

NWQMC Webinar Series
July 11, 2022

State Use of Volunteer-Collected Data: The CT Volunteer Water Monitoring Program

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CT Volunteer Water Monitoring Program



Stream
Monitoring



Lake
Monitoring



Coastal
Monitoring





Volunteer Water Monitoring In Connecticut

The Riffle Bioassessment by Volunteers (RBV) Program

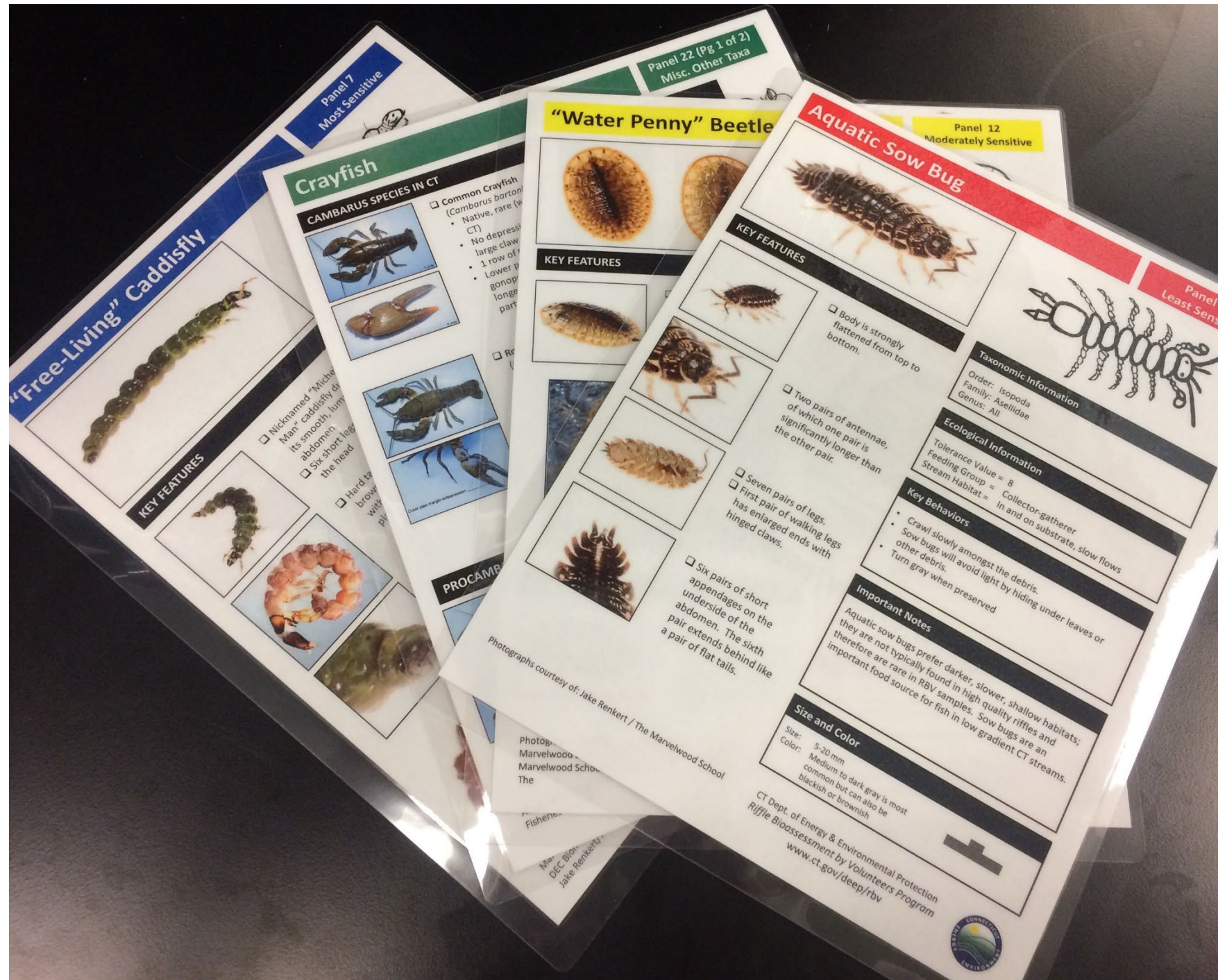


RBV Program Overview



- 1. Collect**
macroinvertebrates
using a kicknet
- 2. Pick** the organisms out
of the sample
- 3. Sort** organisms into
similar looking groups
- 4. Field identify**
organisms
- 5. Prepare a voucher**
specimen
- 6. Submit samples** to
DEEP
- 7. Taxonomic ID** by
laboratory

A Treasure Hunt for CT's CLEANEST Streams



	1	2	3	4	5A	5 B	5 C
MOST WANTED (Most Sensitive to Pollution)	"Body-Builder" Mayfly <i>Drunella</i> sp.	Brush-Legged Mayfly <i>Isonychia</i> sp.	2-Tail Flathead Mayfly <i>Epeorus</i> sp.	Roach-Like Stonefly Peltoperlidae	Common Stonefly Perlidae	Giant Stonefly <i>Pteronarcys</i> sp.	Misc. Small Stonefly Plecoptera
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
MOST WANTED (Most Sensitive to Pollution)	6A Saddle-Case Caddis <i>Glossosoma</i> sp.	6 B Cornucopia Case Caddis <i>Apatania</i> sp.	7 Free-Living Caddis <i>Rhyacophila</i> sp.	8A Humplless Caddis <i>Brachycentrus</i> sp.	8 B Plant Case Caddis <i>Lepidostoma</i> sp.	# Most Wanted Types:	Water Quality:
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5+	EXCEPTIONAL: Fully Supporting Aquatic Life Use Goals
						4	EXCELLENT: Likely Supporting Aquatic Life Use Goals
						0-3	NOT DETERMINED: More Info Needed

Join the 'Treasure Hunt' for CT's Healthiest Streams!

