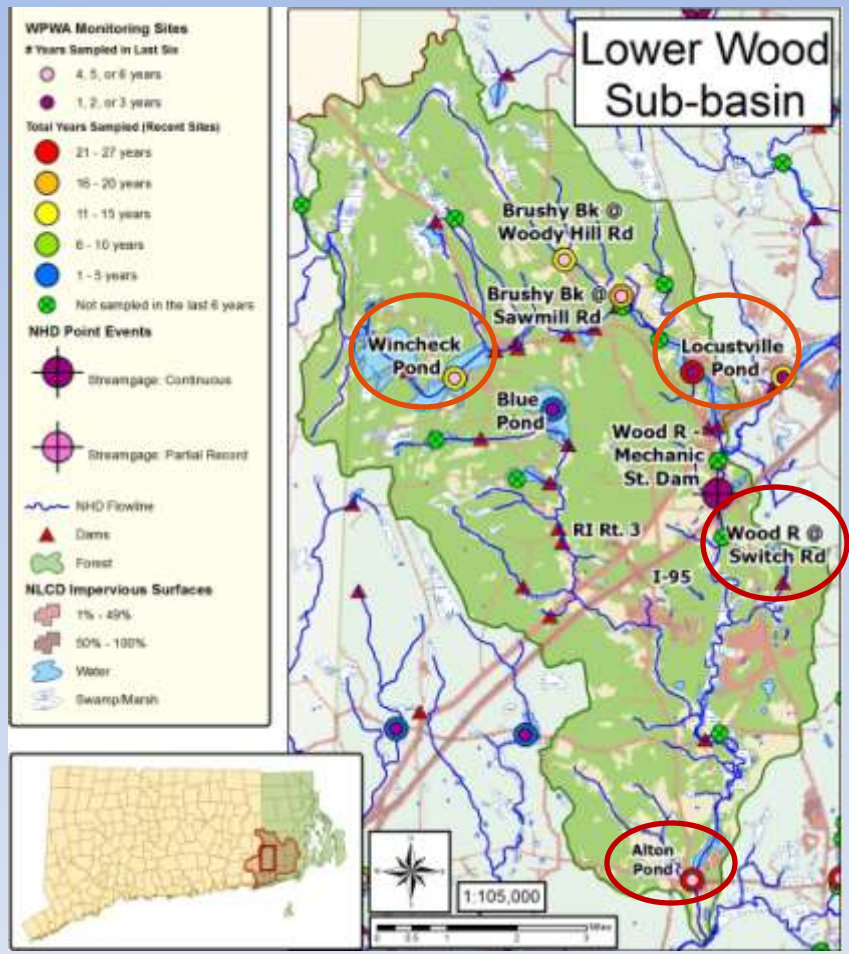

- Mostly in RI, largest sub-basin
- 39,073 acres
- Largely undeveloped
  2.0% IC, 70.2% (highest) FC
- Booth model: stable
- 5 active sites
- 1 recent site

Recommend:

- Four tier 1 sites: upstream, near stream gage, in lake, near bottom of basin in highly impacted pond
- No tier 2 sites

