

An interactive, GIS-based application to estimate continuous, unimpacted daily streamflow at ungaged locations in the Connecticut River Basin

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With support from:

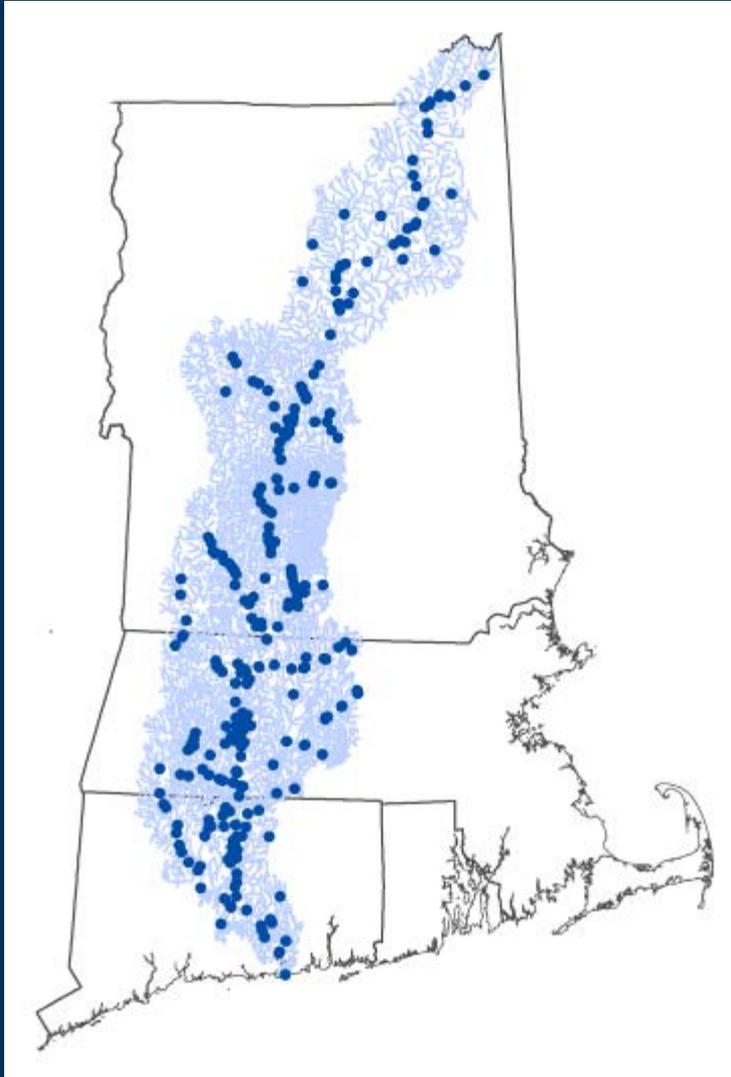


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The Connecticut River looking north in the early evening, from the French King Bridge at the Erving-Gill town line in Western Massachusetts.

Motivations for the study in the Connecticut River Basin



- The Connecticut River watershed contains a number of flood-control and hydropower dams; there has been increased attention on how these dams can be managed to support ecological services
- Daily unregulated streamflow has been estimated for approximately 350 stream locations (*shown at left*) to:
 - Route through reservoir simulation and optimization models that will help to determine how dam operation can be modified to meet ecological services
 - Determine flow prescriptions



Reservoir modeling and optimization being done as a separate (non-RCN) project by:



US Army Corps of Engineers

Objectives

- Develop an **easy-to-use screening-level** tool to estimate continuous unimpacted streamflow at ungaged locations in the Connecticut River basin (excluding the mainstem of the Connecticut River)