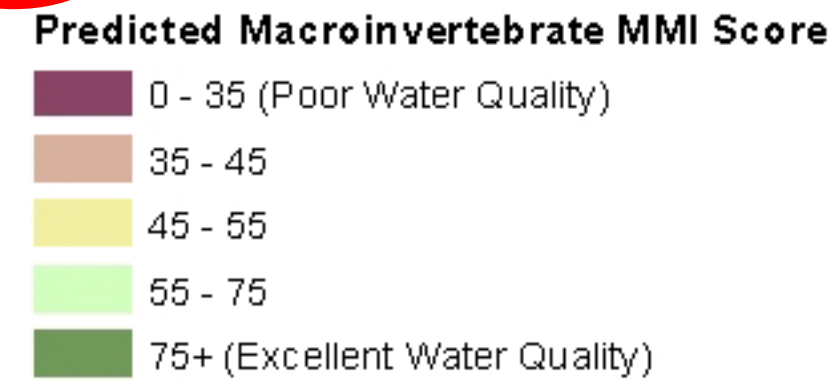
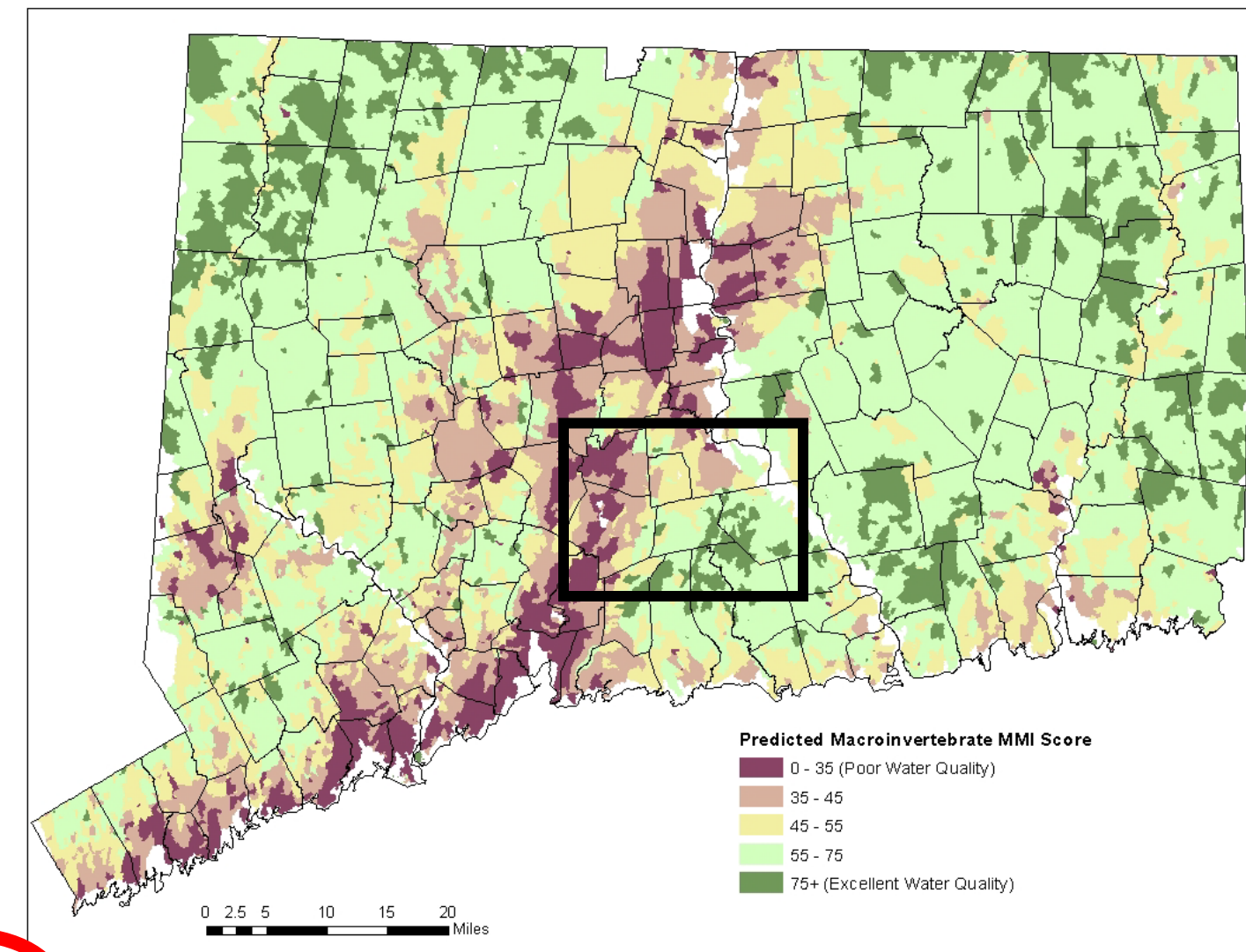
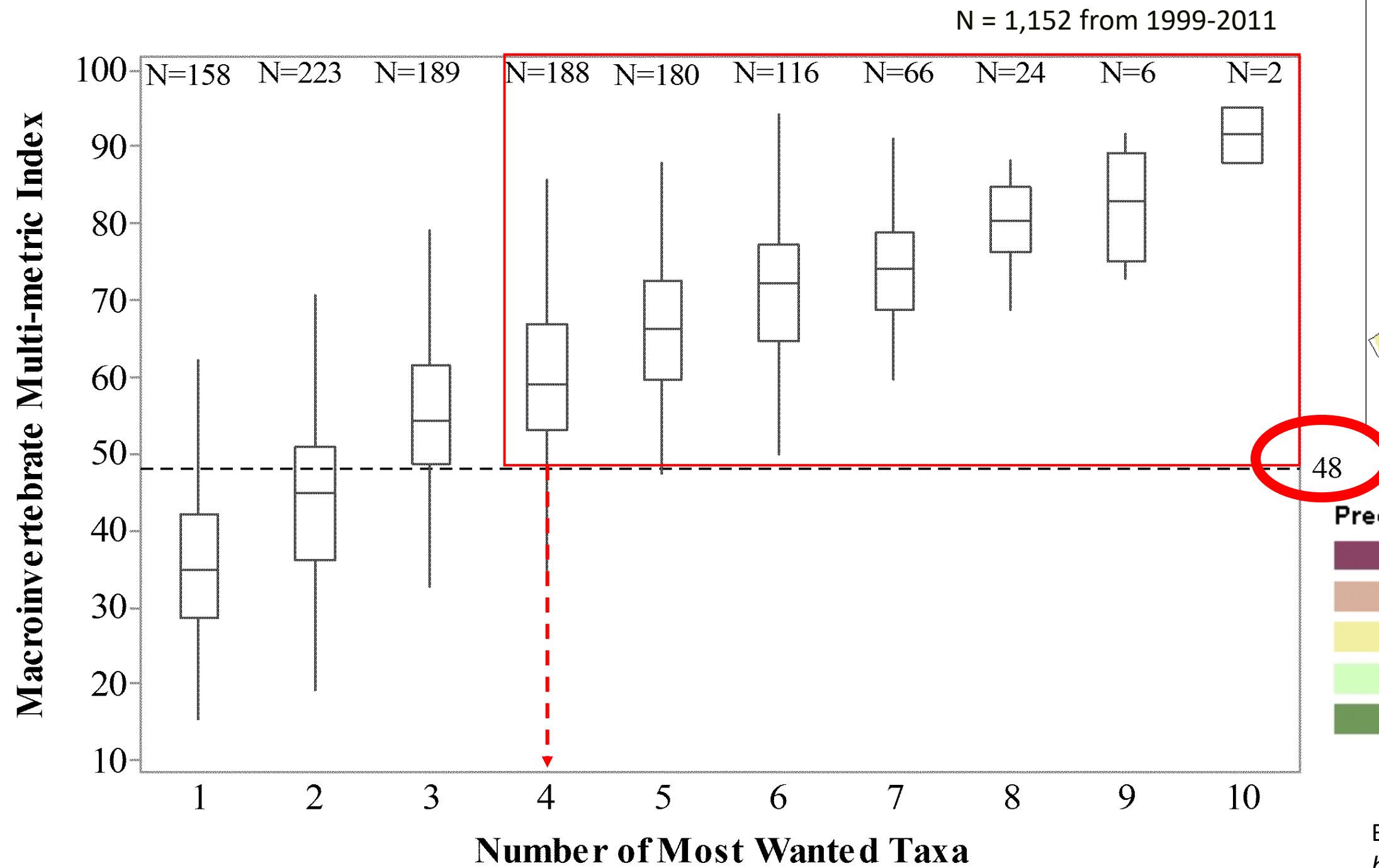
The RBV Program is designed to generate macroinvertebrate-based volunteer water quality monitoring data that can be used to identify small streams with exceptionally high water quality. Suitable sites for the RBV program include streams that:



A riffle section of a stream. DEEP Photograph




- flow year-round except under extreme drought conditions
- Are less than knee-deep
- Are first or second order streams, typically less than 20 feet wide; waterbodies with the name "stream", "brook", "creek" are often suitable candidates
- have shallow, fast flowing, rocky areas (i.e. 'riffles') such as that in the picture above
- have no obvious sources of pollution nearby such as a permitted discharge or listed impairment
- have public access or permission has been granted by the property owner

The RBV “4 or More” Rule



Bellucci, CJ, ME Becker, M Beauchene, L Dunbar. 2013. *Classifying the health of Connecticut streams using benthic macroinvertebrates with implications for water management*. Environmental Management 51:1274.