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

# Lower Wood River Sub-basin

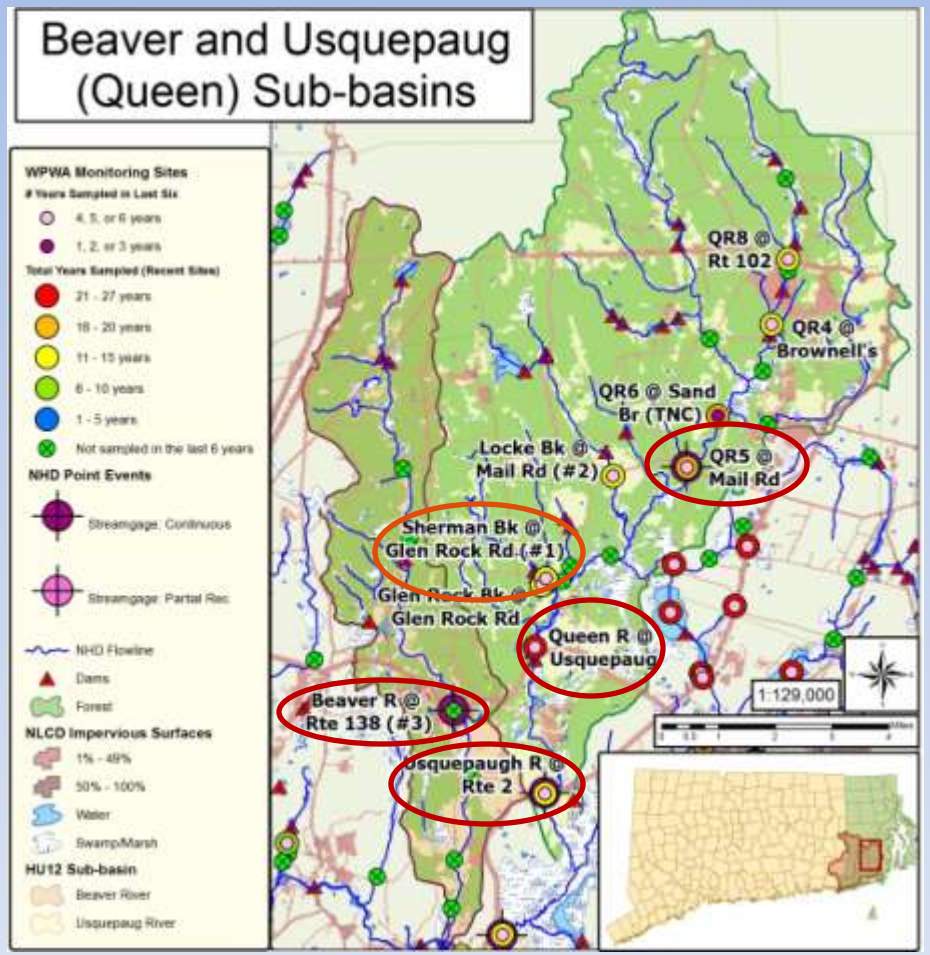



- Mostly in RI
- 18,309 acres
- Largely undeveloped
  2.2% IC, 65.5% FC
- Booth model: stable
- 5 active sites
- 1 recent site

Recommend:

