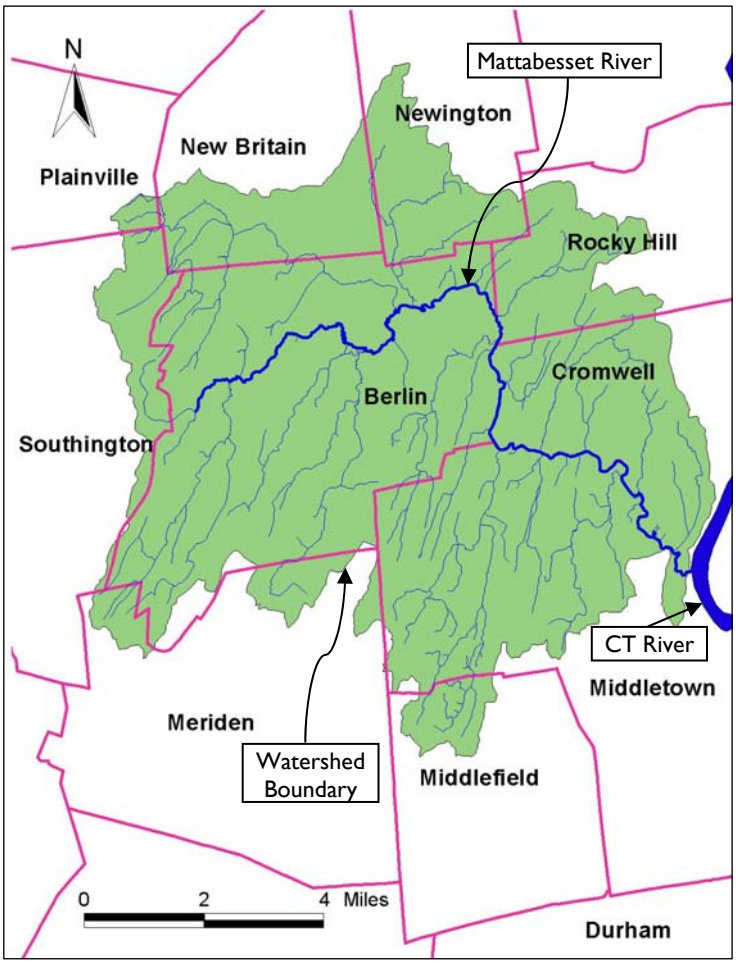
The Mattabesset River Watershed Comparative Subwatershed Analysis: *Developing a Framework for Watershed Restoration in the Mattabesset*

In 2007 the Connecticut River Coastal Conservation District (the District) conducted a Comparative Subwatershed Analysis (CSA) of the Mattabesset River watershed. The CSA is the first step in a new initiative to develop small watershed restoration plans to address water quality impairments in the Mattabesset. The goal of the CSA is to guide future restoration and improvement activities, and support state and local efforts to implement the Mattabesset Total Maximum Daily Load (TMDL) for indicator bacteria.

The Mattabesset River Watershed

The Mattabesset River is a major tributary of the Connecticut River in Central Connecticut. Its watershed includes parts of ten municipalities and encompasses 69.9 square miles (not including the Coginchaug River, which contributes another 39 square miles to the regional Mattabesset River watershed). Six of the ten municipalities have nearly one third or more of their land area within the watershed. The town of Berlin contains the largest portion—97% of its land area and 38% of the total watershed. The Mattabesset River main stem is 16.6 miles long and, all told, there are nearly 165 stream miles in the watershed. Almost 97,000 people live in the watershed (based on 2006 Connecticut population estimates).



In general, the watershed is highly urbanized and suffers from water quality problems related to development, urban runoff and limited riparian buffers. The Mattabesset River and many of its tributaries are on the State list of impaired waters. Water quality impairments are affecting recreation, and habitat for fish, other aquatic life and wildlife. In 2005, a Total Maximum Daily Load (TMDL) analysis for indicator bacteria was completed for the Mattabesset by the Connecticut Department of Environmental Protection. This TMDL establishes quantitative goals for reducing *E.coli* bacteria levels in the watershed's streams.