CT Volunteer Water Monitoring Program Map Series

The Connecticut Department of Energy and Environmental Protection   

Introduction

Rivers: RBV Program

Rivers: VSTeM Network

Lakes: Connecticut Lake Watch

Lakes: bloomWatch Collaborative

Coastal: Unified Waters Study

Riffle Bioassessment by Volunteers (RBV) Program

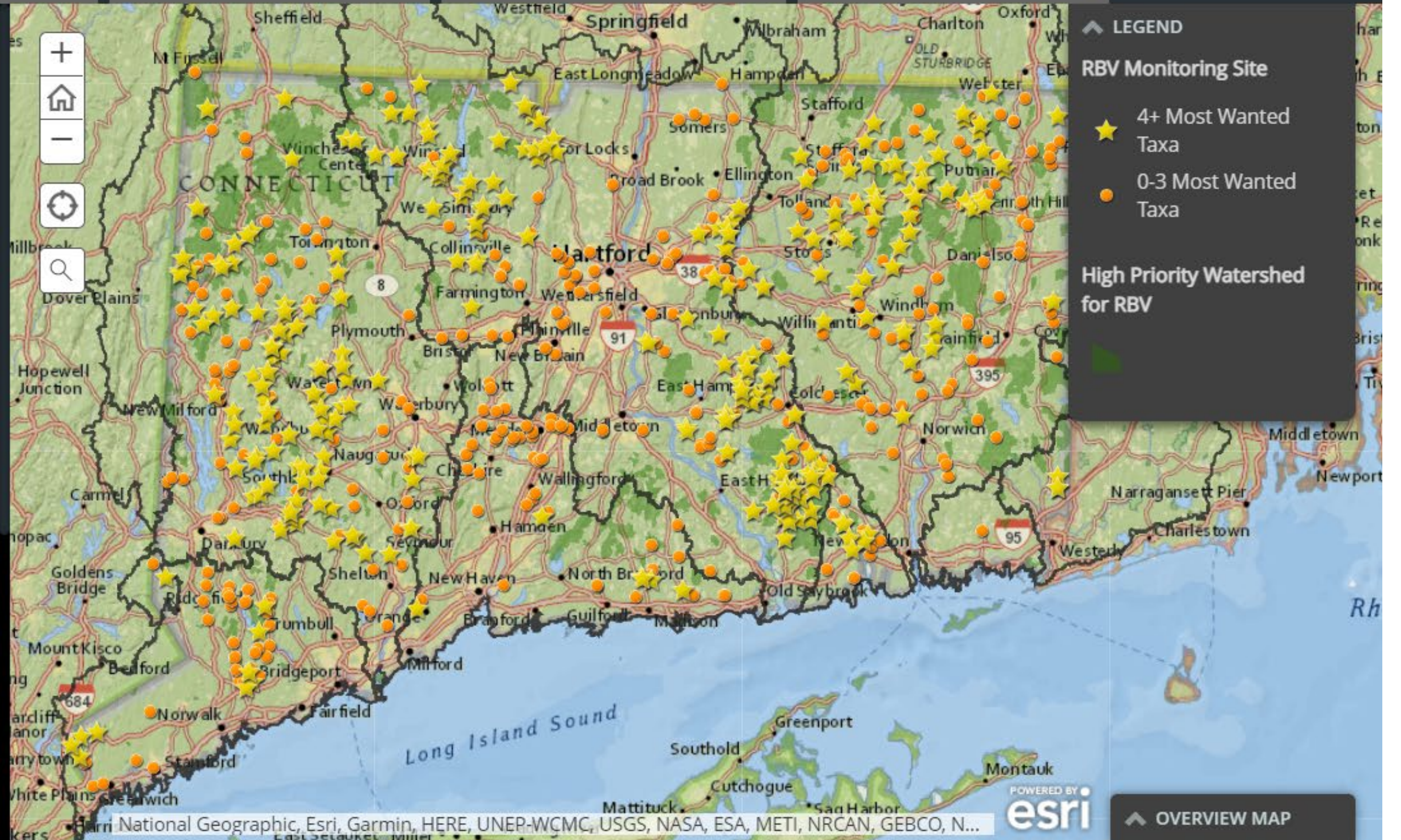
Each fall RBV volunteers participate in a 'treasure hunt' to find Connecticut's healthiest streams. To accomplish this, RBV volunteers are trained to collect macroinvertebrates, or 'river bugs' from their local waterways. To learn more visit <https://portal.ct.gov/DEEP-RBVProgram>



RBV volunteers work to collect a macroinvertebrate sample.

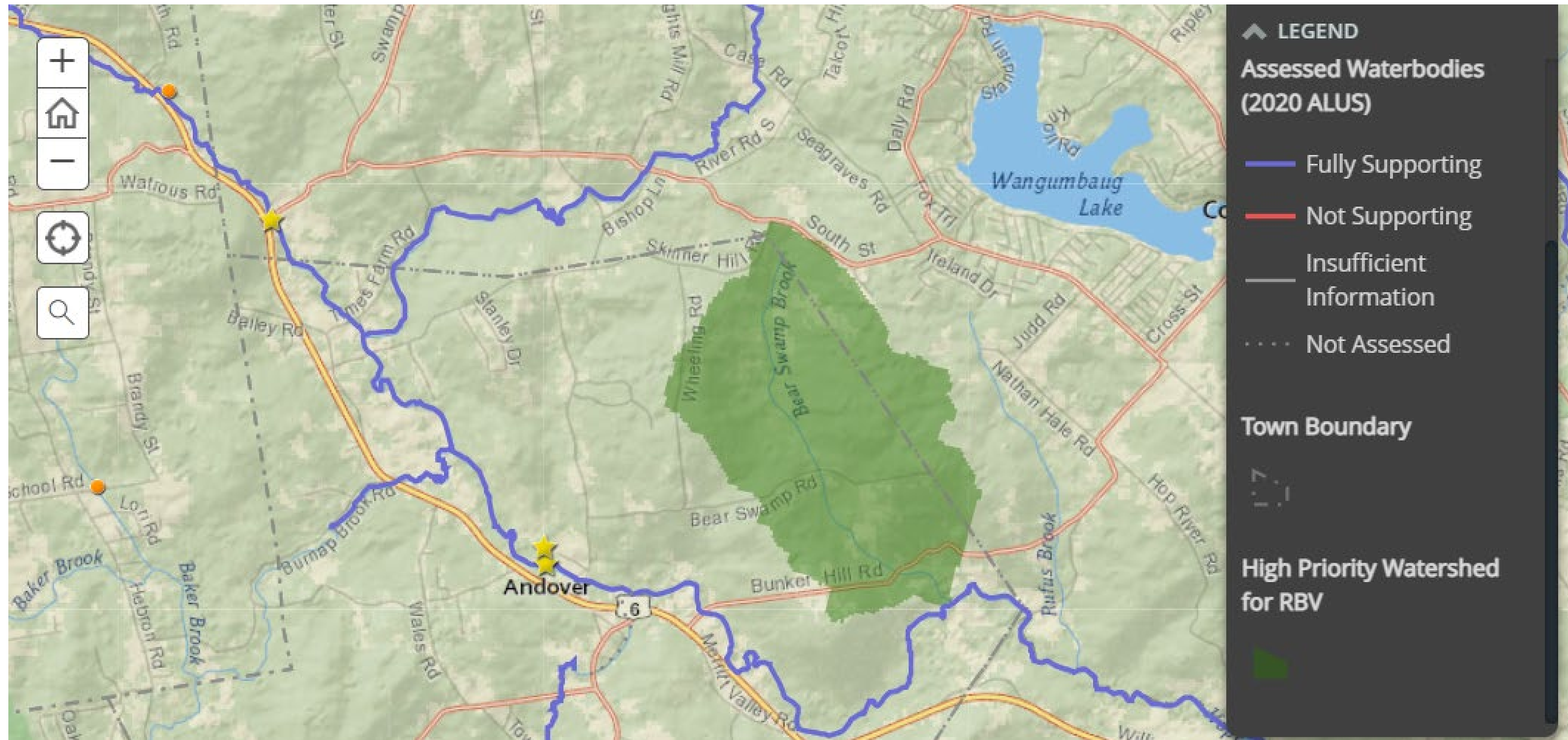
How to Use the Map

RBV sites at which four or more 'most wanted' macroinvertebrate types have been found are depicted as a yellow star; these are now confirmed healthy waters. All other past sites are shown as orange circles. Click on a star or circle to learn more about the location, when it was monitored, and what the results were. Zoom



CT Volunteer Water Monitoring Program Map Series

Monitoring Guidance



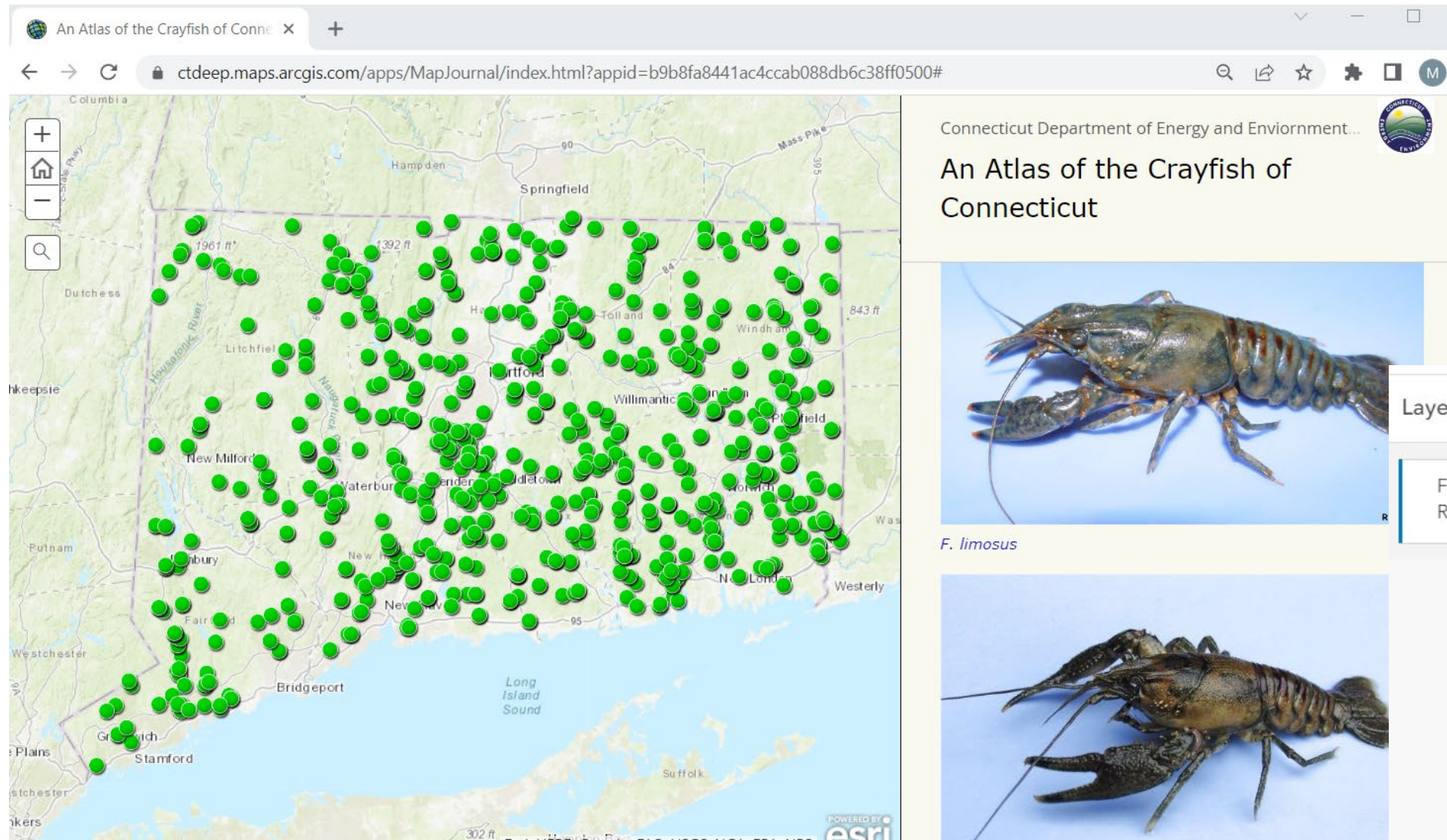
Watershed Health Prediction Reference: Bellucci, CJ, ME Becker, M Beauchene, L Dunbar. 2013. *Classifying the health of Connecticut streams using benthic macroinvertebrates with implications for water management*. Environmental Management 51:1274.