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

# Beaver and Usquepaug (Queen) River Sub-basins

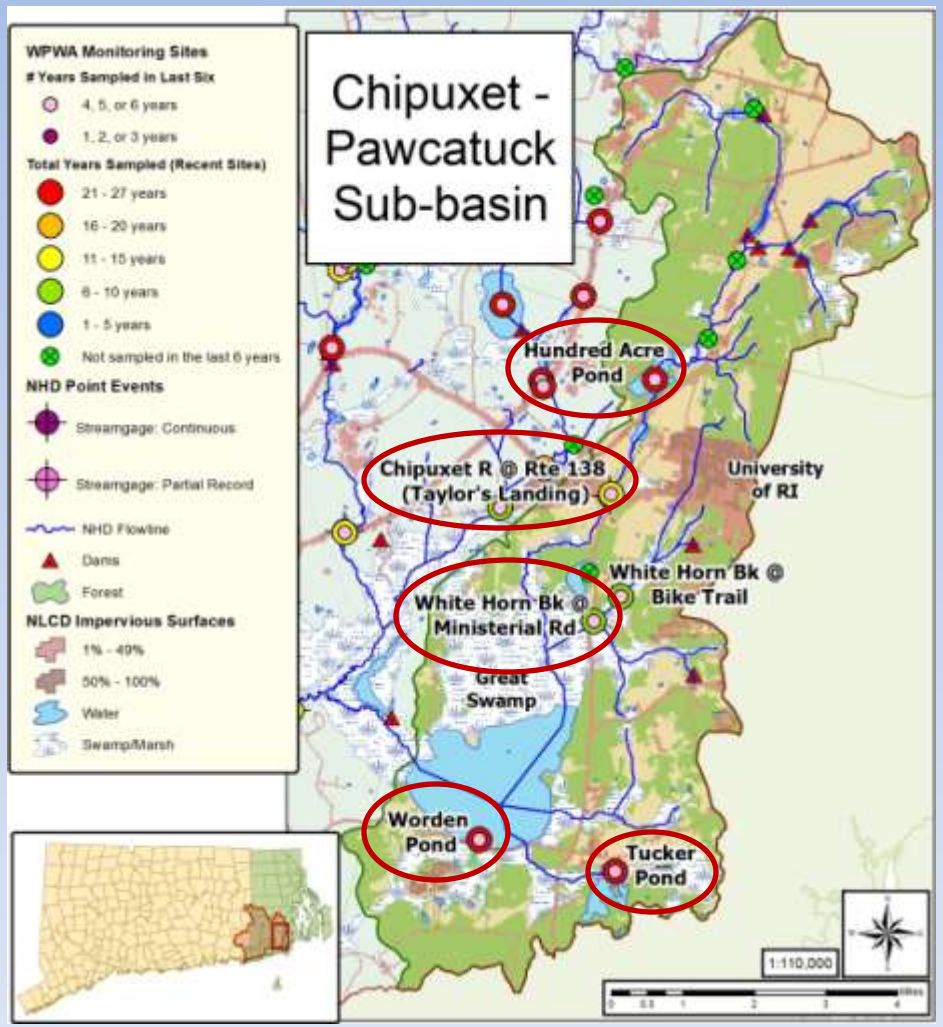



- Beaver R. 7,901 acres – smallest sub-basin
  - 1.8% IC, 66.3% FC
- Queen R. 23,333 acres
  - 1.6% IC, 64.0% FC
- Booth model: stable for both
- BR: NO active or recent sites
- QR: 6 active and 3 recent sites