Why conduct a CSA?

The Connecticut River Coastal Conservation District has been actively engaged in conservation efforts throughout the Mattabesset River watershed for more than 16 years. Since publishing *The Management Plan for the Mattabesset River Watershed* in 2000, and providing critical data for the Mattabesset River TMDL in 2004, the District has focused on improving water quality through restoration. Recognizing that a piecemeal approach would not result in measurable water quality improvements in a watershed as large as the Mattabesset, in 2006 the District began working at a smaller scale, conducting intensive stream walks, or "track down surveys" of tributary streams to locate sources of impairments and develop small watershed restoration plans. The District initiated the CSA project in 2007 to develop a framework for prioritizing and refocusing our assessment and restoration efforts at a more workable subwatershed scale.

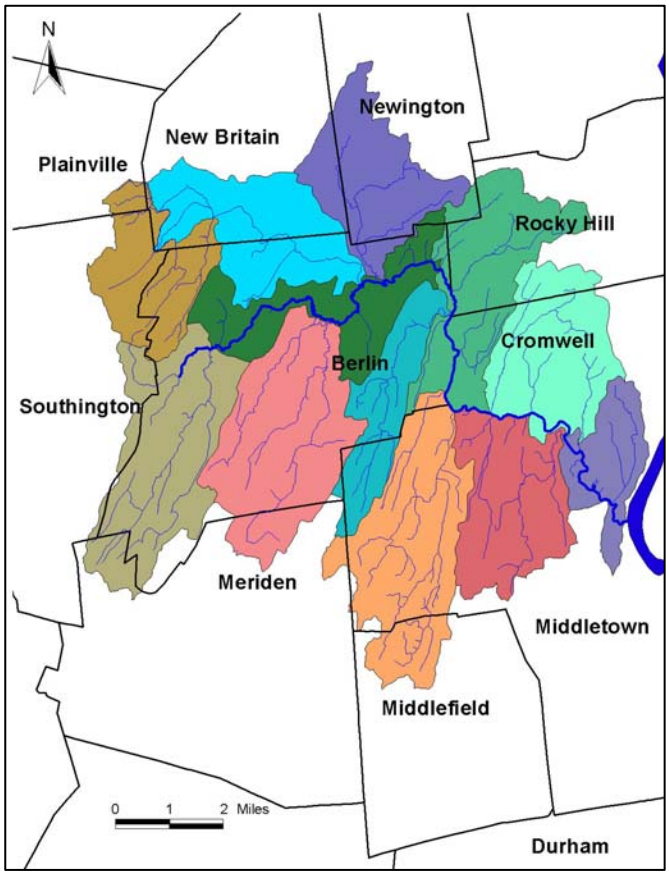
What is a CSA? How does it work?

A CSA is a method for screening multiple smaller subwatersheds within a larger regional watershed to identify those with the greatest restoration potential. This method was developed by the Center for Watershed Protection, and is part of a multi-step restoration planning framework[1]. Once finished, the analysis makes it much easier to target assessment and restoration efforts where they can do the most good. A CSA is primarily a Geographic Information System (GIS) based desktop analysis.

There are **four main steps** involved in performing a CSA.

1. Delineate subwatershed boundaries
2. Develop a watershed GIS
3. Choose a set of restorability metrics
4. Characterize and rank the subwatersheds

1. Delineate subwatershed boundaries: Subwatersheds are small units within the larger regional watershed that are used for making restorability comparisons. They are also called "analysis units," or "AUs." Ideally, an AU is less than 10 square miles in size; has fairly uniform land use; is located mostly within one municipality; and takes into account the boundaries of small stream basins. Twelve subwatersheds were delineated for the Mattabesset, as shown below.



[1] Center for Watershed Protection small watershed restoration methods and manuals can be found on their website at www.cwp.org.