Data Management and Accessibility

The screenshot displays the 'How's My Waterway?' website interface. At the top, the title 'How's My Waterway?' is prominently displayed with the subtitle 'Informing the conversation about your waters.' Below this, there are three tabs: 'Community' (selected), 'State', and 'National'. The main content area is divided into two columns. The left column features a search bar with the text 'Transylvania Rd, Roxbury, CT, 06783, U' and buttons for '>> Go' and 'Use My Location'. Below the search bar is a map showing a watershed boundary in a dashed black line. The watershed includes several monitoring locations: purple circles with numbers 22, 26, 76, and 78, and yellow squares. The right column shows the selected location 'Transylvania Rd, Roxbury, Connecticut, 06783' and its watershed 'Pomperaug River (011000050903)'. Below this are four tabs: 'Aquatic Life', 'Drinking Water', 'Monitoring' (selected), and 'Identified Issues'. The 'Monitoring' section includes a 'Show Text' toggle and a paragraph of text: 'Water is monitored by state, federal, tribal, and local agencies. Universities, volunteers and others also help detect water quality concerns. Water quality monitoring locations are shown on the map as both purple circles and yellow squares.... [Show more](#)'. A 'DISCLAIMER' button is also visible.

<https://mywaterway.epa.gov/>

Other Uses of RBV Data: Natives



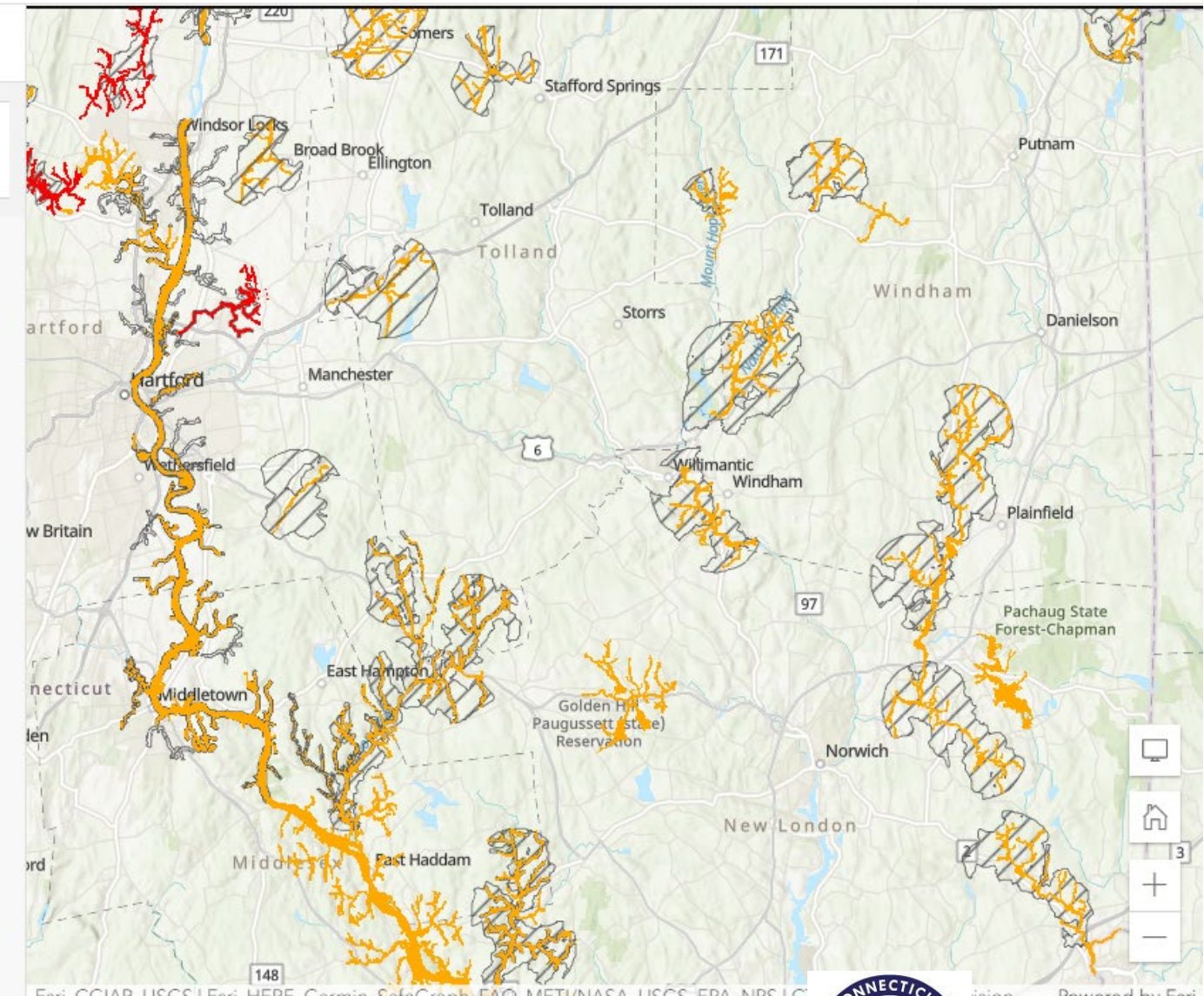
F. limosus



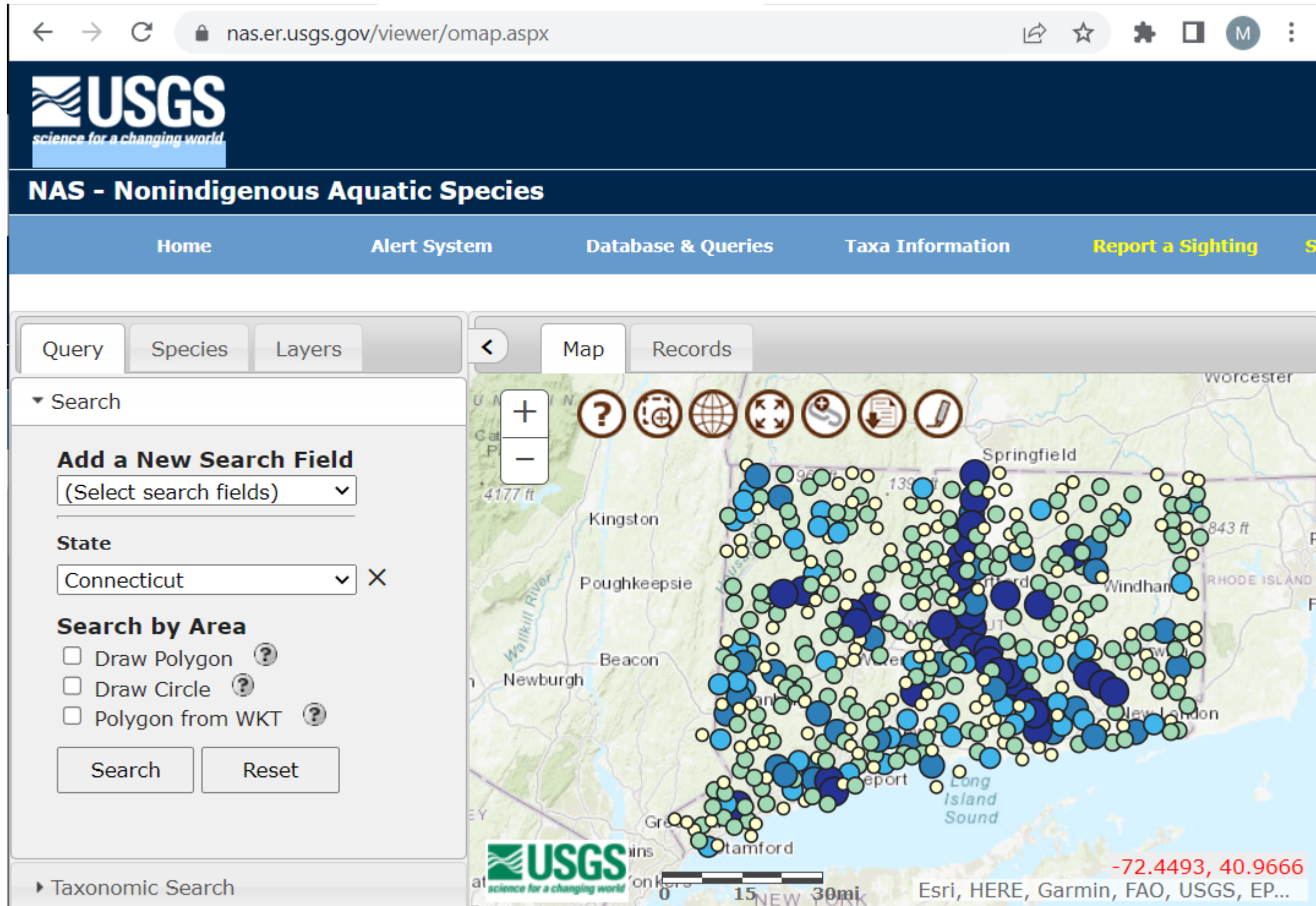
Layers

- Freshwater Mussel Review Area

+ Add layer



Other Uses of RBV Data: Invasives



Map updated Mon Jul 11 2022. Data Disclaimer: Number of records does not imply species abundance. These maps represent collection records only and may not reflect the actual distribution of established populations. Recommended browsers are Firefox, Chrome, IE9 & above. These data are preliminary or provisional and are subject to revision. They are being provided to meet the need for timely best science. The data have not received final approval by the U.S. Geological Survey (USGS) and are provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages



Learn More about RBV

The screenshot shows the top navigation bar with the CT.gov logo, search bar, and accessibility link. The main header features the DEEP logo and the text 'Connecticut Department of Energy and Environmental Protection'. Below this is a breadcrumb trail: 'CT.gov Home / Department of Energy and Environmental Protection / Water / Riffle Bioassessment by Volunteers (RBV) Program'. A left-hand navigation menu lists various water-related topics. The main content area is titled 'Stream Riffle Bioassessment by Volunteers (RBV) Program' and includes a sub-heading 'Community-Science Based Stream Water Quality Monitoring'. It features three images of macroinvertebrates: a stonefly nymph, a caddisfly nymph, and a dragonfly nymph. The text describes the program as a statewide volunteer water quality monitoring initiative coordinated by the DEEP Volunteer Water Monitoring Program. A link to the 'Quality Assurance Project Plan (QAPP) (Revised April 2021)' is provided at the bottom of the main content area.

Report an accessibility issue.

Connecticut's Official State Website

Search Connecticut Government...

Language + Settings

CONNECTICUT ENERGY ENVIRONMENT

Connecticut Department of Energy and Environmental Protection

CT.gov Home / Department of Energy and Environmental Protection / Water / Riffle Bioassessment by Volunteers (RBV) Program

Water Main Page >

Water Resources >

Water Quality >

Water Quantity >

Watershed Management >

Wetlands >

Regulating Water Usage and Water Discharges >

Environmental Protection Begins With You >

Main Menu >

Stream Riffle Bioassessment by Volunteers (RBV) Program

Community-Science Based Stream Water Quality Monitoring

The Stream Riffle Bioassessment by Volunteers program (RBV) is a statewide volunteer water quality monitoring program coordinated by the DEEP [Volunteer Water Monitoring Program](#). Each fall RBV volunteers participate in a 'treasure hunt' to find Connecticut's healthiest streams. To accomplish this, RBV volunteers are trained to collect macroinvertebrates, or 'river bugs' from their local waterways. Depending on the types of macroinvertebrates that volunteers find in a stream, the CT DEEP can assess it as a healthy stream.