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
- One tier 2 site

# Chipuxet - Pawcatuck Sub-basin

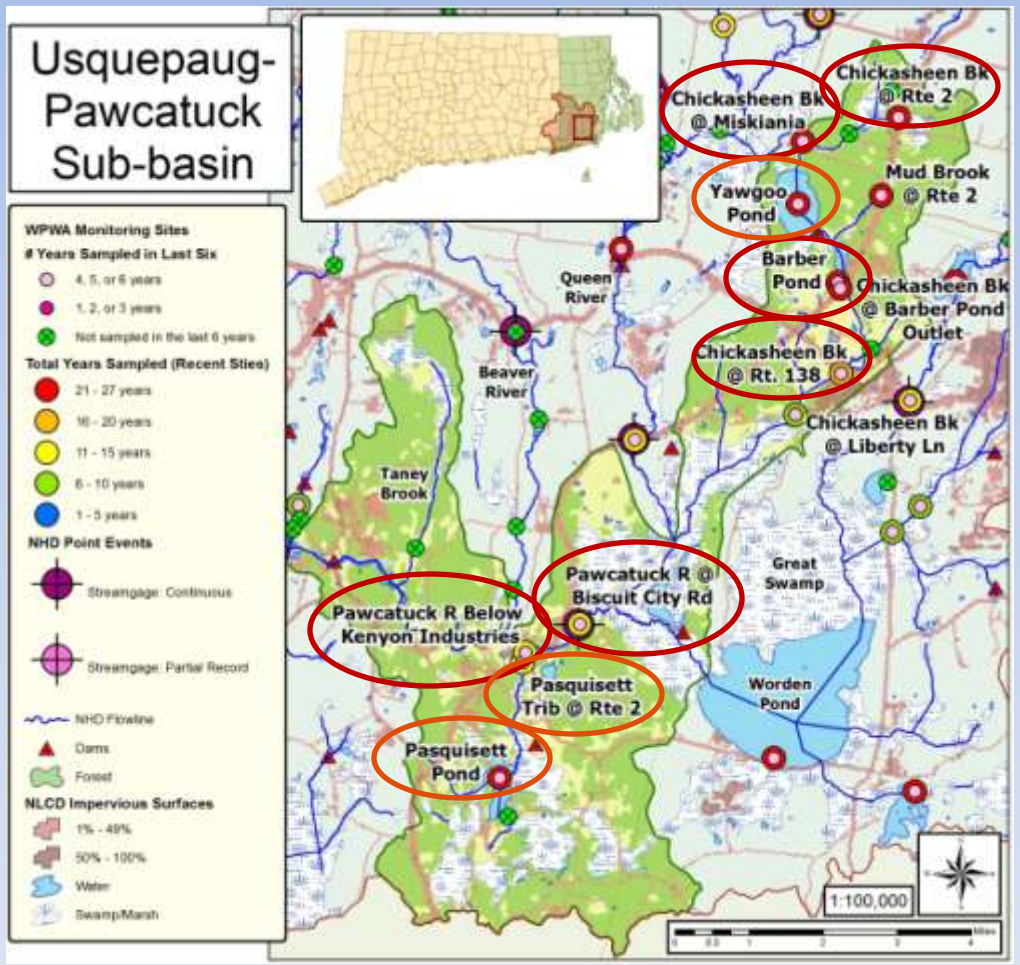



- 16,451 acres
- 4.1% IC (URI), 38.4% FC (Worden Pond, Great Swamp)
- Booth model: unstable
- 5 active sites
- 1 recent site

Recommend:

- Five tier 1 sites: 2 natural ponds, 1 impoundment, 1 river (at stream gage), 1 stream (comes out of URI)
- No tier 2 sites

# Usquepaug (Queen) - Pawcatuck Sub-basin

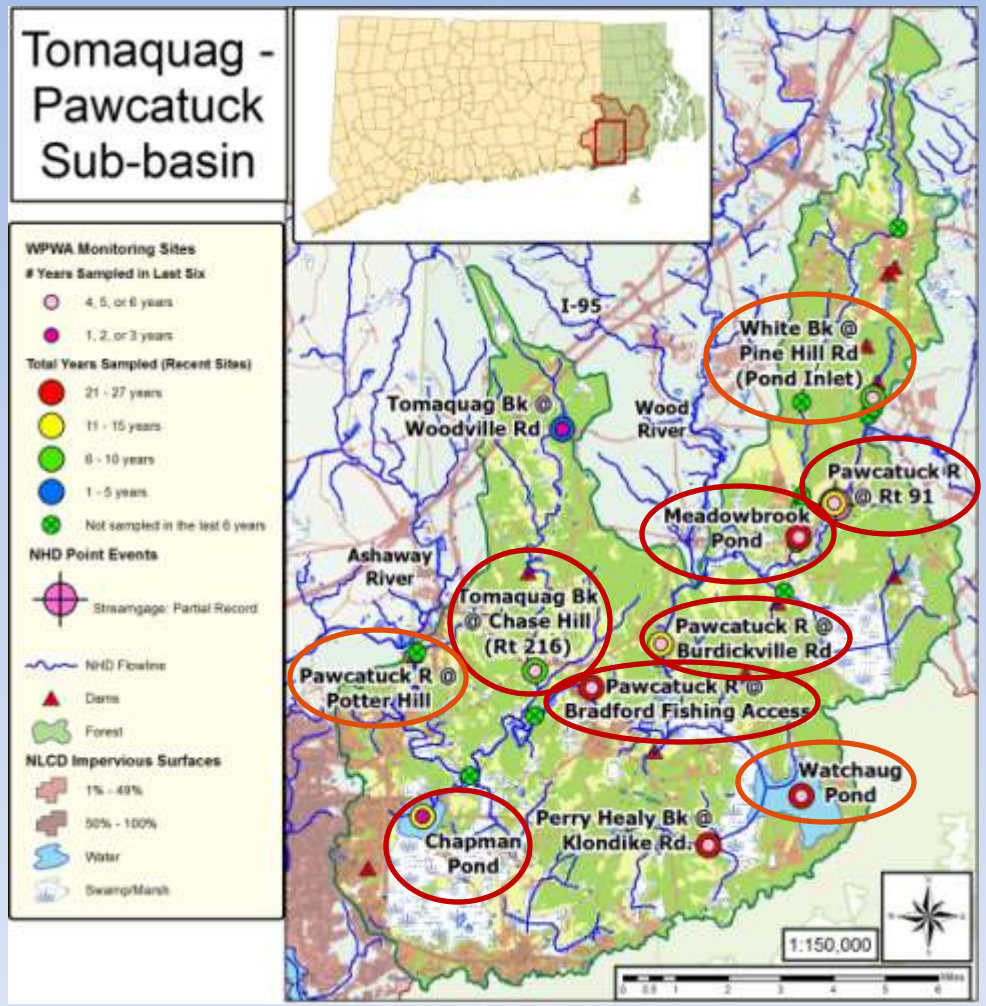



- 13,574 acres
- 3.4% IC, 48.5% FC (turf farms)
- Booth model: uncertain
- 12 active sites