2. Develop a watershed GIS: A crucial first step in performing a CSA is gathering available GIS data for the entire regional watershed. GIS map layers included topography, land use/land cover, roads, sewered/non-sewered areas, surface waters, wetlands, soils, developed land, open space/public land, stream crossings, high resolution digital orthophotos (aerial photographs), and others. These data layers are not only necessary for performing the CSA, they can also be packaged and provided as a resource to municipalities and other watershed stakeholders.

3. Choose a set of restorability metrics: A restorability metric is a measurable, quantifiable characteristic that helps describe the restoration potential of a subwatershed. Some metrics characterize restorability within the stream corridor, others characterize upland conditions. Choosing a group of metrics for a CSA depends partly on practicality (the data for some characteristics are more easily obtained than others), and partly on the unique qualities of the regional watershed. Ultimately, the metrics should reflect opportunities for restoration within each subwatershed.

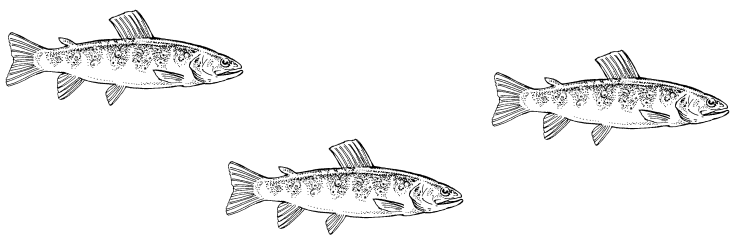
The list of restorability metrics for the Mattabesset CSA was as follows:

- **Impervious Cover** = % of AU (analysis unit) that is impervious cover
- **Open Space** = % of AU that is open space and public land
- **100 Year Floodzone** = % of AU in the 100 year floodzone and floodway
- **Turf/Ag.** = % of AU that is turf/agriculture/barren
- **Wetlands** = % of AU that is wetlands (forested and non-forested)
- **Stream Crossings** = # of stream crossings per square mile of AU
- **Stream Density** = # of miles of stream per square mile of AU
- **Open Space Within Buffer** = % of open space within a 200 ft. wide stream buffer in the AU
- **Turf/Ag. Within Buffer** = % of turf/agriculture/barren within a 200 ft. wide stream buffer in the AU
- **Number of Dams** = # of dams in AU

4. Characterize and rank the subwatersheds: When a list of metrics has been chosen, each individual metric must be weighted relative to the others based on the strength of its relationship to restorability. This process is inherently subjective; however, it is based to the greatest extent possible on an understanding of the conditions within the regional watershed.

The table to the right gives the relative weighting of each of the metrics used for the Mattabesset CSA. Once the metrics are weighted, the subwatersheds are given a score that ranks them relative to each other based on all ten metrics.

Metric	Weighting
Impervious Cover	15
Stream Density	12
Turf/Ag. Within Buffer	12
Open Space	10
Turf/Ag.	10
Open Space Within Buffer	10
Stream Crossings	10
Wetlands	8
100 Year Floodzone	8
Number of Dams	5
Total	100