The RBV Program [Quality Assurance Project Plan \(QAPP\) \(Revised April 2021\)](#) outlines program

Training Materials

- [Training Event Sign-In Sheet](#)
- [Training Presentation](#)
- [Supplemental Training Presentation: Site Photographs](#)

Field Materials

- [Equipment List](#)
- [Field Instructions](#)
- Data Sheets:
 - [Electronic Data Sheet](#)
 - [Hardcopy Data Sheet](#)
- [Macroinvertebrate Sorting Guide](#)
- [Macroinvertebrate Identification Cards](#)
- [Voucher Labels](#)
- [Scientific Collector's Permit](#) (2019-2021)
- [Freshwater Mussel Field Survey Data Form](#)

<https://portal.ct.gov/DEEP-RBVProgram>



Volunteer Water Monitoring In Connecticut

The CT Volunteer Stream Temperature Monitoring (VSTeM) Network



Background: Connecticut Stream Temperature Classification

North American Journal of Fisheries Management 34:119–131, 2014
 © American Fisheries Society 2014
 ISSN: 0275-9047 print / 1548-8675 online
 DOI: 10.1080/02759047.2013.855280

ARTICLE

Summer Thermal Thresholds of Fish Community Transitions in Connecticut Streams

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Abstract

Thermal tolerances have been studied for individual fish species but few have investigated how stream fish assemblages respond along a temperature gradient and which thermal ranges act as a threshold, triggering discernible community change. The purpose of this study was to define summer temperature thresholds of fish community transitions in Connecticut streams. The program Threshold Indicator Taxa Analysis suggested that the coldwater class had a June–August mean water temperature < 18.29°C, the coolwater class 18.29–21.70°C, and a warmwater class > 21.70°C. Significant indicator species of coldwater streams were Slimy Sculpin *Cottus cognatus* and Brook Trout *Salvelinus fontinalis*. Significant indicator species of warmwater streams were Cutlip Minnow *Exoglossum maxillingua*, Smallmouth Bass *Micropterus dolomieu*, Rock Bass *Ambloplites rupestris*, Brown Bullhead *Ameiurus nebulosus*, Redbreast Sunfish *Lepomis auritus* and Yellow Bullhead *A. nalis*. The narrow 3.41°C temperature range between the coldwater and warmwater thresholds was designated as a coolwater transition zone, with potential for the presence of both coldwater and warmwater species and lack of species uniquely associated with this thermal range. Our approach based on a robust set of water temperature and fish community data should be applicable to other temperate regions and will be useful for informing development of thermal criteria, application of multimetric indices, and planning for anticipated effects of climate change.

Stream temperature is an important environmental variable for aquatic ectotherms. Stream temperature affects survival (Xu et al. 2010), growth (Sloat et al. 2005), spawning timing (Warren et al. 2012), abundance (Merten et al. 2010), and geographic distributions (Buisson et al. 2008) of fish. Thermal requirements and preferences have been studied for many freshwater fishes (Coutant 1977; Carveth et al. 2006; Hartman and Cox 2008; Underwood et al. 2012), and fisheries managers have

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 Received July 2, 2013; accepted October 8, 2013






Thermal Class	Water Temperature (Degrees C)		
	June-August Mean	July Mean	Maximum Daily Mean
Cold	<18.29	<18.45	<22.40
Cool/Transition	18.29-21.70	18.45-22.30	22.40-26.30
Warm	>21.70	>22.30	>26.30



VSTeM: A Treasure Hunt for CT's COLDEST Streams

CT Volunteer Water Monitoring Program Map Series

The Connecticut Department of Energy and Environmental Protection   

- Introduction
- Rivers: RBV Program
- Rivers: VSTeM Network
- Lakes: Connecticut Lake Watch
- Lakes: bloomWATCH Collaborative
- Coastal: Unified Waters Study

Volunteer Stream Temperature Monitoring (VSTeM) Network

Participants in the V-SteM Network are trained to monitoring the water temperature waterbodies in their town or watershed. Using this information CT DEEP can classify the stream as 'cold', 'warm', or 'cool' (transitional) habitat. These data are used to inform the state's [coldwater habitat mapping project](#). To learn more about the VSTeM Network, please visit <https://portal.ct.gov/DEEP-VSTeM>.