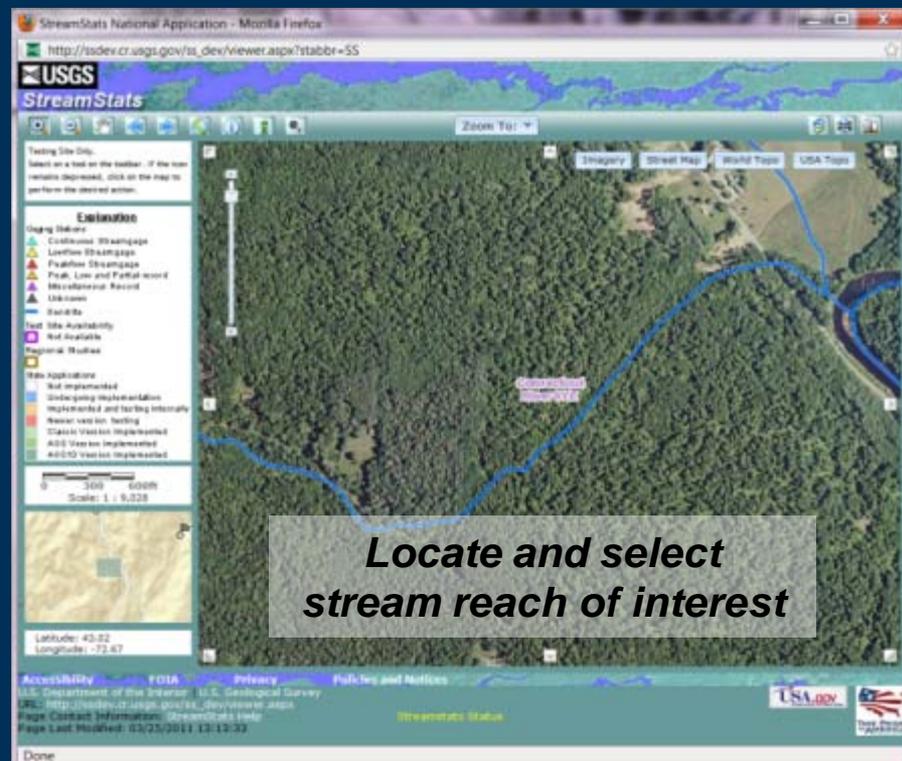
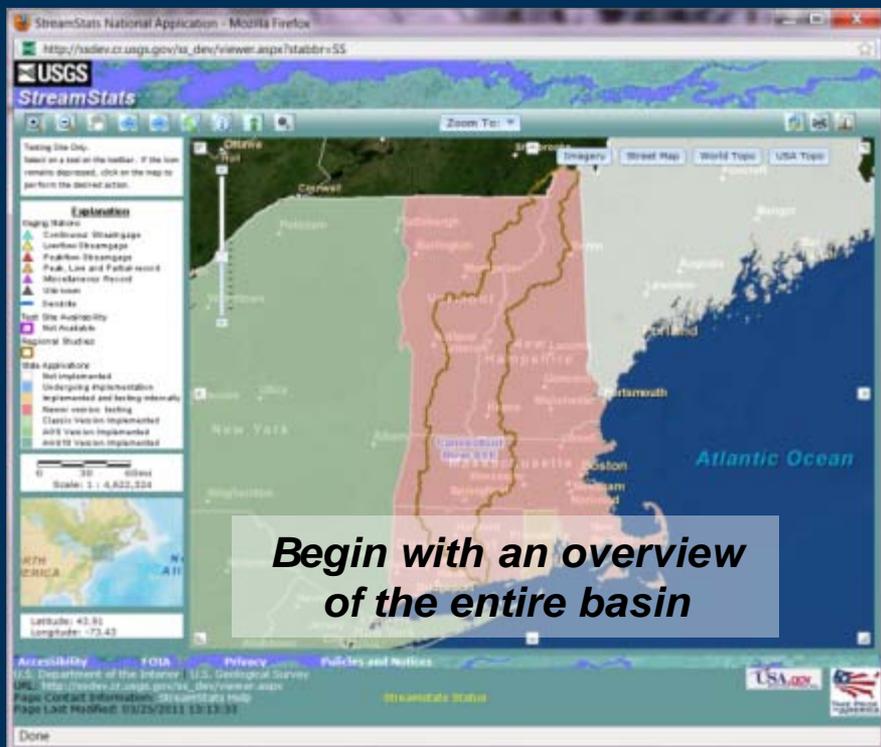
POINT-AND-CLICK GIS USER-
INTERFACE COUPLED WITH
MICROSOFT EXCEL
SPREADSHEET

APPROACH REQUIRES
SIMPLIFYING ASSUMPTIONS AND
FEW PARAMETERS

Leveraging existing methods

- Existing tools to estimate daily, unregulated streamflow in southern New England had already been developed [*Archfield et al.*, 2010 and *Archfield and Vogel*, 2010]
- This RCN grant leveraged these existing methods and tools to provide estimates of daily, unregulated streamflow across the entire Connecticut River Basin

