

# River Instream Flow Stewards

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## *Volunteer Manual*



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# Safety

## Logistics

Be sure to let someone know where you are going, when you will return, and what to do if you don't return on time. If possible, work in pairs.

## Traffic

Park your car off the road where it does not block traffic or create a hazard, but not on the sidewalk or private property.

## Weather

Listen to weather reports and be prepared. Do not sample in unsafe weather conditions or if it is unsafe to reach the sampling location. Be aware of high winds that could cause tree branches to fall or slippery banks that can be caused by even light rain or frost.

## Water safety

Volunteers should not need to enter the water to collect stage height data for RIFLS. If you cannot read the staff gage from the bank, use a pair of binoculars.

## First Aid

Keep a first aid kit in your car and be aware of potentially serious allergic reactions, such as those caused by bee stings or poison ivy. Check for ticks, which may carry Lyme Disease, after each field visit.

## Emergencies

Call 911 in the event of an emergency.

# Field Checklist

- ✓ Field notebook
- ✓ Pen or pencil
- ✓ Binoculars
- ✓ Cell phone/camera

## Definitions

**Discharge (Q):** The volume of fluid passing a point per unit time, commonly expressed as cubic feet per second. The product of the cross-sectional area of a stream (A) and the average water velocity (V).  $Q = V \cdot A$

**Rating curve:** A mathematical or graphical relationship between water depth and discharge.

**Staff gage:** A graduated stick permanently installed in a river to measure the relative depth of water at a single location.

**Stage:** Water depth at a specific location in the river.

**Stream flow:** Same meaning as "Discharge".

## What to Look For

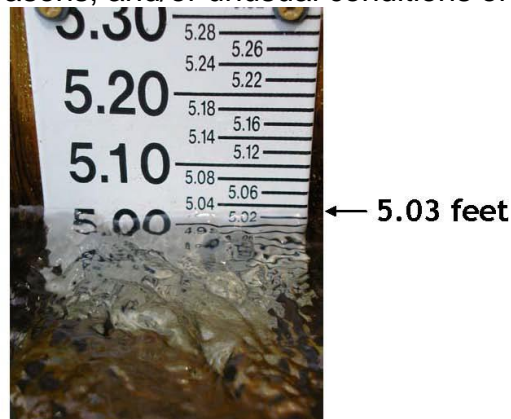
The rating curve is sensitive to changes in the shape of the river bed, pooling from downstream constrictions, and movement of the staff gage. If any of these changes occur, the rating curve will need to be recalibrated. Please contact Ryan O'Donnell at IRWA (978) 412-8200, [rodonnell@ipswichriver.org](mailto:rodonnell@ipswichriver.org)) if you notice any of the following changes at your site, or any other changes that might affect the rating curve:

- A beaver dam downstream that backs up water all the way to the staff gage;
- Newly fallen trees, large debris, or excessive vegetation growth near the staff gage;
- Extreme scour, erosion, or shifting sand bars near the gage;
- Movement or vandalism of the staff gage; or
- Excessive leaf buildup at the downstream riffle.

## How to Read a Staff Gage

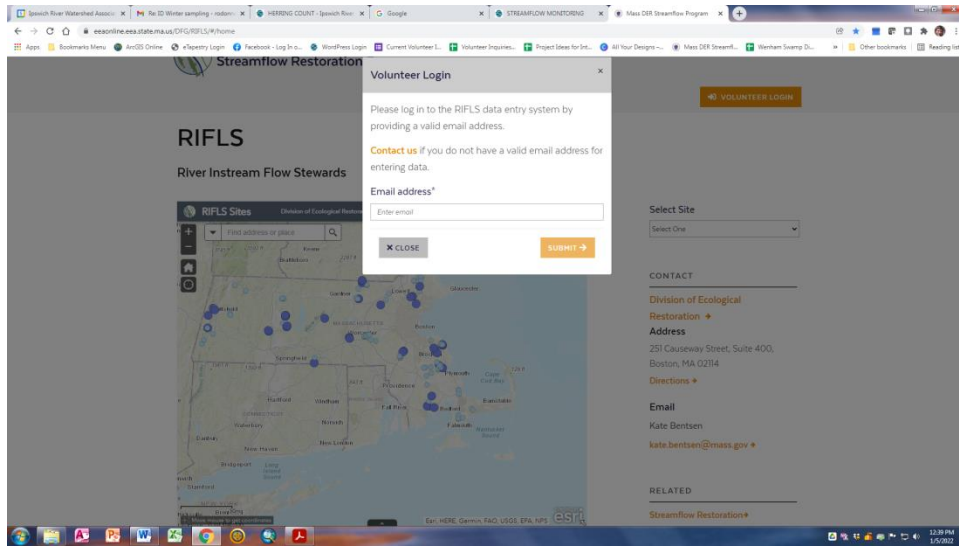
Binoculars are needed to read a staff gage. Our staff gages are marked in feet, tenths, and hundredths of feet (not inches!!). These are the norm for much of the hydrologic work in the United States. The gages are labeled every two hundredths of a foot, so you will have to estimate when the water level is between two marks. If the water level on the upstream side of the staffgage is higher than the water level on the downstream side, record the average. The gage may not be installed with the stream bed at 0.00 feet