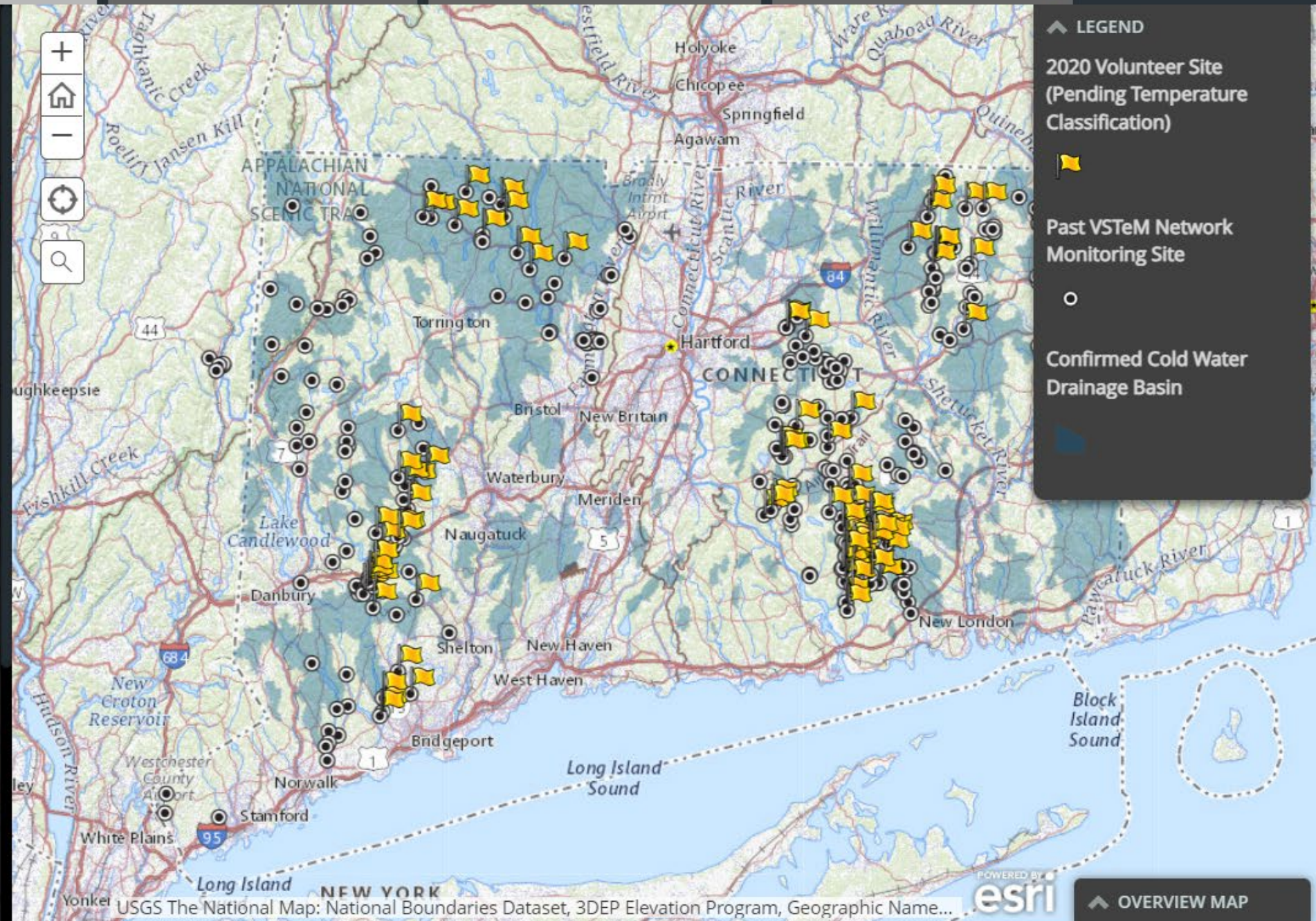


Cobble Brook VSTeM monitoring location.

How to Use the Map

VSTeM monitoring locations are shown as black dots with a halo. (Click on a site to see the location details.) Sites monitored in 2020 are highlighted by yellow flags. Watersheds that have been confirmed either by VSTeM or DEEP data as cold water drainage basins are shaded blue. Zoom in to see additional datasets.

Bright blue dashed lines indicate stream segments that are a priority for VSTeM monitoring. If a blue-dashed segment does not



[CT Volunteer Water Monitoring Program Map Series](#)

Monitoring Guidance



Stream Temperature Predictions: Kanno, Y., Letcher, B.H., Rosner, A.L., O'Neil, K.P. and Nislow, K.H. (2015), Environmental Factors Affecting Brook Trout Occurrence in Headwater Stream Segments. Transactions of the American Fisheries Society, 144: 373-382. <https://doi.org/10.1080/00028487.2014.991446>

VSTeM Network Overview



1. Spring: Deploy loggers
2. Summer: Field check loggers
3. Fall: Retrieve loggers
4. Winter: Download data and evaluate summer thermal metric class
5. Repeat



VOLUNTEER STREAM TEMPERATURE MONITORING (V-STEM) NETWORK



Version 1.2
Last Revised April 2017

VOLUNTEER STREAM TEMPERATURE MONITORING (V-STEM) NETWORK

Quick Reference Field Guide – Sheet 1



LOGGER FIELD DEPLOYMENT & INITIAL DOCUMENTATION

Step 1: Complete top section of field datasheet (Site & Logger Details). Record volunteer group information, site information and logger details. Remember to record the logger serial number! You may need to ask your coordinator for launch information.

Step 2: Secure logger inside the logger housing. First secure the logger inside the PVC pipe with zip ties, then secure the PVC pipe to a heavy weight (metal plate, rail road plate, window weight, etc.) with additional zip ties. Record the materials used in the "Installation Log" section of datasheet (e.g. "Black PVC tubing attached to metal plate").

Step 3: Place the logger setup on the stream bottom. Pick a location that is unlikely to go dry during low flow periods but will not be too deep during normal flow. Avoid highly visible areas when possible.

Step 4: Build a rock pile on top of the logger. Using rocks approximately the size of basketballs, cover the logger to protect it from sunlight, hold it on the stream bottom, and conceal the PVC tube. Note volunteer names, the date and time the logger was put on the stream bottom in the Installation Log section of datasheet.

Step 5: Mark the site with flagging. Use surveyors flagging to mark one or both sides of the stream to help locate the logger in the future. In remote areas you can mark directly next to the rock pile. Use discretion in highly trafficked areas so curious individuals can't easily find the logger – mark on the opposite bank slightly upstream or downstream and note this in the map you draw (step 6).

Step 6. Describe location in detail and sketch a map in the Installation Log section of the datasheet. Describe where the logger is located in the stream relative to easily identified landscape features – this is to help someone who is not out with you find it in the future. It is helpful to include any large rocks, fallen trees or any other unique features (e.g. roads, sheds/houses, rock walls).

Step 7: Take 3 photos – upstream, downstream, logger location. Upstream and downstream photos are taken by standing in the stream next to the logger. Face upstream and capture as much of the stream channel and banks as you can. Turn and face downstream and take a second photo. For the third photo, have someone stand on the bank from which you would enter the stream when first approach. Have them take a photo of you pointing to the logger and, if used, flagging at the site. To remind you, check off each photo taken on the datasheet.

Step 8: Take a field temperature QC reading. Place a waterproof thermometer next to the rock pile, underwater. Count to '10 Mississippi' to allow the values to stabilize. Record the temperature on the datasheet in the "Field Temperature Check" section.

Step 9: Submit your datasheet and photos to your coordinator as soon as possible!



VSTeM Network Field Datasheet (CT DEEP Volunteer Monitoring Program)

Submitted by: eightmileriver
Submitted time: Jul 6, 2022, 10:40:51 AM

Reason for Field Visit

Logger Deployment

Visit Information

dateReturn

05/10/22

timeReturn

12:20

Organization Name

Eightmile Wild & Scenic Coordinating Committee

Name of Field Team Lead

Riley Doherty

Additional Field Team Members

Pat Young

Monitoring Location Information

Stream Name:

Tisdale Brook

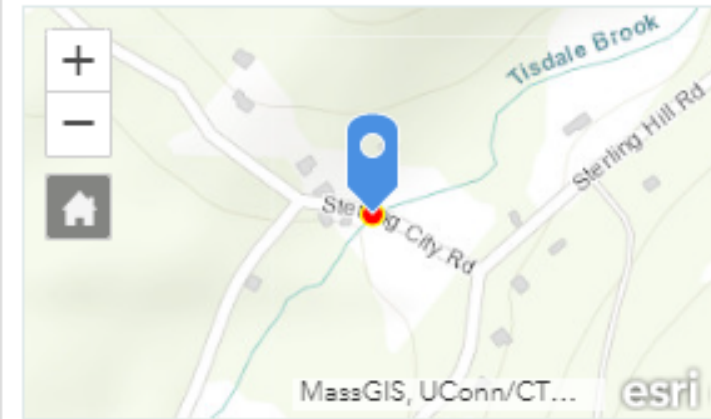
Site Description:

Site Description:

Immediately downstream Sterling City Rd crossing

GPS Coordinates:

Lat: 41.383679 Lon: -72.338427



Logger Details

Logger Type:

HOBO (U-22)

Scheduled Launch Date and Time:

May 29, 2022, 12:00:00 AM

Sampling Interval:

1

Sampling Frequency:

Hour

Deployment Method:

Other

Specify other.