The Connecticut River Basin Unimpacted Flows Tool



The Connecticut River Basin Unimpacted Flows Tool

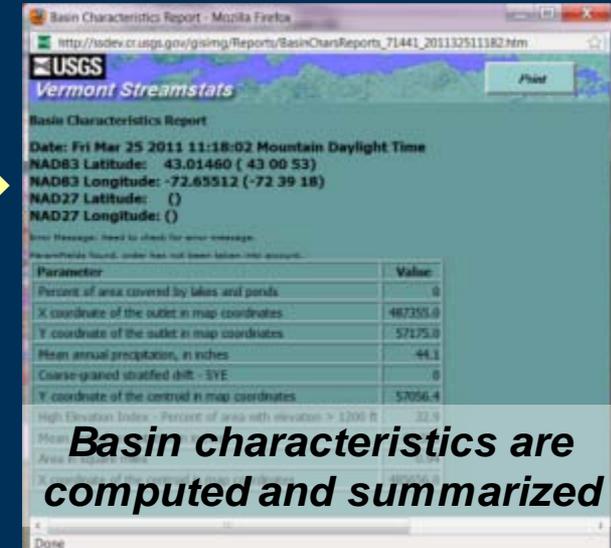


Basin is delineated

The user can export a shapefile of the delineated basin and obtain the basin characteristics needed to calculate daily streamflow

The screenshot shows the StreamStats web application interface. A map displays a delineated basin in red. The interface includes a legend on the left with categories like 'Engage Stations' and 'Data Availability'. A text box at the bottom of the map area contains the text: "The user can export a shapefile of the delineated basin and obtain the basin characteristics needed to calculate daily streamflow".

- Publication of the methods and tool is planned as a journal article
- This tool will be available through a publically-accessible webpage and is currently in beta testing

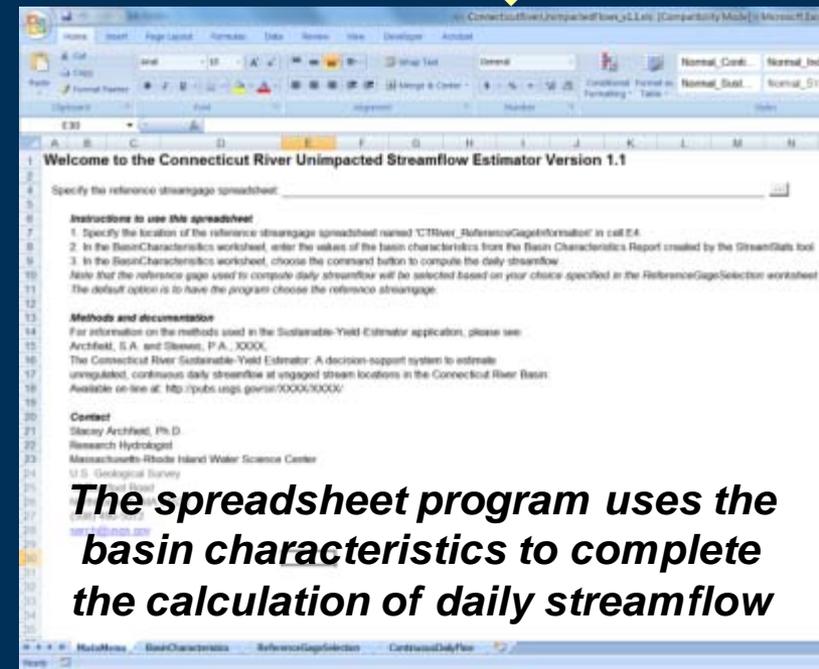


Basin characteristics are computed and summarized

The screenshot shows the Basin Characteristics Report page. It includes a table of parameters and values:

| Parameter | Value |
|---|----------|
| Percent of area covered by lakes and ponds | 0 |
| X coordinate of the outlet in map coordinates | 487355.0 |
| Y coordinate of the outlet in map coordinates | 57175.0 |
| Mean annual precipitation, in inches | 44.1 |
| Coarse-grained stratified drift - SYE | 0 |
| Y coordinate of the centroid in map coordinates | 57056.4 |
| High Elevation Index - Percent of area with elevation > 1200 ft | 32.3 |
| Mean Annual Precipitation | 44.1 |
| Area of the basin in square miles | 100.0 |

A text box at the bottom of the report area contains the text: "Basin characteristics are computed and summarized".



The spreadsheet program uses the basin characteristics to complete the calculation of daily streamflow

The screenshot shows the spreadsheet program interface. The title bar reads "ConnecticutRiverUnimpactedFlow_v1.xls". The spreadsheet content includes instructions for using the spreadsheet and a list of methods and documentation. A text box at the bottom of the spreadsheet area contains the text: "The spreadsheet program uses the basin characteristics to complete the calculation of daily streamflow".