Recommend:

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

# Tomaquag - Pawcatuck Sub-basin

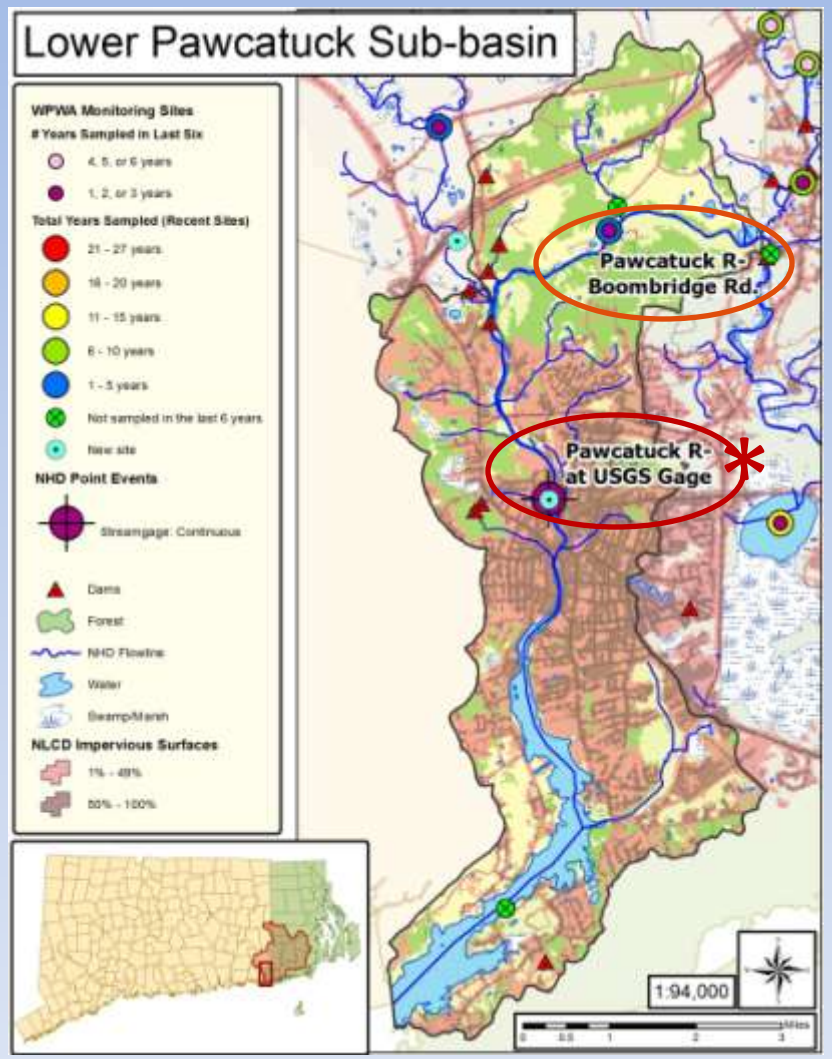



- 36,499 acres
- 4.6% IC, 47.4% FC
- Booth model: borderline uncertain/unstable
- 9 active sites
- 1 recent site

Recommend:

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

# Lower Pawcatuck Sub-basin




- 10,147 acres
- 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—will only sample if USGS stops sampling
- One tier 2 site

Save the Bay samples three sites in the estuary.