Tethered to wooden post

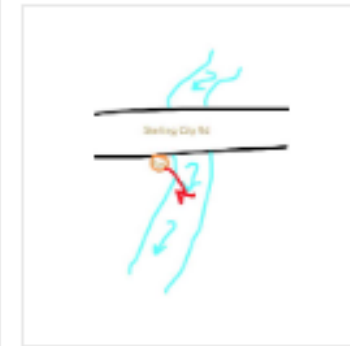
Weight Type:

Railroad Plate

Deployment Location Description Regarding Placement of Probe to Aide in Retrieval:

Located on right side when facing downstream

Site Map- Note Logger Location Relative to Key Landscape Features



siteMap_Drawing-202...

Field Measurements

Flow Level:

Normal Flow

Water Temperature:

14.3

Specific Conductance (Optional):

39.9

Photo Submittal Method

Submit photos via the Survey123 form (*preferred method*)

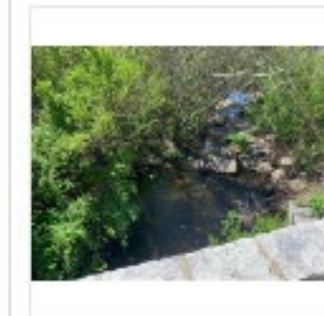
Submitted via Survey123

Upstream Photo



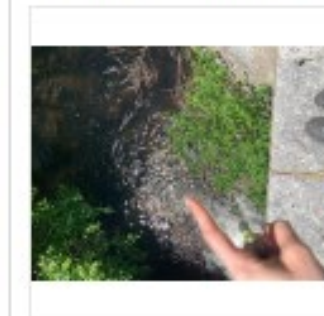
photoUS-20220706-...

Downstream Photo



photoDS-20220706-...

Logger Location Photo



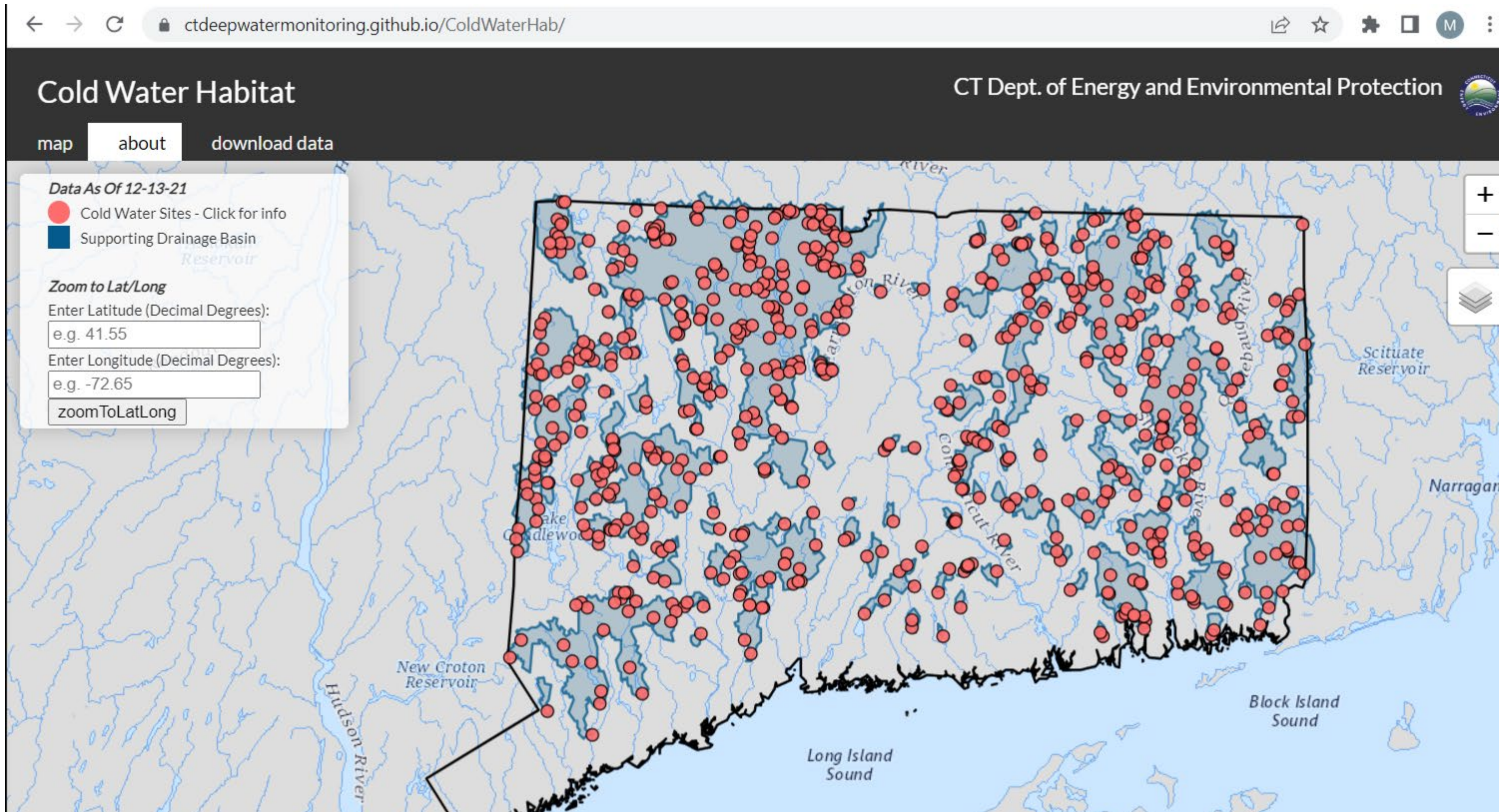
photoLogger-20220...

Data Management & Accessibility

The screenshot displays the SHEDS Stream Temperature Database Public Data Viewer. The interface includes a top navigation bar with 'SHEDS' and 'Stream Temperature Database' labels, a shopping cart icon with '0', and a 'Login' button. A left sidebar contains navigation links for 'Home', 'Public Data Viewer', and 'Contact Us'. The main content area is titled 'Public Data Viewer' and features an 'Instructions' panel. The central 'Station Map' shows a map of the Connecticut region with numerous data points. A legend in the bottom right of the map identifies the points by status: Active (blue), Inactive (green), Planned (orange), Unknown (black), and Selected (red). To the right of the map are two filter panels. The 'Filter by Watershed' panel includes a dropdown menu with the text 'Click Change then select a HUC...' and a 'Change' button. The 'Filter by Timespan' panel includes 'Start Date' and 'End Date' input fields with date pickers, and 'Filter' and 'Clear' buttons.

db.ecosheds.org/viewer

Data Use: Cold Water Habitat Map Project



Data Use: Cold Water Habitat

ctdeepwatermonitoring.github.io/ColdWaterHab/

Cold Water Habitat

map about download data

Data As Of 12-13-21

- Cold Water Sites - Click for info
- Supporting Drainage Basin

Zoom to Lat/Long

Enter Latitude (Decimal Degrees):