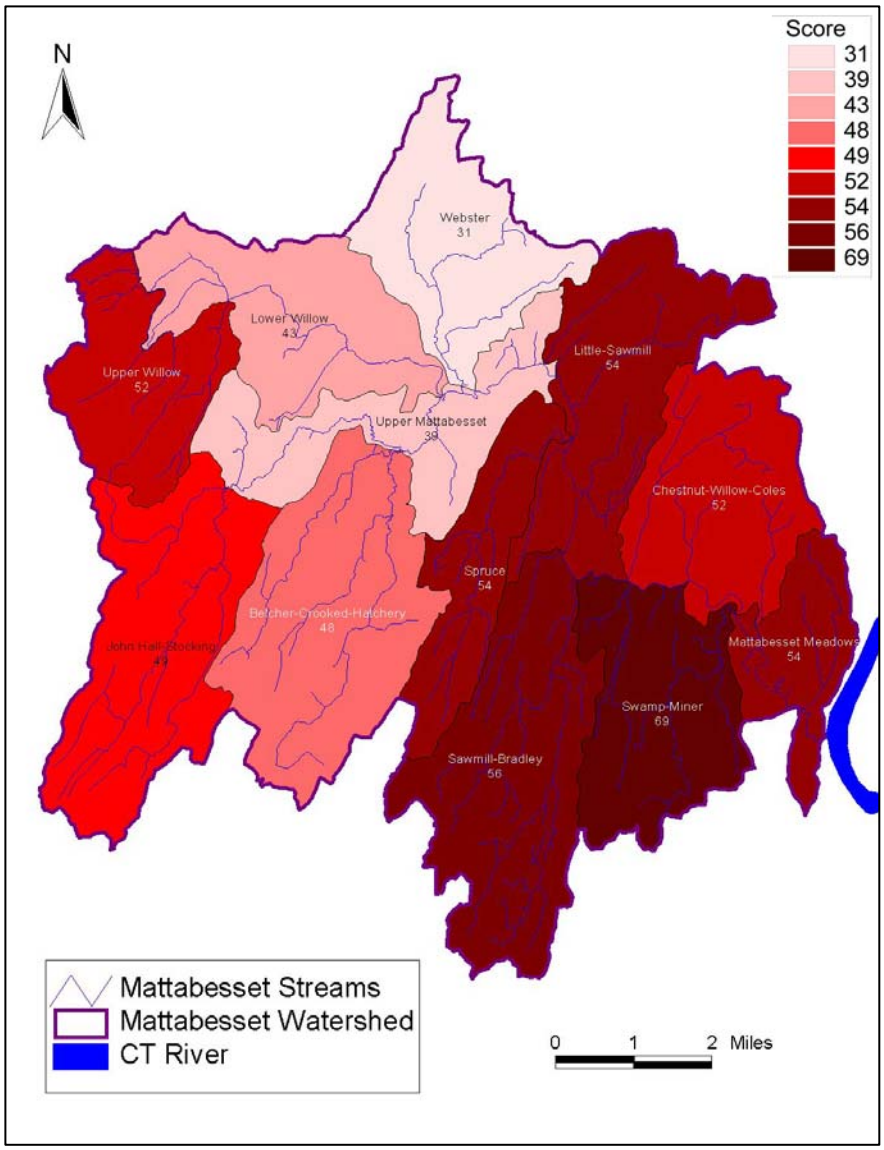
What did we learn from the Mattabesset River Watershed CSA?

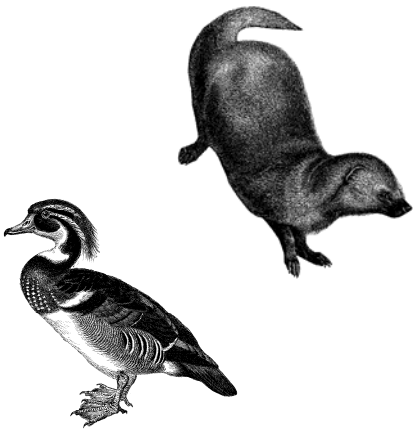
A restorability score for each of the twelve subwatersheds was calculated as a sum of the weighted metrics. These total scores are listed in the chart to the right (totals are out of 100 possible points), and shown on the map below.

Our CSA results indicate that the Swamp–Miner subwatershed stands out as the most promising for restoration work. It is followed by the Sawmill–Bradley subwatershed, and then by five other subwatersheds with fairly close restorability scores. Lowest on the list are the Lower Willow, Upper Mattabesset, and Webster subwatersheds, where impervious cover, which limits restoration opportunities, was a significant factor.

The District plans to use these results to guide and focus future improvement efforts in the Mattabesset River watershed.

Subwatershed (AU)	Restorability Score
Swamp–Miner	69
Sawmill–Bradley	56
Little–Sawmill	54
Mattabesset Meadows	54
Spruce	54
Chestnut–Willow–Coles	52
Upper Willow	52
John Hall–Stocking	49
Belcher–Crooked–Hatchery	48
Lower Willow	43
Upper Mattabesset	39
Webster	31





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