- Record your observations in the same place every time (e.g., a field notebook)
- Note the date and time of your reading
- Note weather conditions or other relevant information.
  - Take a photo of the site from the same location at least 4 times per year to document different water levels, seasons, and/or unusual conditions or events.

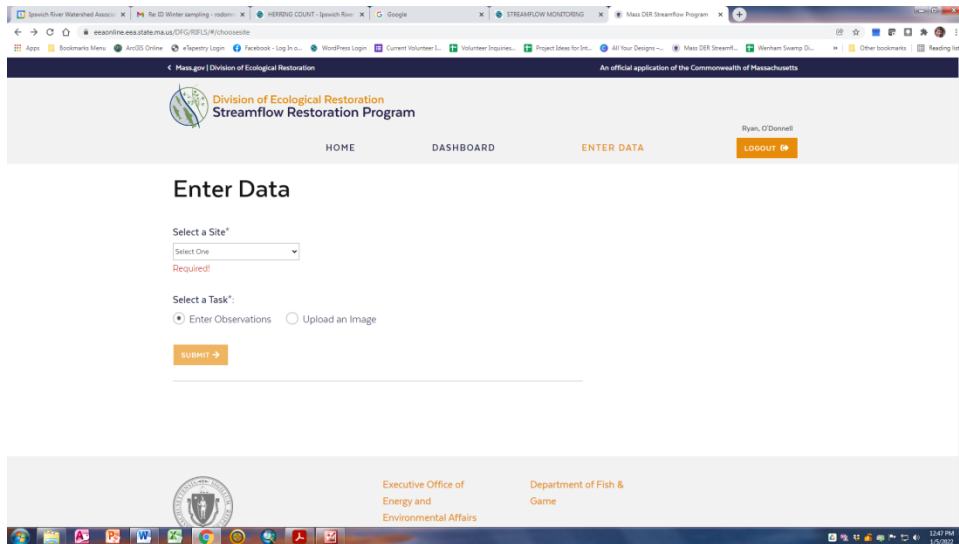


# How to Enter Data

1. Got to <https://eeaonline.eea.state.ma.us/DFG/RIFLS/#/home>; click the “Volunteer Login” link on the upper right. You must first have your email address registered by the Mass. Division of Ecological Restoration to be able to login. Contact Ryan at [rodonnell@ipswichriver.org](mailto:rodonnell@ipswichriver.org) or (978)412-8200 to request this.
2. On the next screen (see below), enter your e-mail address in the space provided and click “Submit.”



3. Select your site from the “Select a Site” drop-down box, select “Enter observations,” then click “Submit.”



4. Enter the date, time, and staff gage readings in the formats specified. In the “Comments” field, enter notes about changes at the site that may affect the rating curve, problems noticed, fish kills, rain events, water pollution, or any other field observations. If you have more data to enter, simply click the “Submit” button and return to the data entry form.

The screenshot shows a web browser window displaying the 'Streamflow Restoration Program' interface. The page title is 'Enter Data' for the 'Ipswich River: Haverhill Street' site. Below the title, there is a sub-header 'Enter your observation details and click SUBMIT. For an observation to be valid a date and depth must be entered. Comment is optional.' The form contains three main input fields: 'Date and Time' with a calendar icon, 'Depth/ft.' with a numeric input field, and 'Comments' with a large text area. Below these fields are buttons for 'DELETE ROW', 'ADD AN OBSERVATION ROW', 'PREVIOUS', 'CANCEL', and 'SUBMIT'. The browser's address bar shows the URL 'easonline.ees.state.ma.us/DFG/RP/LS/W/enterobservations/208'.