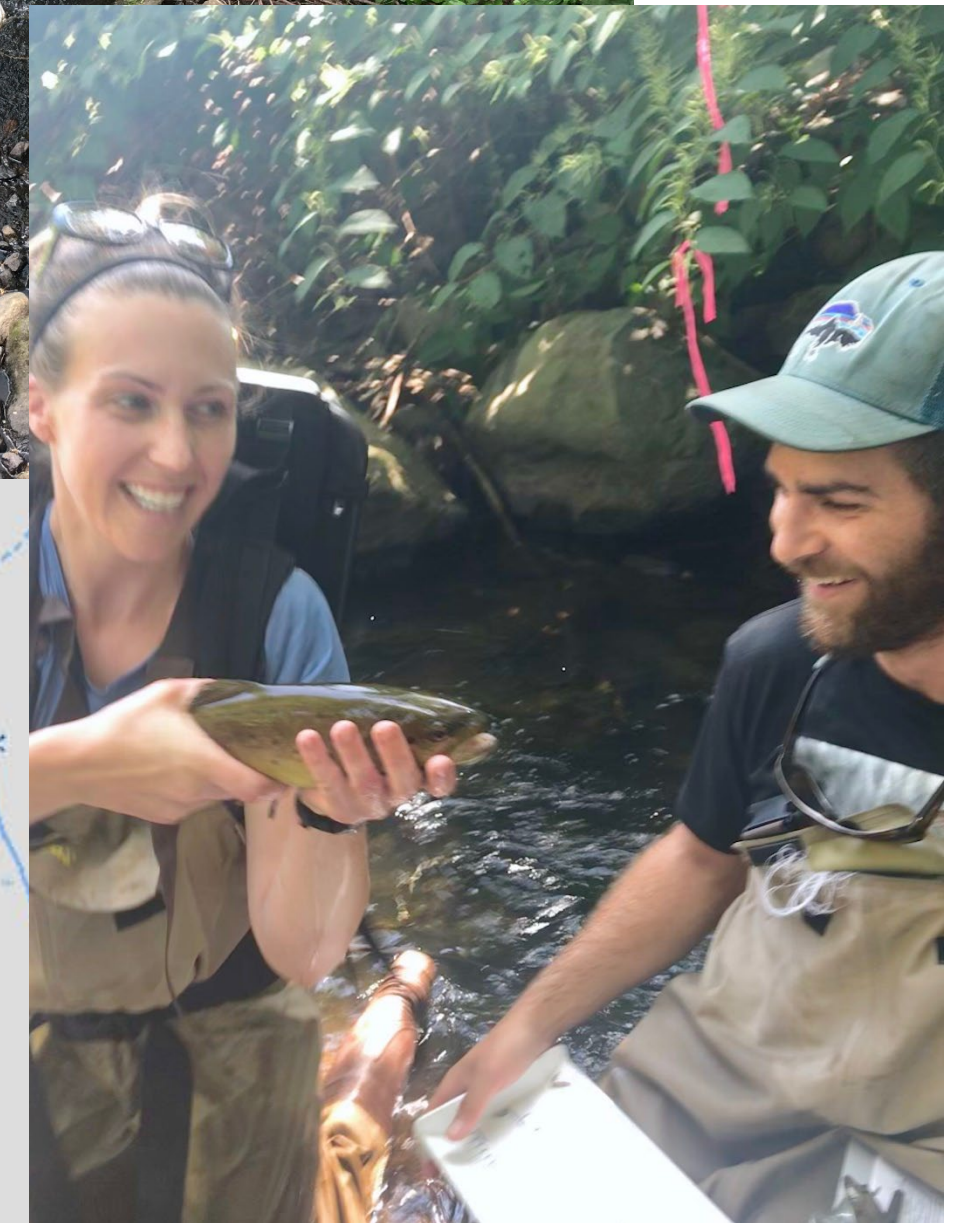
e.g. 41.55

Enter Longitude (Decimal Degrees):

e.g. -72.65

zoomToLatLong

Stream: burnap brook
SID: 17462
Temperature Logger Year Count: 1
Fish Sample Year Count: 1
[Link to Data](#)





Connecticut

Department of Energy and Environmental Protection

CT.gov Home / Department of Energy and Environmental Protection / Water / Volunteer Stream Temperature Monitoring (VSTeM) Network

Water Main Page >

Water Resources >

Water Quality >

Water Quantity >

Watershed Management >

Wetlands >

Regulating Water Usage and Water Discharges >

Environmental Protection Begins With You >

Main Menu >

Search Department of Energy and Environmental Protection

Volunteer Stream Temperature Monitoring (VSTeM) Network

Community-Science Based Water Quality Monitoring

The Volunteer Stream Temperature Monitoring (VSTeM) Network is a statewide volunteer (i.e., 'citizen science' or 'community science') water quality monitoring program coordinated by DEEP as part of the [Volunteer Water Monitoring Program](#). Participants in the V-STeM Network are trained to monitoring the water temperature waterbodies in their town or watershed. Monitoring typically occurs year-round, with the majority of field activity occurring in the Spring (April-May) and fall (September-October).

The [CT Volunteer Water Monitoring Program Online Map Application](#) shows where in Connecticut volunteers have previously collected water quality data, including stream temperature data (select the "Rivers: VSTeM Network" tab). Blue areas indicate watersheds that have been identified as a [cold water supporting drainage basin](#) based upon either stream temperature data or [fish community data](#).

The data collected by VSTeM Network volunteers are used to inform CT DEEP [water quality assessments](#), help develop state water temperature [standards](#), identify [cold water habitat](#), and determine the impact of [nonpoint source pollution](#) mitigation projects.

Program Materials

- [VSTeM Volunteer Handbook](#) 📄
- Appendices:
 - [Site Photograph Documentation Instructions](#) 📄
 - [How To Conduct Temperature QC Checks](#) 📄
 - [How to Calculate Summer Temperature Metrics](#) 📄

Field Materials

- [Quick Reference Field Guide](#) 📄
- Data Sheets:
 - [Electronic Field Data Sheet](#)
 - [Hardcopy Field Data Sheet](#) 📄

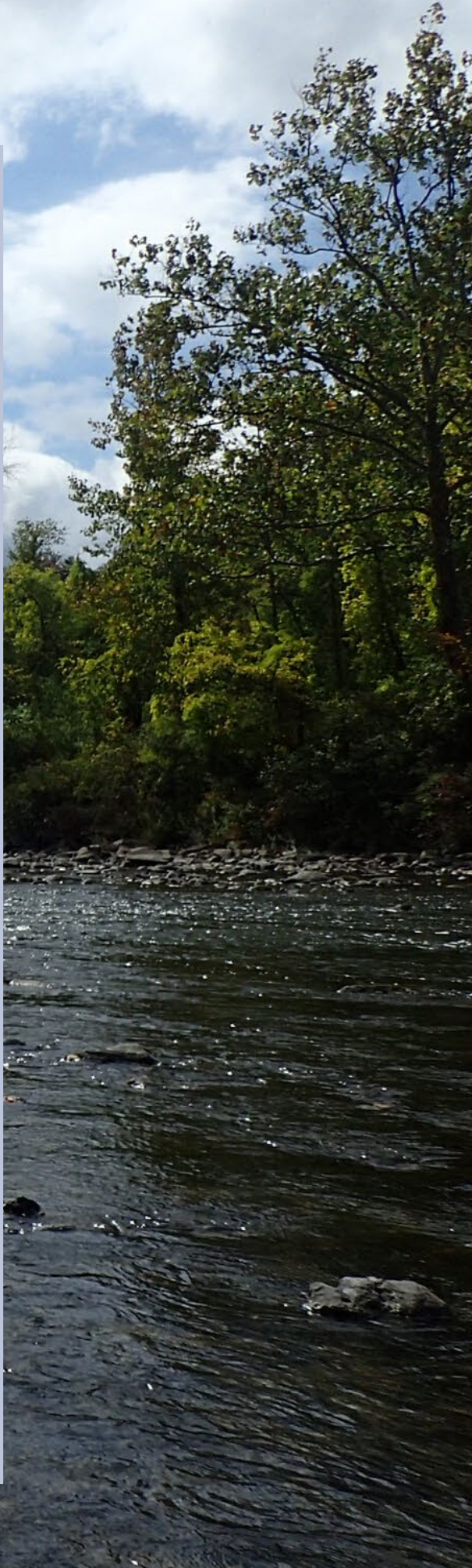
Data Availability

Hourly water temperature data collected by VSTeM volunteers are upload to the [Spatial Hydro-Ecological Decision System \(SHEDS\) Stream Temperature Database](#). The Stream Temperature Database allows users to view an interactive map of all past and current monitoring stations in Connecticut, explore graphs of stream temperature collected by volunteers, and download station information and the corresponding data.

If volunteers are able to successfully monitor a site from June through August, the data for that year are used to generate a water temperature classification (i.e., cold, cool, or warm) for the station. These classifications are available for download from the [Water Quality Portal](#). (Download 'Site data only' to view monitoring locations. Download 'Sampling Activity' to view results for each station.)

<https://portal.ct.gov/DEEP-VSTeM>





NWQMC Webinar Series *July 11, 2022*

Contact Information

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24

July 11, 2022

Learn More:

VSTeM Network - <https://portal.ct.gov/DEEP-VSTeM>

CT Lake Watch Program - <https://portal.ct.gov/DEEP-CTLakeWatch>

RBV Program - <https://portal.ct.gov/DEEP-RBVProgram>



Connecticut Department of Energy and Environmental Protection