# Conclusions

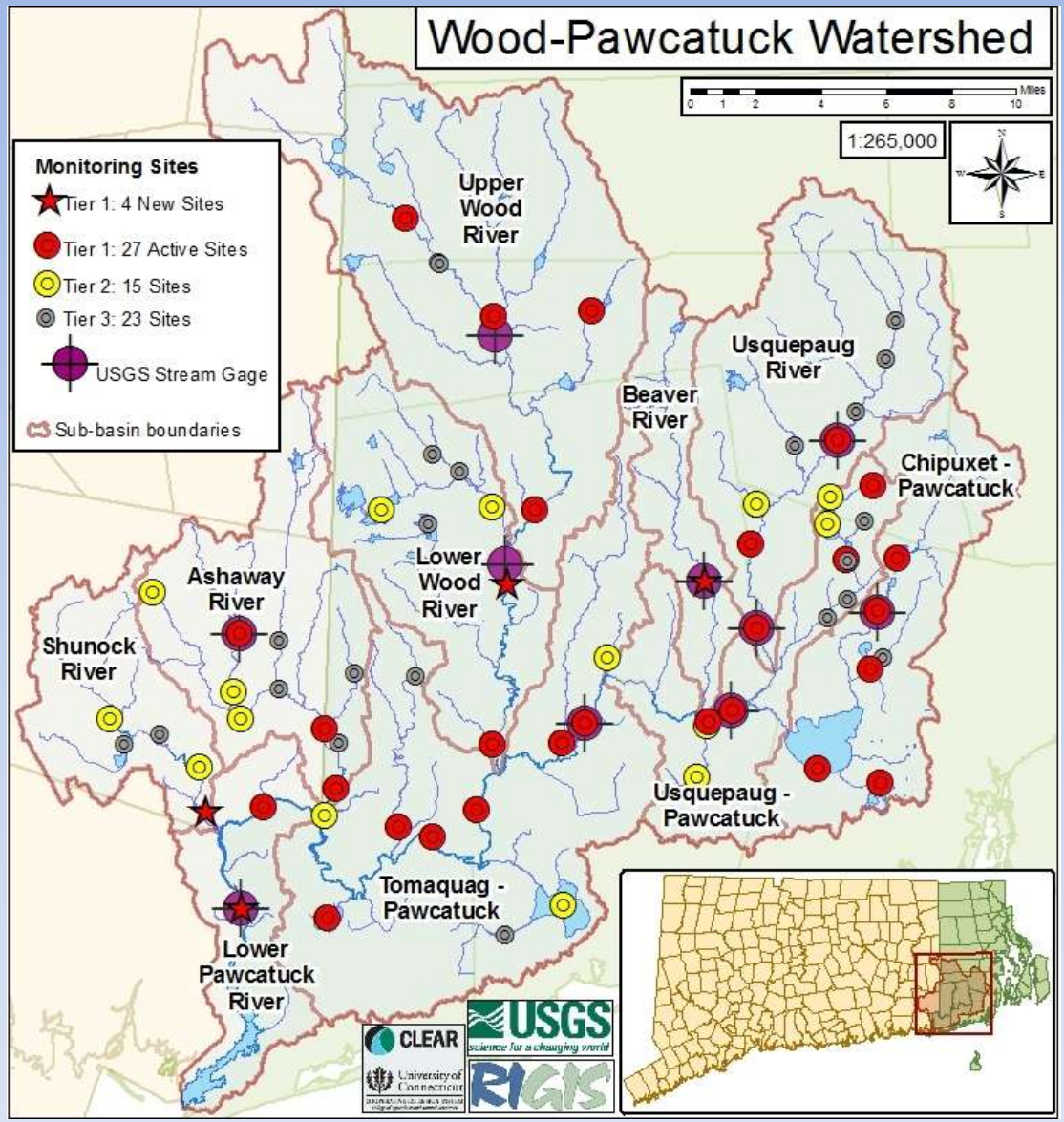
- Overall, spatial coverage has been good!
- Have sites at or near most stream gages
- Reference sites:  hard to place, not predictable—use reference value instead (13 ug/L TP based on our existing data)
- 47 sites in 2014; in 2016, 30 sites in tier one + 15 sites in tier 2 (45 total)
- 23 sites in tier three, but no monitors lost!

# Map of Watershed with Tiers

Tier 1: 31
(27 existing +
2 new +
2 re-activated)

Tier 2: 15

Tier 3: 23



# Stormwater Effects? Conductivity

- Adding continuous conductivity measurement at 10 locations just upstream of major confluences to assess stormwater effects
- Inputs from wastewater, failing septic systems, fertilizer runoff, road salt, or urban stormwater runoff can change conductivity significantly