\*\*\*Please double check your data for typos before hitting This will save everyone a lot of time and headache down the road!

## How to Upload a Photo

1. Please take a photograph of the site from the same location at least once a week. Return to the site selection page, choose your site again, and then select “Upload an Image” and click “Submit.”
2. Select the date and time that the photograph was taken. The date can be easily entered by typing it in directly or clicking on the calendar icon next to the date field, then clicking on the correct date.
3. Select an image type from the dropdown.
4. Select an image file or drag and drop. Then enter a name for the photo in the “Image Name” field. Use the name of the river and a unique identifier (such as Ipswich\_River\_flood).

5. Enter a simple description of the photo you've chosen. These photos will be a visual documentation of habitat conditions under different stream flows. After you're finished.
6. Click "Submit." You can upload as many photos as you want, but only one at a time.

The screenshot shows a web browser window with the title "Ipswich River: Haverhill Street". The page contains a form for entering image details. At the top, it says "Enter your image details and click SUBMIT. For an image to be valid a date/time, an image file and a description must be entered." The form has the following fields:

- Date and Time\***: A text input field.
- Image Type\***: A dropdown menu with "Select One" as the current selection.
- Select an image file to upload or drag and drop below\***: A dashed box containing the text "Click to upload or drop an image here".
- Image Name**: A text input field.
- Description**: A larger text input field.

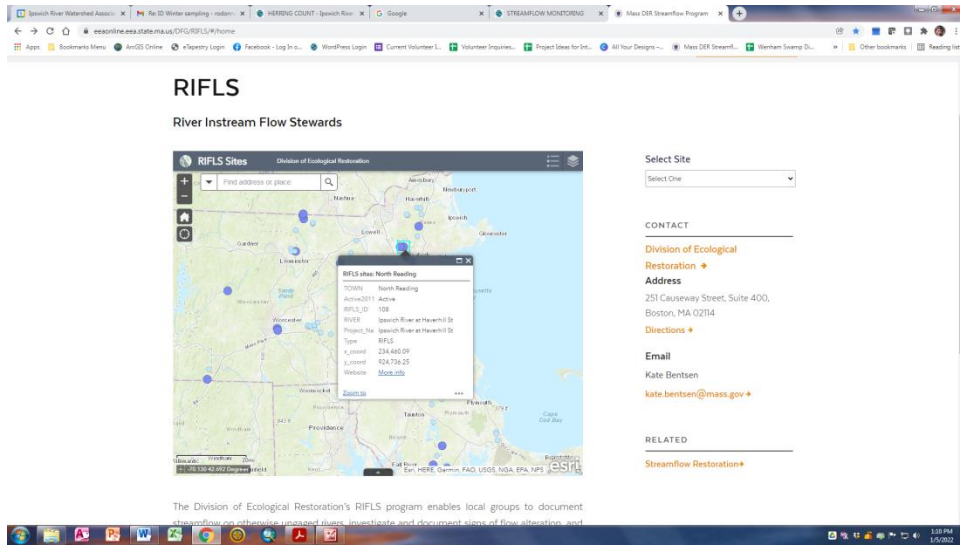
At the bottom of the form, there are three buttons: "PREVIOUS" (with a left arrow), "CANCEL", and "SUBMIT" (with a right arrow). The browser's address bar shows the URL "searchline.ees.state.ma.us/DFG/RIFLS/#/upload/images/108".

## Data Retrieval

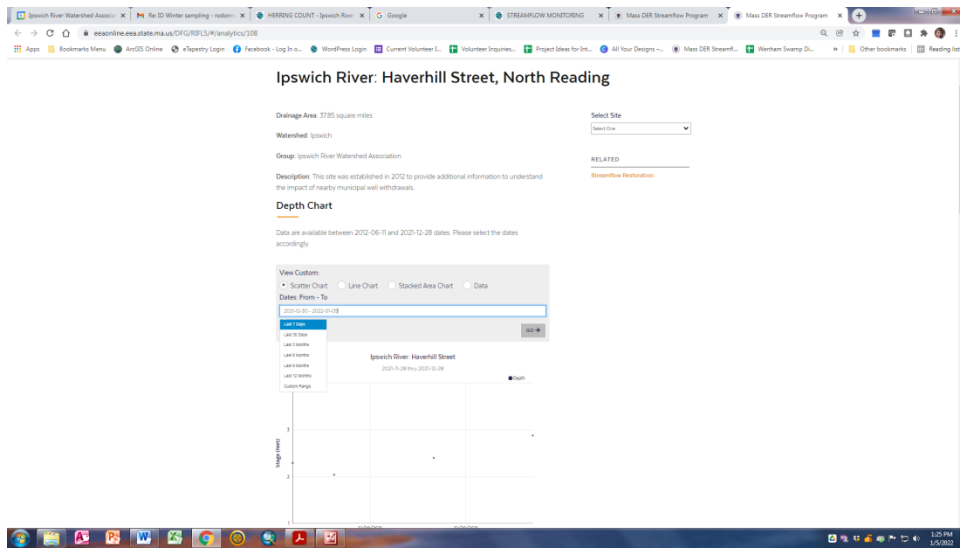
The staff gage data that you have recorded and entered into the Website is instantly available so that your observations and all past observations may be viewed.

Go to the RIFLS main page and zoom in on the map to the site you're interested in. Select the site you're interested in from the dropdown list on the right. Alternatively, clicking on the site in the map will reveal a pop-up box with site information and a link to more info. Click on this link to go to the site page.





This opens a new page which shows a graph of the most recent staff gage data. A drop-down menu at the top allows you to select a 1- 3-, 6-, 9-, or 12-month period to be displayed as a graph. A custom range can also be selected, then click “Go.”



Discharge (cfs) data is also displayed for sites where a rating curve has been established. As with depth charts, discharge charts can also be viewed in 1- 3- to 12-month periods or as a custom chart.

# What's a Rating Curve?

Rivers are unique and dynamic systems. Each stream bed has a different shape and depth of water. Unlike a pipe or concrete culvert where water depth and flow velocity is a straightforward calculation because of the uniform nature of these structures, the variability of a river and its shape must be taken into account when determining the volume of water flowing past a point in a given unit of time, known as discharge.

A single discharge measurement is the product of the cross-sectional area of a stream — captured by 15 - 30 width, depth, and velocity measurements in a line across the stream (Fig. 1) — and the average velocity measured at each point. Multiple measurements of discharge are made at different times and at different water levels throughout the year. These measurements, along with the staff gage readings, are used to create a rating curve (Fig. 2).

By describing the relationship between stream depth and discharge, a rating curve accounts for the natural variability of rivers. This curve can be used as a guide to convert your stream depth readings from a staff gage into discharge (flow) estimates.

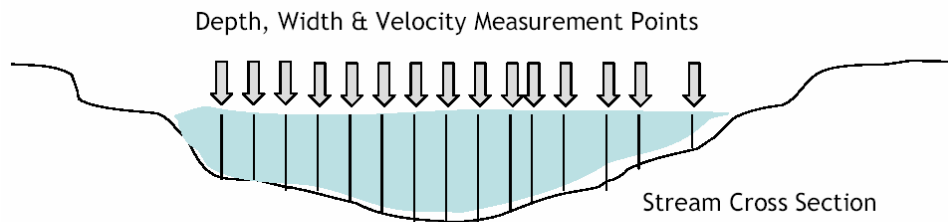


Fig. 1 Discharge Measurement

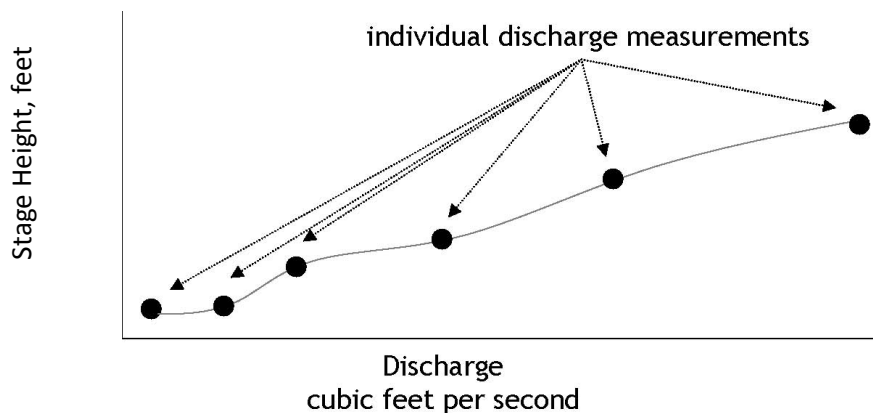


Fig. 2. Rating Curve

## Contact Information

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